

RATIONALIZATION OF THE PACIFIC COAST GROUND FISH LIMITED ENTRY TRAWL FISHERY

**FINAL ENVIRONMENTAL IMPACT STATEMENT
INCLUDING REGULATORY IMPACT REVIEW AND INITIAL REGULATORY
FLEXIBILITY ANALYSIS**

**PREPARED BY
THE PACIFIC FISHERY MANAGEMENT COUNCIL
7700 NE AMBASSADOR PLACE, SUITE 101
PORTLAND, OR 97220
503-820-2280
WWW.PCOUNCIL.ORG**

AND THE

**NATIONAL MARINE FISHERIES SERVICE
7600 SAND POINT WAY NE, BIN C15700
SEATTLE, WA 98115-0070
206-526-6150**

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EXECUTIVE SUMMARY

The Pacific Fishery Management Council (Council) proposes changes to its *Pacific Coast Groundfish Fishery Management Plan* (groundfish FMP) to rationalize Federal management of the Pacific Coast groundfish trawl fishery. This would be accomplished by implementing a limited access privilege (LAP) program and modifying the approach to controlling bycatch of Pacific halibut in the groundfish trawl fishery.¹ LAPs are a form of output control whereby an individual fisherman, community, or other entity is granted the privilege to catch a specified portion of the total allowable catch (TAC). The proposed action (termed “trawl rationalization”) is intended, among other things, to increase economic efficiency within the Pacific coast groundfish trawl fishery and reduce the incidental catch of overfished groundfish and possibly Pacific halibut (often referred to as bycatch and defined as fish that are not kept or sold and are discarded, usually at sea).² Implementing the action will involve both changes to the management framework in the FMP and promulgation of implementing regulations.

The Council is one of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore. The Council is responsible for Federal fisheries off of Washington, Oregon, and California.

ES.1 The Proposed Action and Why it is Needed

The proposed action is to create a management regime under which the owners of Pacific Coast groundfish fishery limited entry (LE) permits with trawl endorsements are more individually accountable for catch of target and nontarget species harvested by the vessels to which that their permits are registered. As originally framed, this action focused on the more general concept of dedicated

¹ Limited Access privilege is defined in MSA §3(26)(A). “The term limited access privilege means a Federal permit, issued as part of limited access system under section 303A to harvest a quantity of fish expressed by a unit or units representing a portion of the total allocable catch of the fishery that may be received or held for exclusive use by a person. . . .”

² Rationalization has a general connotation in economics and sociology as the practical application of knowledge to achieve a desired end. It is intended to increase efficiency or flexibility through the standardization of practices and workflow. In the context of the proposed action, the term is meant to encompass a variety of measures intended to improve the management of groundfish resources, in part by improving the economic efficiency of the fishery. Economic efficiency, in turn, is defined in various ways, but generally refers to a condition where no one can be made better off without making someone else worse off, outputs are maximized for a given level of inputs, and production is at its lowest cost.

access privileges (DAP), now more commonly referred to as LAPs. However, as the Council developed the range of alternatives, other methods to achieve the goals and objectives listed above were considered. The current range of alternatives includes individual fishing quotas (IFQs) and a framework for mandatory fishing vessel cooperatives as the primary catch control tools for selected sectors of the groundfish trawl fishery.³ Because of these changes, beginning in 2006, the developing program has been referred to with the more general term “trawl rationalization” to capture the social and economic objectives that are also expected to have substantial conservation benefits, for example by reducing bycatch.

Despite a program completed in 2003 to reduce fishing capacity through the buy back of groundfish LE permits and associated vessels, management of the west coast LE groundfish trawl fishery is still marked by biological, social, and economic concerns, similar to those cited in the U.S. Commission on Ocean Policy’s 2004 report (2004). The trawl fishery is currently viewed as economically unsustainable.

One major source of concern stems from the management of bycatch, particularly of overfished species.⁴ Over the past several years, the Council’s groundfish management efforts have focused on drafting rebuilding plans for overfished species, minimizing bycatch, and specific management of overfished species. The trawl rationalization program is expected to provide individual fishery participants more flexibility and more individual accountability for their impact on overfished species, other groundfish species, and possibly Pacific halibut.

The two approaches considered for rationalizing the fishery—harvest cooperatives or IFQs—although structurally different, are intended to fulfill the following goal:

Goal

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

Objectives

The above goal is supported by the following objectives:

1. Provide a mechanism for total catch accounting.
2. Provide for a viable, profitable, and efficient groundfish fishery.
3. Promote practices that reduce bycatch, discard mortality, and minimize ecological impacts.
4. Increase operational flexibility.
5. Minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical.
6. Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.
7. Provide quality product for the consumer.
8. Increase safety in the fishery.

³ In the multispecies groundfish fishery sectors are differentiated by target species, gear type, and management structure. The characteristics of these sectors are described in the next section.

⁴ Bycatch is defined in the MSA as “fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards.”

ES.2 The Groundfish Fishery

The groundfish fishery as a whole comprises several different sectors, defined by fishing gear, species targeted, and regulatory context. These sectors are discussed further below. The list of current trawl target species includes flatfish, roundfish, thornyheads, and a few species of rockfish. Primary flatfish target species include petrale sole and Dover sole. Roundfish target species include Pacific whiting, Pacific cod, and sablefish. Some rockfish species, especially Pacific ocean perch and widow rockfish, were important trawl targets until the mid 1990s. However, seven rockfish species are currently declared overfished pursuant to the MSA. The need to rebuild these stocks to a healthy size has led to a variety of harvest constraints on groundfish fisheries, and rockfish are generally no longer a target of these fisheries.

As noted above, the groundfish trawl fishery is subject to a Federal license limitation program (referred to as LE), implemented in 1992; currently there are 178 extant groundfish LE trawl permits. (Groundfish fixed-gear fisheries—using longline and pot gear—are managed under a complimentary LE program. Some targeting of groundfish is allowed without an LE permit; these vessels comprise the “open access” sector.) The LE trawl fishery is divided into two broad sectors: a multi-species trawl fishery, which most often uses bottom trawl gear (hereafter called the nonwhiting sector), and the whiting fishery, which uses midwater trawl gear. The nonwhiting trawl fishery is principally managed through two-month cumulative trip limit periods along with closed areas to limit overfished species bycatch.⁵ Nonwhiting trawlers target the range of species described above with the exception of Pacific whiting.⁶

The Pacific whiting fishery almost exclusively catches that species, using midwater trawl gear, although co-occurring overfished species are also caught. The whiting fishery is further subdivided into three components. The shore-based fishery delivers its catch to processing facilities on land, and the vessels are similar in size and configuration (with the exception of the type of net used) to the nonwhiting fishery. In the mothership sector, catcher vessels deliver to floating processors called motherships. The catcher-processor sector comprises vessels that both catch Pacific whiting and process it on board.

In terms of the types of trawl rationalization measures that would be applied, these four sectors—nonwhiting trawl, shoreside whiting, motherships, and catcher processors—are considered separately.

ES.3 Alternatives Considered by the Council

The Council considered four basic alternatives for implementing the trawl rationalization program. These are as follows:

- Alternative 1: Status quo management (no action alternative)
- Alternative 2: IFQs for all groundfish trawl sectors
- Alternative 3: IFQs for the nonwhiting sector and cooperatives for all whiting sectors
- Alternative 4: IFQs for a single shore-based sector and co-ops for the whiting at-sea sectors

As part of the impact analysis in this environmental impact statement (EIS), which supported Council decisionmaking, variations on some alternatives were developed to contrast key program features,

⁵ The nonwhiting fishery currently uses bottom trawl gear exclusively. In the past, however, fisheries have targeted widow rockfish and other rockfish species with midwater gear. Due to the need to limit catches of overfished species, these fisheries have been closed. Once overfished species stocks are rebuilt, these fisheries could reopen.

⁶ Nonwhiting vessels are allowed to land up to 20,000 pounds (lb) of whiting per trip, which could motivate some limited targeting of whiting by these vessels.

which are sub-alternatives denoted by a letter suffix. These are Alternatives 2a, 2b, and 2c and Alternatives 4a and 4b. Alternatives 1 and 3 do not contain sub-alternatives. Alternative 4b is the preferred alternative. With these variations included, six alternatives are evaluated in Chapter 4 of this EIS. The four basic alternatives are summarized below. Where sub-alternatives were developed, differences between them are noted in the description of the four basic alternatives.

The trawl rationalization program the Council developed is complex, with a large number of specific program elements. For example, in developing the IFQ component of the program, the Council considered 26 different program elements. A similar number of program elements were considered for whiting co-ops. Many of these elements do not vary across the alternatives. The analysis in Chapter 4 of this EIS analyzes the overall impact of alternative programs, while Appendix A and Appendix B evaluate the performance and effect of each program element.

ES.3.1 Alternative 1: Status Quo Management

Under this alternative, most of the elements of the current management regime for the groundfish LE trawl fishery would remain in place.

Every 2 years, the Council establishes harvest limits, called optimum yield (OY), for various species or groups of species.⁷ OYs represent an annual quantity of fish that the groundfish fishery as a whole may catch. A few species, such as Pacific whiting and sablefish, have fixed trawl allocations. The FMP defines other allocations between different gears, which, in addition to the whiting and nonwhiting trawl fisheries, include LE fixed-gear, the open access sector, and recreational fisheries in each state. Other allocations are determined through the biennial process to specify harvest limits (ABCs, OYs, and harvest guidelines) and management measures. The need to rebuild the seven currently overfished rockfish species means that the OYs for these species are relatively low compared to target species OYs. Due to the multi-species nature of the fishery, these low OYs affect all aspects of groundfish management. Principal management measures for nonwhiting trawl fisheries are as follows:

- Trip limit periods. Two-month cumulative trip limit periods are the primary catch control tool.
- Gear restrictions. Gear restrictions focus on discouraging or prohibiting gear that may be used in rocky habitat, where some overfished species occur. The use of bycatch-reducing trawl nets has also been required in some areas.
- Rockfish conservation areas. Closed areas were first implemented in 2003 to keep vessels away from depth ranges where overfished species are more abundant. These closed areas, called Rockfish Conservation Areas (RCAs) are a coastwide feature of management.
- Essential fish habitat (EFH) conservation areas. These are a set of closed areas to protect bottom habitat from the adverse effects of trawl gear.

Each sector of the Pacific whiting fishery receives an annual allocation, and the fishery is managed under a primary season structure where vessels harvest Pacific whiting until the sector allocation is reached, and the fishery is closed. This is different from the cumulative trip limits used to manage the nonwhiting trawl fisheries. Incidental catch of nonwhiting groundfish species in the Pacific whiting fishery, however, is managed under the trip limit structure. Season start dates for each whiting sector are set by regulation, and each sector's fishery proceeds until the whiting quota is reached or the fishery is closed.

⁷ Under new rules in the MSA, the method for determining these harvest limits may change, and they may be referred to as annual catch limits (ACLs) by the time the trawl rationalization program is implemented.

To allow the Pacific whiting industry to have the opportunity to harvest the full Pacific whiting OY, the nontribal commercial fishery is managed with whiting sector specific bycatch limits for certain overfished species. To date, bycatch limits have been established for darkblotched, canary, and widow rockfish. Regulations provide for the automatic closure of the commercial (nontribal) portion of the Pacific whiting fishery upon attainment of a bycatch limit. This is different from the nonwhiting trawl fishery where harvest availability of target species is often constrained by the projected catch of overfished species.

Incidental take of endangered or threatened salmon runs is another concern for the Pacific whiting fishery. Chinook is the salmon species most likely to be affected because of the spatial/temporal overlap between the Pacific whiting fishery and the distribution of Chinook salmon that could result in incidental take of listed salmon. The season start dates are, in part, meant to prohibit fishing when listed Chinook salmon are most likely to be taken incidentally. National Marine Fisheries Service (NMFS) also has the option of closing inshore areas to fishing if too many salmon are caught.

To improve bycatch accounting in the nonwhiting trawl fishery, NMFS implemented the West Coast Groundfish Observer Program (WCGOP) in 2002 for vessels that harvest catch and land the catch on shore. Currently less than 25 percent of nonwhiting trawl fishing trips is monitored by the WCGOP. The primary purpose of the observer coverage is to provide data that can be used to derive catch ratios of nontarget species. Using observer, fish ticket, and logbook data, the fishery is modeled to derive estimates of total catch by species. Due to the delayed availability of fish ticket and logbook data and the time needed to process observer data, the final analysis of estimated total catch by species typically is not finalized until well over 1 year after the fishing year has ended. The At-Sea Hake Observer Program (whiting mothership and catcher-processor sectors) is a seasonal program where the operational costs are shared by NMFS and the vessel owners. Observers are placed on all processing vessels.

ES.3.2 Alternative 2: IFQs for All Groundfish Trawl Sectors

Catch Control Tool

Under this alternative, all groundfish trawl sectors (both whiting and nonwhiting) would be managed with IFQs, which would replace the current two-month cumulative trip limit periods in the nonwhiting fishery and season/quota-based management in the whiting fishery as the primary catch control tool. Three sub-alternatives are evaluated under this alternative (Alternative 2a, 2b, and 2c) to compare and contrast certain key elements of the IFQ program.

Initial Allocation of IFQ and Qualification

At the start of the program quota shares (QSs) must be initially allocated to fishery participants based on catch/processing history during a catch history qualification period, 1994 to 2003. Thereafter, shareholders are free to buy and sell the QSs thus distributed.⁸ QSs represent a proportion, or percent, of the TAC (OY) of different groundfish stocks. Each year, these shares are converted from a percent to a quantity by issuing quota pounds (QPs) based on the OYs/ACLs established for the year. The amount of groundfish caught by an LE trawl vessel, even if it is subsequently discarded, must be matched by an

⁸ The Council considered issuing QSs for a fixed time period, after which all or a portion of the QSs would be periodically reallocated. Although a fixed duration is not part of this alternative, the MSA restricts the duration of a fishing privilege to 10 years, and specifies conditions for automatic renewal.

equivalent quantity of QPs.⁹ The QPs are expended in this way, with the matched amount deducted from the vessel's account. Both QSs and QPs are perfectly divisible and tradable.

QSs would be of long duration, so a transfer represents a long-term or permanent divestment. In contrast, QPs must be used within the year for which they are issued (although there is a provision for limited carry-over of unused QPs from one year to the next or QPs issued in the following year to be used in the current year), so QP transfer would not represent a permanent divestment of the harvest privilege, so long as one continues to control the underlying QSs. QS transfers would be prohibited in the first two years of the program so that transfers would only occur once participants fully understand how the program operates, and stable prices have been reached. QPs would still be fully transferable during the first two years.

Eligibility to own QSs/QPs would be defined very broadly; the main requirements are a U.S. citizen must be the owner, and a U.S. documented fishing vessel registered to a groundfish LE trawl permit must be used to harvest groundfish using QPs.¹⁰

Number of Sectors

Three sectors would be established whereby the two current whiting and nonwhiting shore-based sectors would be combined into a single sector. Participants in this single sector would be free to trade IFQ (QSs or QPs), eliminating any regulatory barrier between targeting whiting and nonwhiting (operational differences among participants may mean that a large degree of specialization in targeting could continue). The whiting mothership and catcher-processor sectors would each be managed separately with their own allocations of catch opportunity and IFQ. IFQ could not be traded among the three sectors.

Accumulation Limits and Grandfather Clause

The maximum number of QSs and QPs an entity may control would be limited, with these limits varying according to the management unit (stock or stock complex). QS limits restrict the amount an individual or entity may control through ownership or other means. QP limits refer to the maximum amount that may be assigned to any one vessel during a given year to cover catch. These vessel limits are twice the control limits to allow several QS holders to work together on a single vessel. These limits are intended to restrict the consolidation of quota holdings by just a few entities. Table ES-1 summarizes control and vessel limits under the alternatives. This alternative contains a grandfather clause under which initial recipients of QSs who exceed the accumulation limits would be allowed to possess excess QSs up to the amount initially allocated to them.

Initial Allocation of IFQ to Processors

Under Alternatives 2a and 2b, all of the initial allocation of QSs would go to LE permit holders (harvesters). Under Alternative 2c, shore-based processors would receive 25 percent of the initial allocation of nongroundfish species and 50 percent of the allocation of whiting QSs, and mothership

⁹ QSs/QPs would not be required to cover catch by LE permit holders in a few special circumstances: if they are fishing under an LE fixed-gear permit and using that gear type on their vessel, or if they are using trawl gear in a nongroundfish fishery, such as a shrimp trawl fishery (these nongroundfish trawl fisheries incidentally catch some groundfish).

¹⁰ Currently, LE permits include a length endorsement that defines the maximum size of vessel that may be registered to the permit. Permits may be combined to achieve a length endorsement for a larger vessel. The length endorsement would be suspended under the IFQ program.

processors would receive 50 percent of the initial allocation of whiting Qs based on their processing history during a qualification period. Catcher-processors both harvest and process fish. For the purposes of initial allocation, they would be considered harvesters.

Species Covered by IFQ

Qs/QPs would be issued for all of the current groundfish management units. Management units are fish stocks, or complexes comprising co-occurring or related stocks, for which an OY (annual catch limit [ACL]) is established. Table ES-2 shows the management units for which IFQ would be established.¹¹ Procedures would be established to reallocate Qs when management units are changed or new ones are added.

Alternative 2 also includes an individual bycatch quota (IBQ) for Pacific halibut. Although functionally equivalent to the IFQ system applied to other species, Pacific halibut are a prohibited species in the groundfish trawl fishery and cannot be retained. Therefore, although accounted for through the IBQ, all halibut must be discarded.

Adaptive Management

Under Alternative 2b each year up to 10 percent of the Qs that would otherwise be distributed to eligible recipients would be set aside for an adaptive management program (AMP). This program is meant to address a variety of objectives, ranging from socioeconomic dislocation resulting from implementation of the trawl rationalization program to encouraging innovative fishing methods, for example to reduce bycatch. The Council would decide how much QP would be set aside every two years for adaptive management use as part of the biennial harvest specifications process. The harvest specifications process establishes OYs/ACLs for a two-year period and adjusts management measures so that catches will not exceed these limits.

Area Management

Under Alternative 2, no separate Qs would be created for different latitudinal areas. Area-specific Qs is considered under other alternatives because this could prevent substantial geographic redistribution of Qs holdings and related impacts to communities. Some stocks are currently managed geographically with separate OYs established for each component; for those stocks, Qs/QPs would be denominated accordingly.

Carryover of Unused QPs between Consecutive Years

Under Alternative 2, unused QPs amounting to 10 percent of the used and unused QPs in the vessel account may be carried over for use in the next year. Similarly, to cover an overage (landings that exceed the amount of QPs held in a vessel account) QPs that may be allocated in the next year may be transferred to the current year, up to 10 percent of the used and unused QPs in the vessel account during the current year.

¹¹ Under Alternative 4b (the preferred alternative), IFQ would not be used as the catch control tool for selected management units, as noted in Table ES-1. Under Alternative 2, these management units would be managed with IFQ.

Tracking and Monitoring

All vessels would be required to carry at-sea observers to monitor sorting and discarding of the catch and shoreside landings. There would also have to be an electronic system to report bycatch and landings, which may be integrated with the current state fish ticket (landings reporting) system. Plant monitors would be employed to ensure that the electronic fish tickets are accurate. NMFS would also administer a system to track QS/QP holdings. Fees would be charged to cover the cost of the tracking system. A comprehensive mandatory monitoring program is expected to require minimal increases in enforcement effort.

Gear Conversion

Once QSs have been distributed, recipients would be free to use them with any legal groundfish gear, which, aside from trawl, principally means bottom longline and fish pots. There is a separate allocation of catch opportunity to nontrawl sectors, which would be unaffected by any catches resulting from gear conversion under the IFQ program.

Table ES-1. Control limits for QSs, co-op shares, or processing and QP vessel limits under the alternatives.

Alternative	Control Limits: QSs / Co-op Share / Processing					QP Vessel Limit / Co-op Usage Limit				
	NW	SSW	MS	MS(CV)	CP	NW	SSW	MS	MS(CV)	CP
Alternative 1	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A
Alternative 2	3%	12%		25%*	60%	6%	25%		50%*	75%
Alternative 3	1.5%	15% [†]	20%	10%	-	3%	-	-		-
Alternative 4a	2.2%	25%	30%	15%	-	4.4%	12%	-		-
Alternative 4b	2.7%	10%	45%	20%	-	3.2%	15%		30% [‡]	-

Notes:

NW: Nonwhiting sector; SSW: Shoreside whiting; MS: Whiting Mothership processors; MS(CV): Mothership catcher vessels; CP: catcher-processor whiting

CV: coefficient of variation

*Under Alternative 2 the mothership sector would be managed with IFQs, and there would be no distinction as to the type of entity that could hold QSs.

[†]Under Alternative 3, whiting sectors would be managed with co-ops; shoreside whiting control limit applies to vessels.

[‡]Catcher vessel usage limit.

ES.3.3 Alternative 3: IFQs for the Nonwhiting Sector and Cooperatives for all Whiting Sectors

Catch Control Tool

Under this alternative, the nonwhiting sector would be managed with IFQs in a program similar to that described under Alternative 2 (differences are summarized below), while the three whiting sectors would be managed with cooperatives. A separate co-op structure would be used for each of the whiting sectors.

Unlike Alternative 2, there would be four separately managed trawl sectors: shoreside nonwhiting, shoreside whiting, mothership whiting, and catcher-processor whiting.

Differences between the IFQ Program for the Nonwhiting Sector in Alternative 3 and the IFQ Program in Alternative 2

Initial Allocation: Under this alternative, the initial allocation of Qs would be based on both catch history during the qualification period and an equal allocation of the catch history associated with LE trawl permits that were bought back and retired in 2003 as part of a capacity reduction program. The buyback program is partly funded through a loan to remaining participants, which is being paid back through landing fees. Equal allocation of Qs associated with the buyback permits would result in a more even distribution of Qs among permit holders compared to allocation based on catch history alone.

Allocation of Overfished Species: Unlike Alternative 2 (where all species are allocated based on catch history) under this alternative, a different formula is used for overfished species. These species will still be under rebuilding programs after the projected implementation date of the trawl rationalization program (2011), requiring relatively small OYs. Thus, Qs/QPs for these species could act as a primary constraint on target fisheries to the degree that incidental catch is unavoidable. Furthermore, since regulations prompted a large proportion of overfished species catch to be discarded, landings toward the end of the allocation period (1994 to 2003) do not accurately reflect the actual distribution of historical catch among fishery participants. Therefore, a different formula would be applied to overfished species to allocate Qs. This formula takes into account the amount of target species Qs received by including a proportional component for overfished species Qs. It also factors in areas where fishing occurred, 2003 to 2006, by a vessel associated with an eligible permit in order to account for geographic variation in overfished species bycatch rates. This approach is intended to better balance individual holdings of target and overfished species Qs and take into account the areas where permit holders have fished in the recent past. Provisions may allow Qs to be reallocated once a species is rebuilt, recognizing that the annual OY/ACL could be increased substantially once the rebuilding restrictions are lifted. This formula would be applied to the landings history associated with current permits, which account for 57 percent of the landings history. As with nonoverfished species, landings history for overfished species associated with the buyback permits would be divided equally among the current permits.

Accumulation Limits and Grandfather Clause: Under Alternative 3, the nonwhiting sector would be subject to lower accumulation limits in comparison to Alternative 2 (see Table ES-1). Alternative 3 does not contain a grandfather clause; any potential initial allocation in excess of the accumulation limit would instead be redistributed to those permits below the limits.

Initial Allocation of IFQ to Processors: In Alternative 3, 25 percent of nonwhiting groundfish would be allocated to shoreside processors. This differs from Alternative 2c, because shoreside whiting is not included since that sector would be managed with co-ops. Small amounts of whiting, representing incidental catch by nonwhiting vessels, would be allocated as Qs to the nonwhiting sector permit holders.

Species Covered: Unlike Alternative 2, this alternative does not include a halibut IBQ. Pacific halibut bycatch would be subject to status quo management. Under status quo, the allocation to other fishery sectors in the west coast management area (International Pacific Halibut Commission [IPHC] Area 2A) is determined by reducing the area (TAC) by an amount equal an estimate of the previous year's groundfish trawl sector halibut bycatch. This is an approximate method for accounting for trawl bycatch; if the trawl bycatch in a given year exceeds the amount by which the area TAC was reduced, that is factored into the next stock assessment.

Adaptive Management Program: This alternative would include the AMP described above for Alternative 2b.

Area Management: Under this alternative, Qs/QPs for each management unit would be divided geographically so that area-specific QPs would be needed to cover catches in each area. Two zones would be established, one north and the other south of 40°10' N. latitude.

Carryover of Unused QP: This alternative would not contain the carry-over provision included under Alternative 2.

Cooperatives for the Shore-based and Mothership Pacific Whiting Sectors

Under Alternative 3, the shore-based and mothership whiting sectors would be managed separately but with a co-op structure that is very similar. For that reason, the co-op structure for both sectors is described here, but differences in the co-op rules for the two sectors are pointed out. The catcher-processor sector currently operates under a voluntary co-op. Under Alternative 3, this voluntary structure would continue with modest changes to the management system. The catcher-processor co-op included in this alternative is described in a separate, subsequent section.

The existing allocation of whiting between the shoreside whiting, mothership, and catcher-processor sectors would not change (42, 24, and 34 percent, respectively). No portion of one sector's whiting allocation could be transferred to another sector.

Although Pacific whiting comprises the dominant portion of the catch in this sector, some overfished rockfish do get caught. As discussed above, bycatch caps have been imposed on the whiting fishery. These sector caps would continue to be used under trawl rationalization. Under this alternative, there would be a single cap to cover catch in all three whiting sectors for each overfished species managed this way. These bycatch caps would be established for those overfished species likely to be caught in the whiting fishery: widow, canary, darkblotched rockfish, and Pacific ocean perch (a separate cap for the same species would be applied to the catcher-processor sector). In addition, the current ESA-listed Chinook salmon bycatch management measure, a triggered 100-fathom closure, and an ESA consultation threshold would continue in effect.¹² Status quo management (trip limits) would be used for other bycatch species. In addition, an amount would be deducted from allocations to the trawl sector for these species to account for the expected small amounts of bycatch. Caps on overfished species would be expected to indirectly limit bycatch of these other species.

Motherships and catcher-processors are already subject to full observer coverage, so few changes in the current monitoring program are needed under this alternative. Shore-based whiting vessels must land all their catch, allowing full dockside monitoring. Under this alternative, this full retention requirement would continue, possibly with additional monitoring to better detect at-sea discards.

New Permit Requirements

Mothership processor permit: Historically, any vessel with the proper groundfish LE permit could enter this sector as a processor. The Council adopted a stopgap measure to limit participation, which would be replaced by a new mothership permit under this alternative. Permit qualification would be based on whiting processing history.

¹² This threshold, based on the total amount of Chinook salmon caught or the Chinook bycatch rate, triggers a reinitiation of consultation under section 7 of the ESA. As part of the consultation process, new measures can be required to mitigate listed species take.

Shore-based processor permit: Similarly, a new shore-based processor permit would be created under this alternative. Only those processors possessing one of these permits could receive whiting during the first two years of the program. Thereafter, any shore-based processor could receive whiting.

Catcher vessel permit: New, separate LE permit endorsements would be created for catcher vessels participating in either the mothership or shoreside co-op sectors. Qualification for a permit would be based on past participation in the relevant whiting sector.

Co-op Formation and Allocation

Each year, catcher vessels would be able to choose to join a co-op or fish in a non-co-op fishery. If a vessel chooses to fish in a co-op, it would have to deliver all of its catch to the processor in its co-op (a mothership or shoreside facility). If a catcher vessel wishes to change its co-op membership, it would have to first fish for a year in the non-co-op fishery before joining the new co-op.

Each co-op that is formed would receive an allocation of the sector's overall whiting allocation, based on the combined catch history associated with each member's LE permit. Although the co-op allocation would be based on particular LE permits' catch history, vessels in the co-op would be able to arrange to have another vessel harvest all or a portion of their catch if they do not want to participate in the fishery.

The non-co-op fishery would receive an allocation based on the collective catch history of vessels that choose not to join a co-op, in a fashion similar to the co-op allocations. However, harvest would be further controlled in the non-co-op fishery through season restrictions. A vessel fishing in the non-co-op fishery would not be obligated to deliver to any one processor.

Control Limits

Shoreside and mothership co-ops would be subject to control limits similar to those described for the IFQ program. Shoreside whiting catcher vessel permit holders would be limited in terms of their control of co-op shares (recognizing that one entity could own multiple permits). In the mothership sector, the mothership processors and associated catcher vessels would be limited with respect to how much of the allocation they could process or control through co-op shares. Table ES-1 summarizes these limits.

Co-op Operation

Co-ops are expected to facilitate coordination and cooperation among members with respect to harvest strategy. Although co-op members would be guaranteed catch opportunity equal to the portion of the allocation they brought into the co-op through their catch history, the co-op allocation, in general, is pooled. Members could jointly agree on the specifics of harvesting.

Two or more co-ops could reach an inter-co-op agreement to coordinate harvest strategy and pool whiting and bycatch cap allocations. Various standards for both co-op and inter-co-op contractual agreements would be established, both to aid NMFS in its fishery management role and to prevent any member from being unduly disadvantaged by co-op participation.

Management of the Non Co-op Fishery

For the duration of any given year, a permitted catcher vessel could participate in the non-co-op fishery, but the structure of this sector is intended to encourage co-op participation. Non co-op fishery

participants would not have the surety of a buyer that a processor co-op obligation represents and could not easily coordinate fishing strategy in the way they are expected to in co-ops. In essence, it would be expected to function as an Olympic-style fishery with individual vessels competing against one another to catch the largest portion of the allocation.

Mothership and Catcher Vessel Quota Limits

As in the IFQ alternative, ownership limits would be imposed so that no single entity can accumulate too large a share of the overall sector allocation, based on the catcher vessel permits they own. Processors would be limited in terms of the share of the particular sector's allocation (mothership or shoreside) they could process.

Catcher-processor Sector Cooperatives

The catcher-processor sector currently operates under a single, voluntary co-op. A permit endorsement would be created to limit participation in the sector. Historically any vessel with the proper groundfish trawl LE permit could participate. The Council adopted a stopgap measure to limit participation, which would be replaced by the catcher-processor cooperative provisions of the trawl rationalization program. There is concern that new entrants could disrupt the current voluntary co-op. Provisions allow for implementing an IFQ program if the current voluntary co-op system were to fail. Few other changes are proposed for this sector under the alternatives.

Adaptive Management Program for Whiting Sectors

An AMP, similar in intent and structure of that described under Alternative 2 would be established for each of the whiting sectors such that only participants in a given sector would be eligible for the adaptive management amounts deducted from each sector's whiting allocation.

ES.3.4 Alternative 4: IFQs for a Single Shore-based Sector and Co-ops for the Whiting At-Sea Sectors (Preferred Alternative)

Two sub-alternatives, Alternative 4a and 4b, were considered in the analysis to compare and contrast certain program elements. The Council ultimately chose Alternative 4b as their preferred alternative. Differences between the two sub-alternatives are noted. All common elements are part of the preferred alternative.

Council decisionmaking on a preferred alternative occurred over several meetings from June 2008 to June 2009. At their June 2008 meeting, the Council identified a preliminary preferred alternative to garner public input. At their November 2008 meeting, they selected a preferred alternative. However, some details of the overall preferred alternative were not finalized at this meeting. At meetings in March, April, and June of 2009, the Council finalized these aspects of the overall trawl rationalization program. Final action, signifying adoption of a complete package containing all program elements, occurred at the June 11 to 18, 2009, meeting in Spokane, Washington. Subsequent concern by participants in the nonwhiting fishery about the allocation of Qs for canary rockfish led the Council to consider a change in the proposed AMP at their October 31 to November 5, 2009, meeting. Canary rockfish is an overfished species with very small harvest limits and is also difficult to completely avoid in the nonwhiting trawl fishery.

Catch Control Tool

Alternative 4 uses IFQs as the management tool for a combined whiting and nonwhiting shoreside sector and cooperatives for the two at-sea whiting sectors.

Differences between the IFQ Program for the Shoreside Sector in Alternative 4 and the IFQ Program in Alternative 2

Initial Allocation: In contrast to Alternative 2, where initial allocation is based on catch history alone, under this alternative, the initial allocation of Qs would be based on both catch history during the qualification period and an equal allocation of the catch history associated with buyback permits, as described under Alternative 3. Under Alternative 4a, equal sharing of buyback history would apply to the combined shoreside sector only; co-op shares for catcher vessels in the whiting mothership sector would be based on catch history alone. Under Alternative 4b (the preferred alternative) the equal sharing provision would apply to both the shoreside sector and the mothership sector.¹³ Since the catcher-processor sector would continue to operate as a single voluntary co-op, catch history assignment is unnecessary; the co-op has access to the full sector allocation.

Allocation of Overfished Species: Under Alternative 4, overfished species Qs would be distributed according to the area-based formula described above under Alternative 3. However, there are no equal sharing element based buyback permits except for canary rockfish under the preferred alternative (Alternative 4b), while in Alternatives 3 and 4a, IFQ based on buyback permit history is distributed equally for overfished species, as it is for nonoverfished species. This difference in the preferred alternative (Alternative 4b) resulted from a reconsideration adopted by the Council at their November 2009 meeting. Canary rockfish bycatch tends to be episodic and unpredictable and has occurred across a range of target strategies. The Council decided that an allocation formula for canary rockfish that included the equal sharing element (so that every permit gets at least some minimum level of canary rockfish IFQ) would lower the risk of some harvesters being forced out of the fishery because they did not possess, and could not obtain (due to expected high cost), the canary rockfish IFQ needed to cover their bycatch.

Accumulation Limits and Grandfather Clause: Table ES-1 compares accumulation limits (QS control/QP vessel) across the alternatives. Alternative 4a contains the grandfather clause allowing QS holdings in excess of accumulation limits based on initial allocation. Alternative 4b (the preferred alternative) does not contain the grandfather clause. Permit holders who would receive Qs in excess of the accumulation limits would have two years to divest their excess Qs to any willing receiver. This would occur in the third and fourth years of the program, since QS transfers are prohibited in the first two years of the program. Any Qs not divested at the end of the fourth year would be forfeited, and the excess Qs would be reallocated to other permit holders below the limit. Before divestiture, these quota holders are free to use the QPs derived from their excess Qs. This is meant to smooth the transition for those fishery participants with historically large catches.

Initial Allocation of IFQ to Processors: Under Alternative 4a, 50 percent of shoreside whiting would be allocated to processors based on processing history. Under Alternative 4b (the preferred alternative), 20 percent of shoreside whiting would be allocated to processors.

Species Covered: Alternative 4a does not include a halibut IBQ; Alternative 4b (the preferred alternative) does include a halibut IBQ. Alternative 4b would not use IFQs as the catch control tool for

¹³ Since the mothership sector would be managed with co-ops under Alternative 4, the equal sharing provision applies to the allocation of catcher vessel co-op shares.

selected management units. Table ES-2 shows management units that would have IFQs for which separate Qs/QPs would be established and those for which IFQ would not be issued under Alternative 4b. Species for which IFQ is not issued would continue to be managed with current tools, such as cumulative landing limits. Part of the trawl allocation for nonwhiting management unit species taken in the at-sea whiting sectors would be set aside to accommodate catches in those sectors; the remainder would be available for harvest in the shoreside sector.

Adaptive Management Program: Alternative 4a would implement an AMP for the combined shoreside sector reserving 10 percent of the Qs for all species (as in Alternative 2b). Alternative 4b would implement a program where only nonwhiting species Qs would be reserved. In addition, under Alternative 4b during the first two years of implementation of trawl rationalization the adaptive management QPs would be passed through to QS holders in proportion to their holdings. Allocations of other species QPs under the program would begin in the third year, based on further specification of AMP objectives and mechanisms.

Area Management: As in Alternative 2, there would be no area management provisions under Alternative 4b, except for existing area designations as shown in Table ES-2. Alternative 4a would have the same area designations described under Alternative 3.

Carryover of Unused QPs: As in Alternative 2, Alternative 4 contains the carry-over provision.

Table ES-2. Management units considered for IFQ under the alternatives. Overfished species shown in bold.

IFQ Management Units	Flatfish
Roundfish	
Lingcod	Dover sole
Pacific cod	English sole
Pacific whiting	Petrable sole
Sablefish north of 36° N. latitude	Arrowtooth flounder
Sablefish south of 36° N. latitude	Starry flounder
	Other Flatfish stock complex
Rockfish	Not Managed With IFQs (Alternative 4b only)
Pacific ocean perch	Shortbelly rockfish
Widow rockfish	Longspine Thornyhead S. of 34°27'
Canary rockfish	Black Rockfish - coastwide
Chilipepper rockfish	Minor Rockfish North Nearshore complex
Bocaccio	Minor Rockfish South Nearshore complex
Splitnose rockfish	California scorpionfish
Yellowtail rockfish	Cabezon (off CA only)
Shortspine thornyhead north of 34° 27' N. latitude	Kelp Greenling
Shortspine thornyhead south of 34° 27' N. latitude	Other Fish*
Longspine thornyhead north of 34° 27' N. latitude	
Cowcod	
Darkblotched	
Yelloweye	
Minor Rockfish North slope species complex	
Minor Rockfish North shelf species complex	
Minor Rockfish South slope species complex	
Minor Rockfish South shelf species complex	

*Starting in 2009, Longnose skate is managed under its own OY. Because during the time period used to determine initial allocation of QSS, it was managed under the Other Fish complex, however, this species would not be managed with IFQ.

Differences between the Proposed Mothership Sector Cooperative Structure under Alternative 3 and Alternative 4

The mothership cooperative structure proposed under Alternative 4 is identical in most respects to that proposed in Alternative 3, with a few key differences. There are also some important differences between Alternative 4a and 4b. These are summarized below.

Under Alternative 4a, catcher vessels would be obligated to deliver 50 percent of their catch to the processor to which they are tied (compared to all their catch under Alternative 3). They would be free to deliver the remaining 50 percent to any mothership processor willing to receive it. As in Alternative 3, to change their processor affiliation they would have to participate in the non-co-op fishery first. Under Alternative 4b, catcher vessels would declare which co-op they would join before the beginning of the fishing year. They would then be obligated to deliver their catch to the associated mothership processor for that fishing season. In any subsequent year, they could change their affiliation without first participating in the non-co-op fishery through the pre-season declaration. Provision for a non-co-op fishery would still be included in the program structure. Any vessel not wishing to affiliate with a co-op could participate in the non-co-op fishery and deliver to any willing mothership processor.

Control limits for the mothership sector differ among the alternatives as shown in Table ES-1. In addition, under Alternative 4b, mothership catcher vessels would be subject to a usage limit as well as to a control limit. The usage limit is a limit on the amount any one vessel can catch and deliver to a processor. Since co-op shares would be pooled, and the allocation of catch opportunity among vessels would be decided by co-op members, it would be impossible to track the accumulation of co-op shares on a vessel in the way that QP vessel limits work in the IFQ program. The usage limit is an alternative approach to achieve the same end.

Catcher-processor Sector Cooperatives

The catcher-processor co-op structure would be the same as described for Alternative 3.

Adaptive Management Program for At-Sea Whiting Sectors

There would be no AMP for the mothership and catcher-processor whiting sectors.

ES.4 Impacts of Trawl Rationalization under the Preferred Alternative (Alternative 4b)

Chapter 4 analyzes the effects of the alternatives. The analysis is organized around the stakeholder groups and environmental components that would likely be affected by the proposed action. These are catcher vessels in the groundfish LE trawl fishery, captain and crew on groundfish LE trawl vessels, commercial harvesters in fisheries other than the LE trawl fishery, shoreside and at-sea processors of groundfish, processing labor, suppliers, fishing communities, tribal harvesters, management agencies, groundfish resources, protected resources, and the California current ecosystem. Major impacts are briefly summarized below.

Limited Entry Trawl Groundfish Harvesters (see Section 4.6)

- Consolidation would shrink fleet size with only the most efficient vessels remaining, leading to a decrease in the cost of harvesting.
- Harvest of under-utilized target species would increase, leading to higher gross revenue per vessel and per-vessel profits.
- Due to co-op harvest privileges in the Pacific whiting sectors there would be less motivation to “race for fish,” allowing harvesters to time fishing operations in a manner that optimizes revenue and improves product quality.
- A variety of factors, including bycatch avoidance, ease in transferring harvest privileges, and the use of nontrawl gear, would likely lead to changes in the geographic distribution and timing of harvest.
- Increased profits and greater flexibility would improve safety conditions on board trawl vessels.
- Harvesters not receiving an initial allocation (or one of sufficient size) would have to buy the quota necessary to participate in the fishery, increasing costs.

Captain and Crew (see Section 4.7)

- Rationalization is expected to result in a decrease in the number of captain and crew jobs, while those who remain in these jobs are expected to receive higher wages.

Nontrawl Commercial Harvesters (see Section 4.8)

- Fleet consolidation may lead to the spillover of excess vessels into the pink shrimp, Dungeness crab, or other fisheries that are operationally similar.
- Bycatch of nontarget species, such as Pacific halibut, in the trawl could change. Bycatch most likely will decrease due to IBQs, providing a benefit, but could increase as currently under-utilized target species catch increases.
- Resource, grounds, and market competition could increase due to greater operational flexibility and gear switching opportunities in the trawl sector.

Shoreside Processors of Trawl Groundfish (see Section 4.9)

Trawl rationalization may result in a wide range of impacts to shoreside processors, distributed according to the geographic shift of fishing effort and subsequent consolidation of fishing and processing enterprises. Impacts may also occur based on the extent to which processing companies gain and control QSs. The effects can be summarized as follows:

- Increased cost for raw fish could occur when harvesters hold the QSs.
- Potential regional shifts in landings may or may not be under the control of processors.
- Increase in the processing of under-utilized target species could occur.
- Lower cost of production in nonwhiting sector could occur due to increased harvest and more utilization of processing capital. Increased compliance costs could occur if first receivers must pay for the cost of shoreside catch monitors to observe offloadings.
- Lower cost of production could occur in whiting sector because of increased season length
- Consolidation could occur among shoreside whiting processors, reducing total capital costs while changing asset values.

Mothership Processors of Trawl Groundfish (see Section 4.10)

- Processor declarations would likely give mothership entities some certainty over delivery volumes in the upcoming year, but little leverage in negotiations over prices or profit sharing.
- Linkages would likely give processing entities more certainty over deliveries from catcher vessels.
- The amount of mothership processing capacity in the fishery may decline due to an increase in season length and a decline in peak harvest volumes.
- The cost of processing whiting may decline because of increased season length and less processing capital necessary to handle the same harvest volume.
- Product recovery and quality may improve along with the opportunity to develop new products and markets.

Trawl Catcher-processors (see Section 4.11)

- Minor impacts would be expected relative to status quo; measures to protect the current voluntary co-op would be implemented.

Fishing Communities (see Section 4.14)

- Fishing communities would be differentially affected due to fleet and processor consolidation. Some communities would likely benefit and others would be harmed.

- Fleet and processor consolidation could result in the concentration of vessels and commercial infrastructure in fewer ports, disadvantaging communities that lose vessels and infrastructure.
- Limits on the amount of Qs an entity can control would reduce ownership consolidation and would increase the number and types of businesses involved in the fishery, contributing to diversity and stability.
- Isolated communities, where there are few alternative employment opportunities, could be adversely affected by the loss of fishing-related jobs.
- Processors would likely consolidate and possibly move, affecting processor labor and municipal revenue.
- Fishing, in all its diversity, is culturally important to coastal communities. As a consequence, communities experiencing a decline in fishing activity due to trawl rationalization would be adversely affected.
- Family fishing businesses would have to deal with the implications of the asset value associated with IFQs (or co-op shares). This can complicate fishery entry and exit, leading to intra-family strife.
- Tourism could be adversely affected in communities that lose a working waterfront to the degree it is important to the tourist identity of the community.
- Nontrawl communities could be affected by rationalization through increased competition, gear conflicts, impacts on the support sector, infrastructure impacts, and competition in the marketplace.

Treaty Tribe Harvesters (see Section 4.15)

- Groundfish trawl fleet consolidation could make vessels available for use in other fisheries, lowering capital costs, but potentially increasing resource competition in nongroundfish fisheries.
- Loss of port infrastructure due to harvester and processor consolidation could affect tribal harvesters disproportionately.
- Changes in the Pacific halibut bycatch rate in the rationalized trawl fishery could have adverse or beneficial effects for treaty tribe halibut harvesters.
- Increased flexibility due to rationalization could increase market competition.

Management Agencies (see Section 4.16)

- Additional staff resources at the Federal level would be needed for program startup and management.
- Additional enforcement personnel would be needed at the state and Federal level; this is estimated to be one new hire for each agency.
- Changes in data collection and data sharing arrangements would occur between state and Federal agencies.
- Management of the groundfish trawl fishery in-season would likely be reduced.

Groundfish and Other Fish Stocks (see Section 4.17)

- Changes in location of catch could lead to localized depletion if fishing is concentrated in certain areas.
- Target species catch would increase, but harvest levels intended to maintain or rebuild stocks to MSY are specified separately and are not affected by the proposed action.

- Fishery-dependent data, including catch accounting, would improve due to the increased observer coverage, decreasing one source of uncertainty in some stock assessments

Protected Species including ESA-listed Salmon (see Sections 4.18 and 4.19)

- Trawl rationalization may change the level and type of interactions between trawl vessels and marine mammals and seabirds, but the magnitude and direction of this change cannot be predicted
- Take of ESA-listed salmon in trawl fisheries may change, but the changes cannot be predicted

Habitat and Ecosystem (see Section 4.20)

- Changes in catch may result in changes to the California current ecosystem food web
- A reduction in the biomass of large demersal predators (e.g., lingcod) and an increase in their prey (miscellaneous nearshore fish and shallow small rockfish) would occur at high catch levels, according to ecosystem modeling
- Fishing in different areas and using different gear (e.g., switching to fixed-gear or modifying trawl gear) would change how much and what kind of essential fish habitat would be affected by fishing.

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CHAPTER 1 INTRODUCTION

1.1 How This Document is Organized

This document provides information and an evaluation of a proposed action and alternatives for managing the Pacific Coast groundfish trawl fishery. This fishery is managed under the *Pacific Coast Groundfish Fishery Management Plan* (groundfish FMP), developed by the Pacific Fishery Management Council (Council). This action is intended, among other things, to increase economic efficiency within the fishery (termed “rationalization”) and reduce bycatch (fish that are not kept or sold and are discarded, usually at sea). The proposed action also must be consistent of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore, and in particular the 10 National Standards for fishery conservation and management enumerated in §301 of the Act (see Chapter 6 in this document). Alternatives considered in this environmental impact statement (EIS) propose different mechanisms to achieve these objectives. Implementing the action will involve both changes to the management framework in the FMP and promulgation of implementing regulations. National Marine Fisheries Service (NMFS) reviews management proposals developed by the Council. If a proposal is approved, the FMP is amended to reflect the changes and NMFS implements any necessary regulations.

In addition to addressing MSA mandates, this document is a final environmental impact statement (FEIS), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. According to NEPA (Section 102(2)(C)), any “major Federal action significantly affecting the quality of the human environment” must be evaluated in an EIS. Based on a preliminary determination by Council and NMFS staff, implementing the proposed action referenced above could possibly have significant impacts. Therefore, rather than preparing an environmental assessment (EA), which provides “sufficient evidence and analysis for determining whether to prepare an environmental impact statement,” NMFS and the Council have decided to proceed directly to preparation of an EIS. This document is organized so that it contains the analyses required under NEPA, MSA, the Regulatory Flexibility Act (RFA), and Executive Order (EO) 12866. For brevity, this document is referred to as an EIS, although it contains required elements of an Initial Regulatory Flexibility Analysis (IRFA) pursuant to the RFA and a Regulatory Impact Review (RIR) pursuant to EO 12866.

Federal regulations (40 Code of Federal Regulations [CFR] 1502.9) require agencies to prepare and circulate a draft EIS (DEIS), which “must fulfill and satisfy to the fullest extent possible the requirements established for final statements in Section 102(2)(C) of the Act” (i.e., NEPA). Federal regulations (40 CFR 1506.10(c)) and agency guidelines (National Oceanic and Atmospheric Administration [NOAA] Administrative Order 216-6,

Section 5.01.b.1(i)) stipulate a minimum 45-day public comment period on the DEIS.¹ At the end of this period, a FEIS is prepared, responding to comments and revising the document accordingly. After the EIS is completed, a 30-day waiting period ensues before the responsible official may sign a record of decision (ROD) and implement the proposed action.

Environmental impact analyses have four essential components: a description of the purpose and need for the proposed action; a range of alternatives, including the proposed action, that represent different ways of accomplishing the purpose and need; a description of the human environment affected by the proposed action; and an evaluation of the predicted direct, indirect, and cumulative impacts of the proposed action and the alternatives.² The human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR 1508.14). These elements allow the decision maker to look at different approaches to accomplish a stated goal and to understand the likely consequences of each choice or alternative. In this EIS, Chapters 1 and 2 cover the purpose and need for the proposed action and describe the alternatives. Chapter 3 describes the components of the biological, physical, and human environments potentially affected by the proposed action. Chapter 4 evaluates the direct, indirect and cumulative effects of the proposed action and alternatives on the resources and stakeholder groups of concern. Chapter 4 is organized around environmental components whereby sections examine and describe the direct, indirect, and cumulative effects of each alternative on a particular resource or stakeholder group. The alternatives include the no action (status quo) alternative and the preferred alternative. These chapters describe both the status quo environment potentially affected by the proposed action and the predicted impacts of each of the alternatives. Subsequent chapters (and appendices) cover the following topics:

- Chapter 5 contains a review of other issues typically found in NEPA documents including short-term uses versus long-term productivity, irreversible resource commitments, and energy requirements and conservation potential of the alternatives.
- Chapter 6 examines the consistency of the proposed action with the trawl rationalization program goals, objectives, constraints, and guiding principles (listed in Section 1.2.3); the Groundfish FMP goals and objectives; and the national standards and other provisions of the MSA.
- Chapter 7 examines consistency with other Federal laws and EOs.
- Chapter 8 lists the individual preparers of this document.
- Chapter 9 presents a glossary of technical terms and a list of acronyms used in this document.
- Chapter 10 summarizes public comments submitted on the DEIS and responses to them.³
- Chapter 11 provides a list of the literature cited in this document.
- Appendix A contains a detailed analysis of the components, elements, and options that are part of the individual fishing quota (IFQ) alternative, one of the action alternatives described in Chapter 2.
- Appendix B contains a detailed analysis of the components, elements, and options that are part of the co-op alternative, one of the action alternatives described in Chapter 2.

¹ This required public comment period occurs after the Council has taken final action, as part of NMFS's review process. Preliminary drafts of the document were also made available for public review as part of the Council process: a partial draft document in advance of the June 2008 Council meeting and a substantially complete draft in advance of the November 2008 Council meeting.

² Federal regulations at 40 CFR 1502 detail the requirements for an EIS. Although there are several additional components, this list is of the core elements.

³ The original comment letters may be viewed on the Council's website.

- Appendix C contains descriptions of the models used in the impact analysis.
- Appendix D is the detailed description of the Council’s preferred alternative, which was adopted in November 2008 with additional program details finalized in June 2009.
- Appendix E contains supplemental analysis of impact of QS allocation on long-term distribution.
- Appendix F is an analysis of a fixed term, auction-based proposal for IFQ.
- Appendix G contains proposed amendments to the Groundfish FMP to implement the proposed action.
- Appendix H contains supplemental information and analysis required by the Regulatory Flexibility Act, which requires consideration of the impact of regulations on small businesses, and EO 12866, which requires and evaluation of the benefits and costs of regulatory proposals. Draft preliminary analyses were included with this FEIS to encourage early public comments on the expected economic effects of the alternatives proposed. As part of rulemaking, NMFS is preparing more comprehensive analyses. Appendix H contains analyses in support of the proposed rule published on May 27, 2010. Additional analyses will be prepared for subsequent rulemakings necessary to implement the trawl rationalization program.
- Appendix I lists the agencies, organizations, and persons to whom copies of this statement were sent.

1.2 Proposed Action and Purpose and Need

1.2.1 *The Proposed Action*

The proposed action is to create a management regime under which the owners of Pacific Coast groundfish fishery limited entry (LE) permits with trawl endorsements are more individually accountable for catch of target and nontarget species harvested by the vessels to which that their permits are registered. As originally framed, this action focused on the more general concept of dedicated access privileges (DAPs), now more commonly referred to as LAPs (described in Section 1.3). However, as the Council developed the range of alternatives, other methods to achieve the goals and objectives listed above were considered. The current range of alternatives includes establishing a framework for mandatory fishing vessel cooperatives (co-ops), which would not operate as an IFQ system. Because of these changes, beginning in 2006, the developing program has been referred to with the more general term “trawl rationalization” to capture the social and economic objectives that are expected to also have substantial conservation benefits, for example by reducing bycatch.⁴

1.2.2 *Need for Action (Problems for Resolution)*

Despite a program completed in 2003 to reduce fishing capacity through the buy back of groundfish LE permits and associated vessels, management of the west coast LE groundfish trawl fishery is still marked by biological, social, and economic concerns, similar to those cited in the U.S. Commission on Ocean

⁴ Rationalization has a general connotation in economics and sociology as the practical application of knowledge to achieve a desired end. It is intended to increase efficiency or flexibility through the standardization of practices and workflow. In the context of the proposed action, the term is meant to encompass a variety of measures intended to improve the management of groundfish resources, in part by increasing the economic efficiency of the fishery. Economic efficiency, in turn, is defined in various ways, but generally refers to a condition where no one can be made better off without making someone else worse off, outputs are maximized for a given level of inputs, and production is at its lowest cost.

Policy's 2004 report (2004). Many participants and observers view the trawl fishery as economically unsustainable under the current management regime.

One major source of concern stems from the management of bycatch, particularly of overfished species.⁵ Over the past several years, the Council's groundfish management efforts have focused on drafting rebuilding plans for overfished species, minimizing bycatch, and specific management of overfished species. The trawl rationalization program is expected to provide individual fishery participants more flexibility and more individual accountability for their impact on overfished species, other groundfish species, and possibly Pacific halibut.

Through the groundfish Strategic Plan and Amendment 18 to the Groundfish FMP, the Council has indicated its support for the use of IFQ programs to manage commercial groundfish fisheries.⁶ These programs will give individual fishery participants more flexibility and more individual accountability for the impact of overfished species catch on the groundfish fishery as a whole.

As highlighted in the following problem statement that the Council sent out for public review in a June 2004 scoping document, problems with capacity, economic inefficiency, and bycatch management are interconnected with problems related to the ability to achieve optimum yield (OY),⁷ the need for a precautionary management approach, the need for a flexible system that allows for variations and contingencies, long-term and short-term concerns for communities, and safety.

As a result of the legal requirement to minimize bycatch of overfished species, considerable harvest opportunity is being forgone in an economically stressed fishery. The west coast groundfish trawl fishery is a multi-species fishery in which fishermen exert varying and limited control of the mix of species in their catch. The OYs for many overfished species have been set at low levels, placing a major constraint on the industry's ability to fully harvest the available OYs of the more abundant target species that co-occur with the overfished species, wasting economic opportunity. Average discard rates for the fleet are applied to project bycatch of overfished species. These discard rates determine the degree to which managers must constrain the harvest of target species that co-occur with overfished species. These discard rates are developed over a long period of time and do not rapidly respond to changes in fishing behavior by individual vessels or for the fleet as a whole. Under this system, there is little direct incentive for individual vessels to do everything possible to avoid take of species for which there are conservation concerns, such as overfished species. In an economically stressed environment, uncertainties about average bycatch rates become highly controversial. As a consequence, members of fishing fleets tend to place pressure on managers to be less conservative in their estimates of bycatch. Given all of these factors, in the current system there are uncertainties about the accuracy of bycatch estimation, few incentives for the individual to reduce personal bycatch rates, and an associated loss of economic opportunity related to the harvest of target species.

⁵ Bycatch is defined in the MSA as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards."

⁶ Section 6.3.3 of the FMP, as amended, authorizes the Council to establish IFQ programs for any groundfish commercial fishery sector for the purposes of reducing fishing capacity, minimizing bycatch, and to meet other goals of the FMP. This part of the FMP will be amended to reflect implementation of the trawl rationalization program.

⁷ The MSA defines optimum yield as "the amount of fish which ... will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; [and] ... is prescribed as such on the bases of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor;..."

The current management regime is not responsive to the wide variety of fishing business strategies and operational concerns. For example, historically the Pacific Council has tried to maintain a year-round groundfish fishery. Such a pattern works well for some business strategies in the industry, but there has been substantial comment from fishermen who would prefer to be able to pursue a more seasonal groundfish fishing strategy. The current management system does not have the flexibility to accommodate these disparate interests. Nor does it have the sophistication, information, and ability to make timely responses necessary to react to changes in market, weather, and harvest conditions that occur during the fishing year. The ability to react to changing conditions is a key factor in conducting an efficient fishery in a manner that is safe for the participants.

Fishery stock depletion and economic deterioration of the fishery are concerns for fishing communities. Communities have a vital interest in the short-term and long-term economic viability of the industry, the income and employment opportunities it provides, and the safety of participants in the fishery.

In summary, management of the fishery is challenged with the competing goals of minimizing bycatch, taking advantage of the available allowable harvests of more abundant stocks, increasing management efficiency, and responding to community interest. “Taking advantage of the available allowable harvests” includes conducting safe and efficient harvest activities in a manner that optimizes net benefits over both the short and long term.

1.2.3 Purpose of the Proposed Action

In 2003, the Council established a Trawl Individual Quota Committee (TIQC), which was charged with assisting the Council in identifying the elements of a trawl individual quota program and scoping alternatives and potential impacts of those alternatives in support of the requirements of the MSA and NEPA. At its first meeting in October 2003, the TIQC drafted a set of goals and objectives, which another Council-established committee, the Independent Experts Panel (IEP), subsequently recommended modifying. The Council adopted this list in June 2005, but at their March 2007 meeting, the Council adopted a further revision of the goals and objectives. The participation of the TIQC, the IEP, and other entities in the scoping process is described below in Section 1.6. To pursue the goal thus developed and shown below, the Council considered alternatives that would rationalize the west coast trawl fishery and provide incentives to reduce bycatch, either through an IFQ program for all groundfish LE trawl sectors and/or through cooperatives for the fishery sectors targeting Pacific whiting. Under either alternative, allocations would be made to eligible fishery participants as a privilege to harvest a portion of fish, and not as a property right. Though structurally different, the Council’s intention is that both the IFQ and co-op alternatives fulfill the goal of the program.

The following goal objectives outline the purpose of the proposed action:

Goal

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

Objectives

The above goal is supported by the following objectives:

1. Provide a mechanism for total catch accounting.
2. Provide for a viable, profitable, and efficient groundfish fishery.
3. Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.
4. Increase operational flexibility.
5. Minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical.
6. Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.
7. Provide quality product for the consumer.
8. Increase safety in the fishery.

Constraints and Guiding Principles

The above goals and objectives should be achieved while the following occurs:

1. Take into account the biological structure of the stocks including, but not limited to, populations and genetics.
2. Take into account the need to ensure that the total OYs and allowable biological catch (ABC) are not exceeded.
3. Minimize negative impacts resulting from localized concentrations of fishing effort.
4. Account for total groundfish mortality.
5. Avoid provisions where the primary intent is a change in marketing power balance between harvesting and processing sectors.
6. Avoid excessive quota concentration.
7. Provide efficient and effective monitoring and enforcement.
8. Design a responsive mechanism for program review, evaluation, and modification.
9. Take into account the management and administrative costs of implementing and oversee the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and Federal resources available.

1.3 Background on Limited Access Privileges

1.3.1 *The Theory behind Tradable Permits*

Tradable permit arrangements have found wide application in dealing with common pool resources. Unlike private property, rights of access to and use of common pool resources are not unitary—controlled by a single person or entity. They are a kind of public good with particular characteristics; aside from the lack of unitary authority to control access and use they are subtractable—that is, the use of the resource by one person affects the ability of others to use it. Examples of common pool resources include the atmosphere (as a place to dispose of airborne pollutants traded off against its life-sustaining properties), water resources (again, both as a sink for pollutants and a resource for human use) and—relevant to the case at hand—fish. Common pool resources may be “open access” with no institutional arrangements to constrain access or use, government owned, or “common property” defined as a system under which access is limited and some type of institution facilitates decision making about resource use by the group that has exclusive access (Ostrom 1990).

U.S. fisheries traditionally have been managed under government trusteeship. Under the trust doctrine, the government sets rules about resource use for the benefit of its citizens who are the “owners” of the resource. Access may be unlimited (or practically so, if only limited to any citizen or resident), and government may establish rules over use in an effort to prevent over-exploitation. A variety of rules may be established to limit fishing activity, or effort—and, thus, indirectly, catch, such as time and area closures and limits on gear effectiveness. Alternatively, catch can be limited directly through quotas, bag limits, landing limits (trip limits), and the like.

Limiting catch directly or indirectly may address stock conservation concerns if catches can be constrained to or below maximum sustainable yield (MSY); even so, economic efficiency objectives are unlikely to be met. Furthermore, effectively matching catch with MSY can be very expensive in terms of government monitoring and enforcement costs. If participation cannot be limited, according to early fisheries economics theory (Gordon 1954; Shaefer 1957), people will enter the fishery until an equilibrium is reached where costs (including the opportunity cost of capital and labor⁸) match revenue. Even in a fishery with a few vessels, this phenomenon is expected: new vessels will continue to enter the fishery, even though average cost for each vessel increases, to the point where revenues no longer exceed costs. In an unconstrained fishery, and depending on costs, this usually occurs at a level of catch above MSY. Maximum economic yield, according to this model, occurs below MSY when revenue is highest in relation to costs. Fishery participants probably would like to maximize profit (the difference between costs and revenue), but they cannot do so if there is no means to exclude entry. Thus, while the individual may be satisfied with wages received, there is a cost in terms of lost profits for the fishery as whole.

Even if participation can be limited, profits may be dissipated as costs escalate, because of over-investment in vessels and equipment to beat out other fishermen in catching the available fish. This type of competition should not be confused with market competition, which serves to lower prices. In an unconstrained fishery, fewer fish will be caught at higher costs, resulting in higher prices in the raw fish market. Even in a constrained fishery, over-capitalization results in higher costs than would otherwise be necessary, potentially increasing prices.

Tradable permits ration access to a resource—the permit represents an exclusive right to use some increment of the resource (a ton of sulfur dioxide emitted into the air or a pound of fish brought aboard, for example) (Tietenberg 2002). In such a scheme, the first step is to set a limit on total resource use, TAC, which in the west coast groundfish context is the OY.⁹ This aggregate amount can then be subdivided and allocated in some fashion. In an IFQ scheme, this allocation typically represents a percentage share of the TAC, which can vary over time (OYs, for example, are set every two years based on an assessment of stock status and can go up or down). This share can then be converted into a quantity (pounds of fish) when applied against the externally determined TAC limit (or OY/ACL).

Tradability is an important feature in terms of economic efficiency and bycatch reduction objectives. It requires each fisherman to match the amount of fish caught to the permit amount. In a competitive market, shares will tend to accrue to the highest valued use. Individuals with higher operational costs, for example, may be better off selling their shares to a person who can use them at lower overall cost (operational cost plus the cost of share purchase). The seller benefits more from selling the shares than

⁸ In this context, opportunity cost represents the individual’s assessment that no other activity that he or she can pursue will pay a comparable wage. Opportunity cost can include nonmonetary benefits. For example, someone may choose to continue fishing at a lower wage because the work is more enjoyable than other kinds of work that might pay better.

⁹ Under new rules in the MSA, the method for determining these harvest limits may change, and OYs may be referred to as annual catch limits (ACLs) by the time the trawl rationalization program is implemented.

from using them and the buyer can still earn profit after absorbing the purchase cost.¹⁰ In this construct, the shares have been put to the most efficient use, because both the buyer and seller are better off. However, some social costs may be external to the tradable quota system. For example, consolidation of shares in fewer hands, resulting in a smaller fishing fleet, can affect fishing-dependent communities where the lost vessels were important income generators, contributed to community identity, supported infrastructure used by other fleets, or provided other benefits. For a tradable permit system to be effective, several preconditions must be met (Tietenberg 2002). A competitive market may be distorted if any one participant exercises too much market power. Transactions costs—the costs involved in exchanging permits (above the actual sales price) and in obtaining information about prices—cannot be too high. The system as a whole relies on effective monitoring and enforcement; “free riding” or “quota busting” occurs if a participant catches fish without possessing the corresponding QPs. When free riding occurs, resource conservation objectives are not met (affecting resource value, reflected in share prices) and, over time, confidence in the system may break down.

The initial allocation of Qs is often controversial. According to economic theory, the value of the resource will be maximized no matter how the shares are initially allocated (Montgomery 1972), whether freely distributed (based on past participation or by lottery) or auctioned off. The implication, according to Tietenberg (2002) is that “the resource manager can use initial allocation to solve other goals (such as political feasibility or ethical concerns) without sacrificing cost-effectiveness.”

By itself, an IFQ program may have few direct conservation benefits, but substantial indirect benefits. This may be illustrated by reference to some of the features of the preferred alternative. First, under the preferred alternative each harvester would be accountable for his or her total catch rather than just landings. Second, the fishery would be subject to 100 percent observer coverage, allowing accurate accounting of bycatch in addition to landings. The program may also increase efficiency and profits enough for industry to be able to bear these monitoring costs. These features are expected to reduce or eliminate regulatory bycatch substantially (discarding of fish because regulations discouraging targeting requires one to do so), which has been a big problem in the groundfish fishery as currently managed, resulting in lost value due to throwing away otherwise marketable fish. If not adequately accounted for, this bycatch contributes to excess mortality and misspecification of future OYs. In addition, IFQs can motivate fishermen to avoid stocks with low harvest limits (such as overfished species) because scarcity value drives up share prices for these stocks. At the same time, direct conservation benefits are probably limited. For example, OY (MSY as reduced by other biological and social factors) is set externally. If it is misspecified, the IFQs do nothing to correct the problem. Certain external costs—habitat impacts, for example—may be addressed through the use of IFQ allocations to provide incentive for use of low impact gears (as an example, see the adaptive management provisions described in Chapter 2). It could also be argued that an IFQ program, because of share value to yield, would stimulate a conservation ethic among fishermen, prompting them to minimize such external effects. For this to work, fishermen would have to see a clear correlation between their behavior and the effect on yield and be confident that all, or most, of the other fishermen behave in the same fashion. This potential benefit is discussed in the analysis.

An IFQ program may also reduce some government costs—there may be less need to constantly adjust regulations constraining the pace of fishing, for example—while increasing other administrative and monitoring costs (e.g., tracking the exchange of quota, observing total catch, requiring onboard observers).

¹⁰ Because of the distinction between QS and QP that represents a realized amount, a variety of other arrangements can be used, such as leasing or selling QP (while retaining the asset value of the QS). But the general principal still applies.

1.3.2 Cooperatives

Cooperatives differ from IFQs in that catch privileges are held jointly by members of the co-op. They can be classed as a kind of common property regime where government plays an instrumental role. Instead of QSs held by individuals, each co-op member receives an allocation that can only be accessed exclusively when it is pooled within the co-op. How fishing occurs within the cooperative (how much of the co-op's pooled allocation any one member may catch) is a matter of joint decisionmaking by co-op members (through side deals, contracts, and the like). In effect, tradability can occur within a co-op; such arrangements are usually not brokered by government.

In theory, cooperatives are less economically efficient than IFQs because the barriers imposed on tradability prevent the assignment of catch privileges to the highest valued use. On the other hand, cooperatives may facilitate fishermen's ability to pool both opportunity and risk. This is an important benefit in West coast groundfish fisheries where low OYs/ACLs for some overfished species are likely to impose constraints on target species fishing opportunity. Government-facilitated cooperatives are probably more attractive in the Pacific whiting fishery, because the catch composition and operational characteristics of the participants are more uniform in comparison to the nonwhiting trawl fishery sector.

In addition, rather than cumulative trip limits, the whiting fishery operates under a primary season structure where each whiting fishery sector (shore-based, mothership, and catcher-processor) receives an allocation, which when reached closes that fishery. In comparison to the trip limit regime more economic efficiency may be lost in a race for fish.¹¹ This means that cooperatives offer efficiency gains from status quo in comparison to—other things being equal—adoption of cooperatives in the nonwhiting trawl fishery.

1.3.3 Dedicated Access Privileges and Concerns about Conferring a Property Right

The U.S. Commission on Ocean Policy (2004) popularized the term “dedicated access privilege” without defining it except by example.¹² The term is meant, first, to underscore the diversity of arrangements that can be established to regulate access to fishery resources including IFQs, cooperatives, or community control. As important, the Commission emphasized that these arrangements do not confer any real interest in property, as represented by ownership of a QS, for example:

U.S. fishermen do not now and will never have inalienable rights to fish because the fisheries resources of the United States belong to all people of the United States. Under current law, fishermen are granted a privilege to fish, subject to certain conditions. Because this privilege can be taken away, it is not a right. (p. 289)

¹¹ This was partially addressed by Amendment 15 to the groundfish FMP, implemented in 2009 to reduce the incentives that result in a race for fish in the whiting sectors. Amendment 15 was intended to be an interim measure until the implementation of a trawl individual quota or co-op management program.

¹² A dedicated access privilege (DAP) fishery management program provides an individual fisherman, cooperative, or community with the exclusive privilege of harvesting a quantity of fish. In a DAP program, each recipient of a fishing privilege can use its share of the harvest quota at any time during the fishing season. The MSA currently authorizes only two forms of DAPs—individual fishing quota programs, and community quotas (specifically authorized in two geographic areas). Current DAP programs have resulted in increases in per-unit product value and decreases in total harvesting cost. They have also provided fishermen with greater control over when to fish, thus improving safety. This flexibility also allows them to improve profitability by harvesting fish when prices are most favorable. For more information, see http://www.nmfs.noaa.gov/docs/msa2005/daps_fs.pdf.

Section 303A of the reauthorized MSA, entitled “Limited Access Privilege Programs,” elaborates on this point by stating that such programs do not create a right, title, or interest in allocated fishing opportunity (e.g., QSs). Any such privilege may be revoked without compensation at any time.

1.4 Biological Context of West Coast Groundfish

The species covered by the Groundfish FMP include more than 90 species that live on or near the bottom of the eastern Pacific Ocean within 200 miles of the U.S. west coast. These include the following species groups:

- **Rockfish.** The FMP covers at least¹³ 64 different species of rockfish, including widow, yellowtail, canary, shortbelly, chilipepper, yelloweye, darkblotched, and vermilion rockfish; bocaccio; cowcod; thornyhead; and Pacific ocean perch.
- **Flatfish.** The FMP covers 12 species of flatfish, including various soles, starry flounder, turbot, and sanddab.
- **Roundfish.** The six species of roundfish included in the FMP are lingcod, cabezon, kelp greenling, Pacific cod, Pacific whiting (hake), and sablefish.
- **Sharks and skates.** The six species of sharks and skates in the FMP are leopard shark, soupfin shark, spiny dogfish, big skate, California skate, and longnose skate.
- **Other species.** These include ratfish, finescale codling, and Pacific rattail grenadier.

The list of current trawl target species includes flatfish, roundfish, thornyheads, and a few species of rockfish. Primary flatfish target species include petrale sole and Dover sole. Roundfish target species include Pacific whiting, Pacific cod, and sablefish. Some rockfish species, especially Pacific ocean perch and widow rockfish, were important trawl targets until the mid 1990s. Rockfish include four genera under the family Scorpaenidae. One genus, *Scorpaena*, forms only a small fishery off southern California. The thornyheads, genus *Sebastolobus*, are occasionally referred to as rockfish; however they are biologically quite different. The genus most commonly referred to as rockfish, *Sebastes*, is a very diverse group. Figure 1-1 shows the distribution of members of the genus *Sebastes* and other groundfish species by latitude and depth association.

¹³ Because the management unit includes all species in the family Scorpaenidae, and their systematics are still being resolved, there is a potential for new species to be added to the management unit.



Figure 1-1. Latitude and depth association of selected groundfish species.

West coast flatfish and roundfish stocks are relatively abundant, short-lived, and productive. Large initial catches of rockfish gave the impression that these stocks were also highly productive. However, increased scientific knowledge of the natural history and stock status of several rockfish species made it clear that most members of the genus *Sebastes* are not able to withstand the level of removals that occurred until the mid 1990s. There are several reasons for this:

1. Most rockfish are viviparous. Fertilization is internal, and the female retains the eggs until they hatch, giving birth to live young. This limits the number of eggs that are produced annually.
2. Rockfish have extreme longevity. Specimens of several rockfish species have been estimated at over 60 years of age, and some over 100 years.
3. Rockfish have long generation times. Many rockfish species require 10 or more years to reach sexual maturity.
4. Rockfish have low natural mortality. Rockfish are adapted to relatively slow natural population turnover, unlike species such as Pacific whiting, sablefish, and most flatfish.
5. Fecundity increases with age. Evidence shows that older female rockfish produce more young than younger ones.

6. Rockfish have infrequent recruitment success. Ocean conditions or other factors seem to create large variability in recruitment success.
7. Specific habitat requirements vary with life stage. Eggs, larvae, juvenile, and adult forms of many rockfish use different types of habitat over their lifecycle.
8. Rockfish have relatively low mobility of adults. Many rockfish tend to inhabit a particular site for much of their adult life, making them particularly susceptible to capture.

The traits of long life, slow growth, viviparity, and increasing fecundity with age may have evolved to deal with environmental variability. The ability of rockfish to live a long time and produce more young with age increases the odds that they will be able to “wait out” poor environmental conditions and produce enough young that a few offspring will likely survive. However, these characteristics also lead to a relatively low productivity for a given biomass and mean that most rockfish are unable to support large, sustained removals. Low productivity, coupled with a tendency to associate with other target species, increases management difficulty. This is especially problematic when the associated species differ markedly in life history traits such as generation time, fecundity, and natural mortality rate.

1.5 Groundfish Fisheries Context

The west coast groundfish fishery uses bottom trawl (large footrope, small foot rope, and selective flatfish), midwater trawl, trap, and hook-and-line gears, including recreational gear. The commercial fishery is prosecuted over a wide range of depths, from 20 fathoms (37 meters [m.]) for English sole and sanddabs to as deep as 700 fathoms (1,280 m.) for Dover sole, thornyheads, and sablefish. Fishing may occur on smooth mud/sand substrates, rocky reefs, pinnacles, and canyons. Recreational groundfish fisheries typically occur closer inshore than most commercial fisheries.

West coast groundfish range from semi-pelagic species like Pacific whiting, shortbelly rockfish, and widow rockfish to demersal species such as Dover sole, lingcod, and thornyheads. Most species primarily inhabit the continental shelf, but Dover sole, thornyheads, rex sole, petrale sole, and some others occur in greatest abundance on the continental slope. The close spatial relationship of certain species often results in large catches of a mix of species. This is particularly true in the case of bottom trawl catches. For example, vessels catching Dover sole also catch large amounts of other valuable species such as thornyheads, sablefish, and darkblotched rockfish. Several species of rockfish may be caught in a single trawl tow, and the species mix changes from north to south. Historically, widow rockfish, yellowtail rockfish, and canary rockfish were caught in the Vancouver and Columbia management areas, while bocaccio and chilipepper rockfish have been significant catch components in the Monterey and Conception areas (Figure 1-2). Currently, only a few rockfish species are trawl targets, including yellowtail rockfish in northern midwater fisheries and splitnose rockfish and associated species in the southern slope fishery.

To exercise some control over the mix of various species in their catches, fishermen can modify the depth and area of their fishing effort, as well as the manner in which gear is fished. However, it is often impossible to avoid catch of some nontarget species. The fishery’s multi-species nature is further complicated by seasonal changes in fish availability, weather, and market conditions (prices and poundage limits)—factors that may cause a trawler to fish on several species’ assemblages in a single fishing trip. Many gear types are used in the commercial groundfish fishery, including trawl nets, traps, and longlines. However, trawl nets (both bottom and midwater types) account for the major portion of the groundfish catch.

In the trawl fishery, some incidental catch of nontargeted groundfish is unavoidable, and for economic or regulatory reasons, some of the catch is discarded.

Figure 1-2. West Coast groundfish management areas and other key management lines.



1.6 Groundfish Management Context

The west coast groundfish trawl fishery is jointly managed by state and Federal authorities under the MSA, which was passed in 1976 to “Americanize” U.S. fisheries. In addition to establishing eight regional fishery management councils, the MSA extended U.S. fishery management authority in territorial waters from 12 miles out to 200 miles from the shore. This created the EEZ, which, including U.S. Federal territorial waters, extends from 3 to 200 miles off shore. For the west coast (California, Oregon, and Washington), the Council coordinates Federal management of fisheries in the Federal EEZ with state management of fisheries occurring in state waters (i.e., between the shoreline and 3 miles offshore).

The Secretary of Commerce approved the Groundfish FMP in 1982. The Groundfish FMP initially focused on species targeted by the midwater trawl fishery (widow rockfish and Pacific whiting). Over the following decade, several additional species were added to the list of actively managed species, with established OY catch amounts and, in some cases, allocations, harvest guidelines, or quotas. Under the MSA, catch by foreign fleets in the EEZ was eliminated by 1992. However, this decline was more than offset by expansion of the U.S. domestic fleet, which was encouraged by government subsidies.

In 1996, the Sustainable Fisheries Act amended and reauthorized the MSA. The MSA’s National Standard 1 requires that FMPs prevent overfishing while maintaining OY. OY is the harvest amount that will achieve MSY, as reduced by relevant economic, social, or ecological factors (MSA §3(33)). Under the Groundfish FMP, a stock is considered overfished if current stock biomass is less than 25 percent of the unfished biomass.

The Council manages the commercial fishery primarily with bimonthly cumulative trip limits set to prevent fishing mortality from exceeding OYs. During a two-month cumulative trip limit period under the cumulative trip limit system, each vessel may land fish up to weight limits established for each species, stock, stock complex, or other management unit for which an OY has been set. The two-month cumulative limits can change from one period to the next and may be adjusted in response to new information. The primary exceptions to the use of cumulative trip limits are the trawl whiting fishery, which is managed using quotas and season closures, and the fixed-gear sablefish fishery, which is managed using a restrictive individual quota program tied to the “stacking” of multiple permits and associated quota, on a single vessel (Section 3.8.1). Both the cumulative trip limits and the sablefish quotas are functionally limited access privilege programs (LAPPs) because individual vessels are provided an opportunity to catch specified amounts of fish. However, the cumulative limits only cover landings; the system does not provide individual accountability for bycatch, which can be a problem for constraining species, where the limit is set very low or retention is prohibited. In effect, bycatch is estimated (based on observer data) and limited indirectly through season and area closures, or gear restrictions. Fixed-gear sablefish quotas only apply to the one target species; incidental catch may be subject to cumulative limits and the same issue as described above applies to bycatch.

In multi-species fisheries such as this, it is practically impossible to optimize harvests—achieve MSY—for all stocks simultaneously. Optimally harvesting any one stock may result in either under-harvest or over-harvest of co-occurring stocks. While under-harvest is not a concern from a biological standpoint, it may have social and economic impacts in terms of forgone protein supply, revenues, and income.

Current under-harvest of target species is the indirect result of over-harvest, which led to the designation of seven groundfish species as overfished (bocaccio, canary rockfish, cowcod, darkblotched rockfish, Pacific ocean perch, widow rockfish and yelloweye rockfish). Bocaccio, lingcod, and Pacific ocean perch were declared overfished in 1999. Under the Groundfish FMP, when a species is declared overfished, mortality levels for that species must be reduced to allow the species to recover to a biomass capable of

supporting MSY. In response, the Council began implementing depth-based area closures in the summer of 2002. These measures were designed to exclude fishing effort from depth zones particularly inhabited by overfished species. In addition, to keep the groundfish fishery within the species-specific catch limits for overfished species (landings plus discard mortality), limits were imposed on the landings of healthy stocks to reduce the take of incidentally caught overfished species. The entire fishery is thus managed based on constraints imposed by a few species, even if those species are not targeted by any particular fishery. Constraints of this type led the Secretary of Commerce to declare the west coast groundfish fishery a Federal disaster in January 2000.

The current number of overfished species and their occurrence in different areas and habitats affect virtually all fisheries for healthy stocks. For this reason, overfished species are sometimes referred to as “constraining stocks.” Managing fisheries to prevent overfishing of these stocks requires forgoing substantial potential harvests.

The Council has been developing programs to reduce capacity in the groundfish fisheries since the mid-1980s, culminating with this proposal to consider IFQs and/or co-ops. Groundfish FMP Amendments 6, 8, 9, and 14 were drafted specifically to reduce capacity in groundfish fisheries. A vessel buyback program implemented in 2003 reduced the number of groundfish trawl vessels by one third. The adoption of rebuilding plans for overfished species (Amendment 16) led to the development of a vessel monitoring system (VMS), implemented in 2007, to ensure that proscribed fishing does not occur in closed areas—termed groundfish conservation areas (GCAs).

1.7 Council and Agency NEPA Scoping

Pursuant to NEPA, scoping is “an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action” (40 CFR 1501.7). The scoping process described in NEPA regulations emphasizes public involvement, prioritization of issues so that the impact analysis may focus on potentially significant impacts, and planning the impact analysis. The Council and the public process it conducts pursuant to the MSA provide an effective process for coordinating involvement of the public and interested state and Federal agencies in decisionmaking related to Federal fishery management. As such, the Council process serves as an effective scoping mechanism. All Council meetings and meetings of its various committees are open to the public, and this provides an opportunity for oral and written comment on issues brought before these bodies.

Development and refinement of the alternatives leading to the Council’s choice of a preferred alternative has taken more than five years, with numerous Council and committee meetings during the process. The Council initiated development of an IFQ program for groundfish trawl fisheries at its September 2003 meeting.¹⁴ The Council Chair then appointed members to the Ad Hoc TIQC from a broad range of constituencies. The TIQC was an important part of the scoping process, making recommendations on the development of the trawl rationalization program. Several other ad hoc committees have been formed to support the process of considering individual quotas; an existing standing committee, the Groundfish Allocation Committee (GAC), has also become involved in developing and refining the alternatives and options considered by the Council. Table 1-1 lists these committees with a brief description of their functions. Rosters for standing and ad hoc committees may be accessed on the Council’s website at <http://www.pcouncil.org/operations/rosters.html>. Table 1-2 lists the meetings that have been held by the committees as well as Council meetings at which trawl rationalization or intersector allocation (which, as described above, is a separate but closely related action) has been discussed, with a brief description of the topics covered in each meeting.

¹⁴ IFQs were an alternative under the 1991 Amendment 6 groundfish license limitation program, and they have been raised in Council discussions about management alternatives before and since that time.

Two standing committees, the Groundfish Management Team (GMT) and the Groundfish Advisory Subpanel (GAP), play an ongoing role in all aspects of groundfish management. The GMT is composed of representatives from NMFS and state fishery management agencies, while the GAP draws its representation from groundfish fishery sectors, gear groups, and other stakeholders. These two committees meet at every Council meeting where groundfish issues are on the agenda, and the GMT also holds three or four additional week-long meetings every year. Although initially not directly involved in development of the trawl rationalization program, these two committees' roles grew by commenting and providing recommendations as program alternatives were developed. Because their activities are not confined to the trawl rationalization program and the frequency of their meetings, these two committees' activities are not listed in Table 1-2.

Examination of Table 1-2 shows that the process of program development (formulating and evaluating alternatives, culminating in Council action to choose a preferred alternative) has moved forward in several stages. In late 2003, once the Council had committed to program development, and through 2004, various committees began initial work on program development. Publication of a notice of intent (NOI) to prepare an EIS on May 24, 2004, (69 Federal Register [FR] 29482) initiated an extensive public scoping effort, including a deadline for submitting comments by August 2, 2004. Input on the range of alternatives and potential impacts of the proposed action were solicited during this scoping period. Comments received during this NEPA public scoping period are summarized in a separate document (PFMC 2004b). Although the notice established a public comment deadline, scoping has effectively continued through the Council process because, as noted above, all meetings of the Council and its committees are open to the public and opportunities for the broader public to comment are provided at each meeting.

A funding shortfall at the end of 2004 prevented much work being done until funding was secured in the summer of 2005. At that time a consulting firm (Northern Economics, Inc.) was hired to begin EIS development. This process was broken up into two stages. During the first stage a detailed outline and analytical framework were to be developed; subsequent production of the EIS is a second stage. The consultants organized a workshop in April 2006 to bring together the various Council committees and members of the public to seek further input on program development and the structure of the alternatives. The completed Stage 1 document (NEI 2006) was presented to the Council in September 2006 (this EIS document is considered the Stage 2 document). In the latter part of 2006, the TIQC and GAC developed recommendations for a major restructuring of the alternatives to simplify them, including dropping some elements (such as an alternative involving permit stacking) in order to narrow the scope of the action. It was during this period that the Council added the whiting sector cooperatives alternative.¹⁵ Because of this broadening of the range of alternatives, what had been referred to as the trawl individual quota program was henceforth called the trawl rationalization program. These restructured alternatives were adopted by the Council in March 2007, further refined by the committees, and adopted in detailed form for analysis by the Council in November 2007. These are the alternatives evaluated in this EIS.¹⁶

¹⁵ The alternative principally deals with the at-sea and shorebased whiting fishery subsectors. The third whiting subsector, catcher-processors, operates under an independently formed co-op.

¹⁶ In the process of developing the alternatives, the Council focused on many detailed aspects of the IFQ and co-op programs, working from an outline organization of program features, which is reflected in the structure of Appendices A (IFQ program components analysis), B (co-op program components analysis), and D (description of the Council preferred alternative). The alternatives adopted in 2007 were organized in this format. Generally, Council decisionmaking proceeded along the lines of considering no action, IFQs for all the trawl sectors, and a combination of IFQs for the nonwhiting trawl sector and co-ops for the whiting sectors, with variations in many specific program components. Preliminary drafts of the environmental analysis produced in 2008 presented "analytical scenarios" in Chapter 4 that allowed programmatic comparison of these various features, consistent with the general Council approach of considering IFQs and co-ops for different trawl

Council and NMFS staff used the Stage 1 document as the basis for developing the EIS, along with some modifications to the proposed structure of the document and analytical approach and incorporating the major modifications to the alternatives subsequently made.

The Council chose a preliminary preferred alternative for trawl sector rationalization in June 2008. Council decisionmaking on the trawl rationalization program culminated in November 2008 when it took final action by choosing a preferred alternative. However, several issues relating to the detailed specification of the preferred alternative still had to be resolved. These issues were addressed in the first half of 2009, with the Council taking final action on these program details at its March, April, and June 2009 meetings. A 45-day public comment period on the DEIS commenced on December 4, 2009, as required by the Council on Environmental Quality (CEQ) regulations. This FEIS responds to comments received (see Chapter 10).¹⁷ The responsible official within NMFS (the Assistant Administrator) may sign a ROD no less than 30 days after publication of the FEIS, which clears the way for program implementation (recognizing that various other statutory requirements must be simultaneously met). Although this NEPA process is expected to be completed in 2010, the earliest projected date for program implementation—in terms of when fishing would begin under a rationalization program involving IFQs and/or cooperatives—is January 1, 2011. Program infrastructure (e.g., IFQ monitoring systems) is under development during 2010.

1.8 Relationship to Other NEPA Documents

The EIS is a stand-alone NEPA document that does not tier off any previous EISs. A NEPA environmental review was prepared for the Groundfish FMP, which was implemented in 1982. NEPA environmental reviews have been prepared for each of the subsequent amendments to the FMP. These documents are incorporated into the EIS as necessary to fully explain the No Action (status quo) Alternative and to analyze the cumulative effects of the alternatives on the human environment.

This EIS incorporates information from other EISs produced by NMFS and the Council by reference, where applicable. EISs prepared to evaluate harvest limits and management measures for the last two biennial management cycles (2005-06 and 2007-08) (PFMC 2004a; PFMC 2006) provide detailed discussion of the Federal, state, and tribal roles and responsibilities in groundfish management; fishery ecosystem and marine biodiversity in relation to groundfish management; groundfish essential fish habitat (EFH), including adverse impacts of fishing and nonfishing related activities; life history characteristics, distribution, and stock status of groundfish species and nongroundfish species; life history, population biology, and foraging ecology of protected species, including ESA-listed salmon, marine mammals, seabirds and sea turtles; and the socioeconomic environment, which includes commercial, tribal and recreational fisheries, coastal communities, and nonconsumptive and nonmarket benefits. The *Pacific Coast Groundfish Fishery Management Plan Essential Fish Habitat Designation and Minimization of Adverse Impacts Final Environmental Impact Statement* (EFH EIS) prepared by NMFS (NMFS 2005) provides habitat information and analysis of the effects of the groundfish fishery on habitat. Additionally, *The Pacific Coast Groundfish Fishery Management Plan Bycatch Mitigation Program Final Environmental Impact Statement* (Bycatch EIS) prepared by NMFS (NMFS 2004c) provides a guide for developing issues for a rights-based program of IFQs.

sectors. In completing the DEIS, it was decided that presenting the analytical scenarios as alternatives in Chapter 2 would improve reader comprehension and better reflect the decisions made by the Council.

¹⁷ Section 302(f) of the MSA Reauthorization Act of 2006 (P.L. 109-479) requires the Council to submit a proposal for the rationalization program to Congress within 24 months of the Act's passage, or January 12, 2007. Although a DEIS was not released for public comment by that date, a description of the Council's preferred alternative adopted in November 2008 and a preliminary version of the DEIS were submitted to Congress to satisfy this requirement.

The Council took action parallel to trawl rationalization to allocate harvest opportunity for selected species between the groundfish trawl sector and other groundfish fishery sectors (Amendment 21 to the Groundfish FMP). These allocations support trawl rationalization since a quantity of fish, by species or management unit, must be identified for assignment through the IFQ or co-op systems. A separate EIS has been prepared for this action.

Table 1-1. Description of committees involved in trawl rationalization program development.

Committee Name	Composition and Function
Groundfish Allocation Committee (GAC)	Six voting members are drawn from the Council; seven nonvoting members drawn from stakeholders. Provides high level policy guidance and refinement of alternatives for consideration by the full Council.
Ad Hoc Groundfish TIQ Committee (TIQC)	Seventeen members drawn from stakeholders; principally fishing and processing interests. Involved in the initial development of program features; provides stakeholder perspective on program development.
Ad Hoc TIQ Analytical Team	Council and agency staff and consultants conducting NEPA analysis. This group held several public meetings early in the process to discuss how the impact analysis would be done. Composition subsequently changed to include mainly agency and Council staff with most work occurring internally.
Ad Hoc TIQ Enforcement Group	Drawn from the standing Enforcement Consultants committee to review and advise on practicality of program features in terms of enforceability.
Ad Hoc Trawl Rationalization Tracking and Monitoring Committee	Management and enforcement agency staff at the state and Federal level; charged with developing program options for monitoring and enforcement.
Ad Hoc TIQ Independent Experts Panel	Five academic experts with expertise in fishery science, economics. Provides external review of program features.

Table 1-2. Committee and Council meetings related to trawl rationalization program development.

Date	Committee	Subject
September 11, 2003	Council meeting, Agenda Item C.10 ^a	Initiated development of a TIQ program, which later became the trawl rationalization program.
October 28-29, 2003	Ad Hoc TIQC	Began development of alternatives for an individual quota program to cover LE trawl landings in the west coast groundfish fishery. Established committee charge, decision rules, and purpose, need, and objectives for an individual quota program.
November 6, 2003	Council meeting, Agenda Item D.12	Provided guidance based on Ad Hoc TIQC report and considered establishing a new control date.
March 18-19, 2004	Ad Hoc TIQC	Continued development of alternatives.
March 24-25, 2004	GAC ^b	Discussed allocations necessary to support trawl sector IFQs.
April 9, 2004	Council meeting, Agenda Item C.16	Provided further guidance on program development and discussed issue of latent permits.
May 25-26, 2004	Ad Hoc Groundfish TIQ Enforcement Group	Conducted preliminary scoping on types of enforcement programs that would be necessary for a groundfish trawl IFQ program, information needs, and landings tracking and monitoring systems.
June 8-9, 2004	Ad Hoc TIQ Analytical Team Ad Hoc Groundfish TIQ Independent Experts Panel	Conducted preliminary scoping on the types of impacts to be considered and analytical methods used in a groundfish trawl DAP EIS. Related data collection issues also discussed.
June 17, 2004	Council meeting, Agenda Item C.9	Heard committee reports, discussed need for programmatic EIS, and approved scoping information document for public distribution.
July 1-2, 2004	Ad Hoc TIQ Analytical Team	Continued work from previous meeting.
September 7-8, 2004	Ad Hoc TIQ Analytical Team	Reviewed results from public scoping plan and progress on analytical tasks; discussed organization and assignments for EIS.
September 17, 2004	Council meeting, Agenda Item C.11	Heard progress report and results of public scoping, provided guidance on committee work and composition, and intersector allocation.
September 22-23, 2004	Ad Hoc Groundfish TIQ Independent Experts Panel	Reviewed scoping information document and comments received during recently completed NEPA public scoping period to determine whether there were significant options and impacts not yet identified that, in the Experts Panel's view, should be considered by the Council.
September 28, 2004	Ad Hoc Groundfish TIQ Enforcement Group	Reviewed enforcement program alternatives developed at its previous meeting in the light of comments received during the recently completed NEPA scoping period and worked on developing a general assessment of the costs for status quo enforcement and levels of enforcement that might be required for different individual quota enforcement programs.

Date	Committee	Subject
October 25-26, 2004	Ad Hoc TIQC	Reviewed results from public scoping and some preliminary analysis and refined recommendations to the Council.
November 3-4, 2004	Council meeting, Agenda Item E.6	Provided guidance for the evaluation of a preliminary range of alternatives.
November 17-18, 2004	Ad Hoc TIQ Analytical Team	Reviewed the Council action from the November 2004 Council meeting; planned the next analytical tasks.
January 27, 2005	GAC*	Discussed allocations necessary to support rationalization.
February 23-24, 2005	Ad Hoc TIQC	Continued review of results from public scoping and some preliminary analysis; refined recommendations to the Council.
May 2-3, 2005	GAC	Discussed rationalization alternatives with attention to intersector allocation.
May 10-11, 2005	Ad Hoc TIQC	Developed recommendations on program design.
June 16, 2005	Council meeting, Agenda Item C.5	Approved range of alternatives for analysis.
October 30, 2005	Ad Hoc TIQC	Provided guidance on measures to mitigate impacts to communities.
November 3, 2005	Council meeting, Agenda Item H.11	Received update on progress of program development, provided guidance on measures to mitigate impacts to communities.
November 14-15, 2005	GAC	Discussed allocations necessary to support rationalization.
March 16, 2006	Ad Hoc Groundfish TIQ Independent Experts Panel	Reviewed and commented on preliminary internal draft document that consultants developed for a public workshop (see below) on approach for analysis of TIQ alternatives.
April 18-20, 2006	Public Workshop on Trawl Individual Quota Analysis	Conducted workshop to review and receive comments from the public and Council advisory bodies on the first stage of the draft analytical package developed by consultants.
June 11, 2006	Ad Hoc TIQC	Developed recommendations on structure of alternatives and program design.
June 15, 2006	Council meeting, Agenda Item F.3	Reviewed draft of the preliminary (Stage 1) analysis and provided recommendations on refinements to analytical approach. Drafting of the EIS was divided into two stages due to budget constraints. Stage 1 was an analytical framework for the EIS.
September 10, 2006	Ad Hoc TIQC	Reviewed stage 1 document (analytical framework). Provided guidance.
September 14, 2006	Council meeting, Agenda Item C.7	Reviewed Stage 1 document (analytical framework). Provided guidance on a process to revise and simplify the alternatives for Stage 2 analysis. Added alternative for cooperatives in Pacific whiting fishery.
October 18-19, 2006	GAC	Provided guidance on development of alternatives for allocation between trawl and nontrawl sectors necessary to support rationalization.

Date	Committee	Subject
November 6-8, 2006	Ad Hoc TIQC	Reviewed and further developed alternatives under analysis, with particular emphasis on co-op alternatives for whiting sectors; reviewed GMT comments from September 2006 Council meeting.
November 16, 2006	Council meeting, Agenda Item D.7	Adopted preliminary alternatives for intersector allocation, which supports trawl rationalization (to be analyzed in a separate NEPA document).
December 12-14, 2006	GAC	Recommended restructuring and narrowing the range of alternatives to be considered for rationalization.
February 20-22, 2007	Ad Hoc TIQC	Reviewed and further developed alternatives under analysis, with particular emphasis on GAC report from GAC's December meeting and GMT comments from GMT's January 2007 meeting.
March 8, 2007	Council meeting, Agenda Item E.4	Modified and simplified alternatives based on GAC and other committees' recommendations. Adopted revised goals and objectives for the program. Added feature to Pacific whiting cooperative alternative to cover shore-based sector.
May 2-4, 2007	Ad Hoc TIQC	Reviewed and further developed alternatives under analysis, particularly with respect to alternatives for whiting sector vessel co-ops.
May 15-17, 2007	GAC	Developed recommendations for further refinement of trawl rationalization alternatives.
June 13, 2007	Ad Hoc TIQC	Further refined the trawl rationalization alternatives.
September 25-27, 2007	GAC	Developed recommendations for further refinement of trawl rationalization alternatives and intersector allocation alternatives.
October 11-12, 2007	Ad Hoc TIQC	Reviewed and further developed trawl rationalization alternatives under analysis.
November 7-9, 2007	Council meeting, Agenda Items D.5 and D.7	Adopted range of intersector allocation alternatives for analysis. Refined and finalized trawl rationalization alternatives for analysis.
November 30, 2007	Ad Hoc Trawl Rationalization Tracking and Monitoring Committee	Provided agency guidance and perspectives on design constraints and scoped likely impacts of alternative configurations of tracking and monitoring systems for trawl rationalization.
February 13, 2008	Ad Hoc Trawl Rationalization Tracking and Monitoring Committee	Provided agency guidance and perspectives on design constraints and scoped likely impacts of alternative configurations of tracking and monitoring systems for trawl rationalization.
February 20-22, 2008	GAC	Considered draft alternatives (and other material for trawl rationalization) and intersector allocation alternatives.
April 7-12, 2008	Council meeting, Agenda Item H.3	Deferred selection of preferred alternative for intersector allocation to support trawl rationalization until March 2009.
May 13-15, 2008	GAC	Developed advice a preferred alternative for the Council's June 2008 decision.
May 15-16, 2008	Ad Hoc TIQC	As above for the GAC.

Date	Committee	Subject
June 8-13, 2008	Council meeting, Agenda Item F.6	Selected preliminary preferred alternative for trawl rationalization program.
October 8-9, 2008	GAC	Developed recommendations to the Council on preferred trawl rationalization alternative, on which the Council was scheduled to take final action at the November 2008 Council meeting.
November 1-7, 2008	Council meeting, Agenda Item F.3	Selected preferred alternative for trawl rationalization program.
January 27-29, 2009	GAC	Developed recommendations on accumulation and control limits for IFQs.
March 7-13, 2009	Council meeting, Agenda Item G.3	Provided guidance on eligible to own provisions and clarified aspects of its November 2008 decision.
April 2-9, 2009	Council meeting, Agenda Items F.4 and F.5	Clarified action on adaptive management program, community fishing associations, and other miscellaneous issues.
May 5-7, 2009	GAC	Considered options for adaptive management program and community fishing associations, vessel and control limits for Pacific halibut and IFQs, FMP amendment language, and other miscellaneous items.
June 11-19, 2009	Council meeting, Agenda Items E.10 - E.12	Took final action on outstanding issues for trawl rationalization program.
October 31-November 5, 2009	Council meeting, Agenda Item G.8	Modified the initial allocation formula for canary rockfish IFQs.
March, April, and June 2010	Council meetings	Council reviews proposed regulations for program implementation and deems them necessary and appropriate.

^aBriefing materials provided at each Council meeting are available at <http://www.pcouncil.org/bb/bbarchives.html>. The materials constitute a substantial part of the record of the development of the program. Council meeting minutes, summarizing Council discussion and decisions, are available at <http://www.pcouncil.org/minutes/cminutes.html>.

^bThe GAC was originally constituted as the Ad Hoc Allocation Committee. It was converted to a standing committee in March 2005.

CHAPTER 2 DESCRIPTION OF THE ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

This chapter describes the alternatives for implementing a trawl rationalization program. There were three management approaches that the Council considered in developing its action alternatives: (1) vessel cumulative landing limits, (2) IFQs, and (3) cooperatives (co-ops). From these management approaches, four basic alternatives were developed for analysis. Most of the alternatives are a hybrid of the IFQ and co-op management approaches. These management approaches are broadly described below and are described in more detail within the alternatives and in Appendices A and B.

Vessel Cumulative Landing Limits Management Approach: The groundfish LE trawl fishery is currently managed with vessel cumulative landing limits (i.e., trip limits) and season closures. The vessel cumulative landing limits are used mainly for the nonwhiting segment of the trawl fishery and are generally structured around six, two-month cumulative periods with the first period being January-February, etc. While the two-month limits are used to maintain a year-round fishery, however, if a harvest limit for the trawl fishery is exceeded, the entire fishery may face increased area restrictions or closure. Cumulative landing limits are set based on catch projections derived from a bycatch model that incorporates various data from previous years. Season closure is used as the main tool for controlling harvest in the whiting fishery.

IFQ Management Approach: IFQs are a form of LAP. They grant an entity the privilege to catch a specified portion of the LE trawl fishery's allocation of groundfish. If an individual vessel's quota, or harvest limit, is exceeded, that vessel is accountable. All catch would be monitored and independently verified, eliminating the need for catch projection based on bycatch modeling. Near real time catch data would be available to manage the fishery.

Cooperative Management Approach: Co-ops are another form of LAP. They are a system by which groups pool their resources together and act in a cooperative manner. Generally, the most efficient vessels are used to harvest the pooled resource. In the current groundfish fishery, the Pacific whiting catcher-processor sector has organized itself as a co-op (vessels in the mothership and shoreside whiting sectors operate independently, competing with one another in the seasonal fishery). All catch would be monitored and independently verified. Real time catch data would be available to manage the fishery.

From these management approaches, four basic alternatives were considered for implementing the trawl rationalization program. These are as follows:

- Alternative 1: Status quo management (no action alternative)
- Alternative 2: IFQs for all groundfish trawl sectors
- Alternative 3: IFQs for the nonwhiting sector and co-ops for all whiting sectors
- Alternative 4: IFQs for a single shore-based sector and co-ops for the whiting at-sea sectors

Implementing trawl rationalization—whether through IFQ or cooperatives—requires the specification of numerous program elements (features). In many cases, there are different ways to specify these elements. These different approaches are structured as options (choices to be made in structuring the program), where appropriate. Variations on some alternatives were developed to contrast key program features, which are sub-alternatives denoted by a letter suffix. These are Alternatives 2a, 2b, and 2c and Alternatives 4a and 4b. Alternatives 1 and 3 do not contain sub-alternatives. Alternative 4b is the preferred alternative (Section 2.4). With these variations included, six alternatives are evaluated in Chapter 4 of this EIS. The four basic alternatives are described below in Sections 2.1 through 2.4. Where sub-alternatives were developed, differences between them are noted in the description of the four basic alternatives. Table 2-1 provides an overview of the action alternatives and their program elements.

The trawl rationalization program developed by the Council is complex, with a large number of specific program elements. For example, in developing the IFQ component of the program, the Council considered 26 different program elements. A similar number of program elements were considered for whiting co-ops. Many of these elements do not vary across the alternatives. The analysis in Chapter 4 of this EIS looks at the overall impact of alternative programs, while Appendix A and Appendix B evaluate the program elements considered by the Council for an IFQ and whiting cooperative program, respectively. Appendix D is a detailed, stand-alone description of the complete trawl rationalization program recommended by the Council in the preferred alternative (Alternative 4b). Section 2.5 describes the alternatives considered but rejected from further analysis, including permit stacking and extended cumulative landing limits.

Table 2-1. Summary of alternatives by program elements.

ELEMENT	ALTERNATIVES						
	Alt. 1 (status quo/no action)	Alt. 2a	Alt. 2b	Alt. 2c	Alt. 3	Alt. 4a	Alt. 4b (Preferred Alt.)
Catch Control Tool	<input type="checkbox"/> 2mo cum trip limits for NonWhgt Trawl <input type="checkbox"/> Seasonal mngmnt for Whgt Trawl	IFQ for all Trawl Sectors			<input type="checkbox"/> IFQ for Nonwhiting Trawl <input type="checkbox"/> Co-ops for Whiting Trawl	<input type="checkbox"/> IFQ for SS Trawl	<input type="checkbox"/> IFQ for SS Trawl (trip limits for nonIFQ species) Co-ops for At-Sea Trawl
Initial Allocation and Qualification	None	Based on permit landing history			<input type="checkbox"/> Equal sharing of buyback history in Nonwhiting (all groundfish) <input type="checkbox"/> Rebuilding stocks allocated on a bycatch rate <input type="checkbox"/> CV co-op endorsement & allocation 97-03	<input type="checkbox"/> Equal sharing of buyback history in SS <input type="checkbox"/> Rebuilding stocks allocated on a bycatch rate (all groundfish) <input type="checkbox"/> CV (MS) endorsement & allocation 97-03	<input type="checkbox"/> Equal sharing of buyback history in nonCP sectors (all nonoverfished spp. & canary) <input type="checkbox"/> Rebuilding stocks and halibut alloc. on bycatch rate/pro rata <input type="checkbox"/> CV (MS) end. & alloc. based on 94-03 <input type="checkbox"/> MS permit: at least 1,000 mt in 2 years from 97-03
Accumulation Limits	None	<input type="checkbox"/> SS nonwhiting groundfish: 3% control & 6% per vessel <input type="checkbox"/> SS whiting: 12% control & 25% per vessel <input type="checkbox"/> MS: 25% ctrl & 50% per vsl <input type="checkbox"/> CP: 60% ctrl & 75% per vessel			<input type="checkbox"/> SS grnd: 1.5% ctrl & 3% per vsl <input type="checkbox"/> CV(SS) whiting: 15% <input type="checkbox"/> MS: 20% <input type="checkbox"/> CV (MS): 10% <input type="checkbox"/> CP: none	<input type="checkbox"/> SS grnd: 2.2% ctrl & 4.4% per vsl <input type="checkbox"/> SS whiting: 25% ctrl & 12% per vessel <input type="checkbox"/> MS: 30% <input type="checkbox"/> CV (MS): 15%	<input type="checkbox"/> SS grnd: 2.7% ctrl & 3.2% per vessel <input type="checkbox"/> SS whiting: 10% ctrl & 15% per vessel <input type="checkbox"/> MS: Cannot process more than 45% <input type="checkbox"/> CV (MS): 20% own, 30% usage <input type="checkbox"/> CP: none
Grandfather clause	None	Grandfather clause exists			None	Grandfather clause exists	None, but entities must divest overage QSS at the end of year 4
Processor Initial Allocation / Co-op Affiliations	None	None			<input type="checkbox"/> 100% Proc.affiliations in MS and SS whiting sectors. <input type="checkbox"/> 25% SS processor alloc of SS groundfish	<input type="checkbox"/> 50% Processor affiliation in MS sector <input type="checkbox"/> 50% SS proc. alloc. of SS whiting <input type="checkbox"/> No proc. alloc. of SS grndfsh	<input type="checkbox"/> Annual mothership declaration requirement <input type="checkbox"/> 20% SS processor allocation of SS whiting <input type="checkbox"/> No processor allocation of nonwhiting
Species Covered	All groundfish	All groundfish and Pacific halibut			<input type="checkbox"/> All groundfish in nonwhiting sector <input type="checkbox"/> Select species at sea. Bycatch pools are shared by all whgt sctrs	<input type="checkbox"/> All groundfish in SS sector Select species at sea. At-sea sector bycatch is allocated at co-op level	<input type="checkbox"/> Select groundfish species and Pacific halibut in shoreside sectors.
Number of Trawl Sectors	Four	Three			Four	Three	
Adaptive Mngmnt	None	None	10% A.M. set aside	None	10% A.M. set aside for all sectors	10% A.M. set aside for SS	10% A.M. set aside for SS nonwhiting species
Area Mgmt	TL vary by area; main split at 40 10 N lat	None			Species split at 40 10 N lat	Species split at 40 10 N lat	None
Carry-over	None	Carry-over exists			None	Carry-over exists	Carry-over exists. Allowance decreases if OY declines

- 1) For analytical purposes, the adaptive management provision will be assumed to be used to A) mitigate against the effects of the program on adversely impacted communities, B) provide incentives to use habitat and bycatch friendly gear, and C) to mitigate against adverse effects of the program on processors (this is specific to Alternative 2b). For Alternative 4b, the Council's goals and objectives specified for AMP are used.
- 2) Under the Council's preferred Alternative (Alternative 4b), control limits do not apply to QPs.
- 3) Assumptions regarding the sector level allocations of groundfish species and Pacific halibut differ between Alternative 4b and other alternatives. Alternative 4b uses the Council's Final Preferred Alternative for Intersector Allocation.
- 4) The catcher processor sector has independently developed and operated under a private co-op structure within the season structure provided by Federal regulations.

2.1 Alternative 1 - Status Quo (No Action)

Under Alternative 1, status quo/no action, most of the elements of the current management regime for the groundfish LE trawl fishery would remain in place. The Groundfish FMP describes the management

framework for the groundfish trawl fishery. The groundfish LE trawl fishery includes a nonwhiting trawl fishery (shore-based) and a whiting fishery (shore-based, mothership, and catcher-processor sectors).

Every two years, the Council establishes harvest limits (OYs) for various species or groups of species.³¹ OYs represent an annual quantity of fish that the groundfish fishery as a whole may catch. A few species, such as Pacific whiting and sablefish, have fixed trawl allocations. The FMP defines other allocations between different gears, which in addition to the whiting and nonwhiting trawl fisheries include LE fixed-gear, the open access sector, and recreational fisheries in each state. Other allocations are determined through the biennial process to specify harvest limits (ABCs, OYs, and harvest guidelines [HGs],) and management measures (i.e., specifications and management measures process). The need to rebuild the seven currently overfished rockfish species means that the OYs for these species are relatively low compared to target species OYs. Due to the multi-species nature of the fishery, these low OYs affect all aspects of groundfish management.

The following sections describe the main elements of Alternative 1, as summarized in Table 2-1.

2.1.1 Catch Control Tool

Nonwhiting Trawl Fishery

Under status quo (Alternative 1), two-month, cumulative trip limit (landing limit) periods are the primary catch control tool. Other catch control tools used include the following:

- Gear restrictions focused on discouraging or prohibiting gear that may be used in rocky habitat, where some overfished species occur. The use of bycatch-reducing trawl nets has also been required in some areas.
- Rockfish conservation areas. Closed areas were first implemented in 2003 to keep vessels away from depth ranges where overfished species are more abundant. These closed areas, called RCAs, are a coastwide feature of management.
- EFH conservation areas. These are a set of closed areas to protect bottom habitat from the adverse effects of fishing gear, including trawl gear.

For the nonwhiting trawl fishery, catches resulting from a set of proposed cumulative landing limits (i.e., trip limits) can be projected, indicating the proportion of the OY expected to be taken by the fishery and the amount available to other fisheries. During the season, if projected catches diverge from generally agreed fishing opportunity for a fishery (an implicit allocation target), the proposed trawl cumulative landing limits (or those established for other fisheries) can be adjusted until the projections are in line with expectations.

OYs for some overfished species—in the case of the trawl fishery, particularly canary rockfish on the continental shelf and darkblotched rockfish on the slope—impose the greatest constraint, translated into a variety of management measures that indirectly limit mortality on the constraining stocks.

Catch restrictions based on cumulative landing limits are the primary measures set for the trawl fisheries in the biennial specifications process. The boundaries of closed areas—the RCAs or GCAs—are also often adjusted as part of the biennial process. Although trawl gear restrictions, principally intended to keep trawlers out of rocky habitat (where several of the overfished species are found), are an important part of the management process, these requirements are much less frequently modified. In addition to restrictions on the size of trawl net footropes intended for this purpose, selective flatfish trawl (SFT) gear,

³¹ Under new rules in the MSA, the method for determining these harvest limits may change, and they may be referred to as annual catch limits (ACLs) by the time the trawl rationalization program is implemented.

which has shown a lower incidental catch rate for some groundfish, including some overfished species, is required shoreward of the trawl RCA north of Cape Mendocino, California.

Other measures affecting the nonwhiting trawl fishery are established in permanent regulations and are not modified through biennial or inseason action. Important among these are various measures implemented in 2006 and intended to reduce adverse impacts to EFH. These include gear restrictions and prohibitions and additional areas closed to trawl gear.

Whiting Trawl Fishery

Under status quo, all three commercial sectors of the whiting fishery (shore-based, mothership, and catcher-processor sectors) would continue to be managed under a primary season structure where vessels harvest whiting until the sector allocation is reached, and the fishery is closed. Incidental groundfish taken in the whiting fishery would continue to be managed under cumulative trip limits. To allow each sector of the whiting industry to have the opportunity to harvest its share of the whiting OY, the nontribal commercial fishery is managed with sector-specific bycatch limits for certain overfished species. To date, bycatch limits have been established for darkblotched, canary, and widow rockfish. Concern that bycatch in one sector would result in the closure of a different sector of the fishery led the Council to recommend that sector-specific bycatch limits be implemented as part of the 2009-10 Harvest Specifications and Management Measures, rather than a single bycatch limit for all commercial sectors.

Regulations provide for the automatic closure of the commercial (nontribal) portion of the whiting fishery, upon attainment of a bycatch limit. If a sector-specific bycatch limit is reached or is projected to be reached, the Pacific whiting fishery for that sector will be closed, regardless of whether the Pacific whiting allocation has been achieved.

Incidental take of endangered or threatened salmon runs is another concern for the Pacific whiting fishery. Chinook is the salmon species most likely to be affected because of the spatial/temporal overlap between the Pacific whiting fishery and the distribution of Chinook salmon such that it could result in incidental take of listed salmon. The season start dates are, in part, meant to limit targeting on whiting fishing when listed Chinook salmon are most likely to be taken incidentally. NMFS also has the option of closing inshore areas to fishing if too many salmon are caught.

2.1.2 Initial Allocation and Qualification

Measures to control capacity—such as the license limitation and vessel buyback programs—are another important permanent feature of the current groundfish trawl fishery management framework. A Pacific Coast groundfish LE permit with a trawl endorsement is required to participate in the nonwhiting trawl fishery, and participants deliver their catch to shore-based processors.

A Pacific Coast groundfish LE permit with a trawl endorsement is required to participate in the whiting fishery. Since Amendment 15 was implemented in 2008, vessels are also required to have a Pacific whiting vessel license specific to the sector in which they participate. Requirements for obtaining a Pacific whiting vessel license in the nontribal sectors were as follows: catcher vessels in the whiting shore-based fishery were required to have made sector-specific whiting landings in any one calendar year from January 1, 1994, through January 1, 2007; vessels participating in either the catcher-processor or mothership sector were required to have either caught and processed whiting (catcher-processor sector,) caught and delivered whiting (catcher vessels in mothership sector,) or processed Pacific whiting (motherships) in any one calendar year from January 1, 1997 through January 1, 2007. This was the first participation requirement for motherships, which, unlike catcher vessels, have not needed a groundfish LE permit registered to them. Amendment 15 is intended to serve as an interim measure to limit potential

participation in the whiting fishery within the U.S. west coast EEZ until implementation of a trawl rationalization program under Amendment 20 to the Groundfish FMP.

The shore-based whiting sector participants who want to participate in the maximized retention program also need an exempted fishing permit (EFP) to participate. The EFP specifies the terms and conditions of catch retention and monitoring. Pacific whiting first receivers intending to accept deliveries of EFP catch also have to obtain an EFP that specifies terms and condition of sorting, catch accounting, and monitoring.

2.1.3 Accumulation Limits and Grandfather Clause

There are no accumulation limits or grandfather clause under status quo management (Alternative 1).

2.1.4 Initial Allocation to Processors

There is no initial allocation to processors under status quo management (Alternative 1).

2.1.5 Species Covered

Alternative 1 covers all groundfish species managed under two-month cumulative trip limits. For the LE trawl fishery, these species are listed in the trip limit tables codified in regulation at 50 CFR part 660, subpart G, appendix Tables 3 (north and south).

2.1.6 Number of Sectors

The groundfish trawl fishery is divided into a nonwhiting and whiting fishery. The whiting trawl fishery is divided into three sectors: the shore-based sector, the mothership sector (including motherships and catcher vessels), and the catcher-processor sector.

2.1.7 Adaptive Management

There is no explicit adaptive management provision under status quo management (Alternative 1). On a biennial basis, the Council adapts regulations to current OYs, and it makes adjustments inseason to accommodate unexpected harvest rates. Other adaptive actions are taken up as either regulatory or FMP amendments.

2.1.8 Area Management (Latitudinal)

Under Alternative 1 (status quo/no action), the two-month cumulative trip limits for groundfish species vary by gear and by area for the nonwhiting fishery. The two-month cumulative trip limits, displayed through the groundfish biennial harvest specifications process in trip limit tables, are generally split by area to match the ABC/OYs for those species. The main area designation is at 40° 10' N. latitude.

2.1.9 Carryover of Unused QPs between Consecutive Years

There is no carry-over provision under status quo management (Alternative 1). Regardless of each year's harvest level, the fishery starts the subsequent year with a new OY (there are no adjustments to carry overages or underages from one year to the next). Over-harvest and under-harvest are accounted for through the effects on the status of the stocks, as reflected in stock assessment documents.

2.1.10 Tracking and Monitoring

Nonwhiting trawl fishery

Cumulative landing limits have been used to manage the trawl fishery since 1996. Landing limits were originally implemented on a per-trip basis in the 1980s. Cumulative landing limits worked reasonably well until the need to rebuild overfished stocks became a central concern of the management process. Managing by landings alone then became much less effective because the low landing limits (or no retention rules) established for these stocks led to unacceptable levels of unmonitored bycatch. To better estimate total catch, NMFS implemented the West Coast Groundfish Observer Program (WCGOP) in August 2001. The WCGOP collects data applied to derive catch ratios of nontarget species that are used to model bycatch. Using observer, fish ticket, and logbook data, the fishery is modeled to derive estimates of total catch by species. The overall estimates of total catch were much improved over the previously used bycatch ratio, which had been derived from a scientific study. The current WCGOP coverage plan identifies the monitoring target for the nonwhiting trawl fishery as 20 percent of the catch as a proportion of total landings

Although the WCGOP has substantially improved monitoring of the nonwhiting trawl fishery, the program uses partial coverage by observers to provide data on total catch by species over the course of a full year. As a result, there is a considerable lag time in the delivery to managers of catch estimates based on WCGOP observations because the program did not have the necessary observer coverage for real time fishery management of the entire groundfish fishery. Currently, observer reports, which contain bycatch rates that can be used to project total catch mortality, are on an eight-month lag. Due to the delayed availability of fish ticket and logbook data and the time needed to process observer data, the final analysis of estimated total catch by species, which gives a retrospective picture of how the fishery performed and is used to project future catch (or the effectiveness of management measures in meeting targets), is typically not finalized until well over one year after the fishing year has ended.

Whiting trawl fishery

The whiting fishery has a higher level of monitoring than the nonwhiting trawl fisheries, which would be maintained under status quo. The At-Sea Hake Observer Program (whiting mothership and catcher-processor sectors) is a seasonal program where the operational costs are shared by NMFS and the vessel owners. Since 1991, the domestic at-sea Pacific whiting processors (motherships and catcher-processors) have carried third-party observers on all processing vessels. Third-party observers are certified by NMFS to sample the catch and provide data that is used to estimate total landed catch and discards, monitor the attainment of annual groundfish allocations, estimate catch rates of prohibited species (salmon, halibut, and Dungeness crab), and assess stock conditions. Mandatory observer coverage requirements were codified in 2004 (69 FR 31751; June 7, 2004). From 1992 to July, 2004, the motherships voluntarily carried observers. Prior to 2000, most motherships each carried one observer, while catcher-processors carried two for monitoring their self-developed voluntary co-op. Since 2000, the motherships have, for the most part, carried two observers, too. Having two observers allows all or almost all hauls to be sampled and increases the accuracy of data used to monitor fishery allocations and estimate incidental catch. To date, catcher vessels in the mothership sector have not been required to have onboard monitoring, nor have they voluntarily been monitored.

Since 2007, whiting shore-based sector vessels fishing under EFPs have been required to pay directly to a NMFS-specified provider for electronic monitoring system (EMS) services as no Federal funding has been available to provide for EMS coverage. EMS is a video-based tool used to verify full retention of catch. EMS systems consist of two or more closed circuit television cameras, global positioning systems

(GPS), hydraulic and winch sensors, and on-board data storage. From an EMS pilot study, it was determined that EMS could be used accurately to identify the time and location of discard events. In 2008, NMFS began transitioning the whiting shore-based fishery from a maximized retention and monitoring program conducted under a state-run EFP to a Federal regulatory program. In doing this, NMFS chose to manage the 2008 and 2009 Pacific whiting shore-based fishery maximized retention and monitoring program under EFPs. The EFPs incorporated provisions that NMFS anticipates as being necessary in regulations implementing a maximized retention and monitoring program for the Pacific whiting shoreside vessels, including EMS coverage requirements, EMS equipment specifications, and EMS provider certification requirements.

Pacific whiting first receivers are required to have an EFP to process unsorted whiting catch. The EFP would continue to require first receivers to procure third-party catch monitors for fish ticket verification. These individuals would be trained by NMFS or to NMFS specifications. In 2009, the Council recommended that the catch monitor coverage level be increased to full coverage of all deliveries for monitoring sector-specific bycatch limits. With full coverage of all deliveries, a catch monitor must be present throughout the offloading, sorting, and weighing of each Pacific whiting delivery. With full coverage, the number of individual catch monitors per facility would vary depending on the hours of operation and the number of Pacific whiting deliveries received each day.

First receivers would continue to be required to submit federal electronic fish tickets. Electronic fish ticket requirements support a real-time inseason data system (i.e., Microsoft Access version 2003 or later or Pacific States Marine Fisheries Commission [PSMFC] software is used). Electronic fish ticket software would continue to be provided by NMFS or PSMFC at no cost.

The trawl fleet has been required to carry satellite VMS units since 2004. These units provide hourly position reports on trawl vessels and are used to ensure compliance with area restrictions.

2.1.11 Gear Conversion

There is no provision for gear conversion under status quo management (Alternative 1). Groundfish LE permits can be endorsed for trawl, longline, or pot gear, and a limited number of permits are dual-endorsed for more than one gear type. If a fisherman wants to switch to another gear, he would have to obtain (buy or lease) and register a LE permit with an endorsement for that gear to his vessel. There are frequency and vessels size restrictions on registering and transferring LE permits.

2.2 Alternative 2 - IFQs for all Groundfish Trawl Sectors

This section describes Alternative 2, IFQs for all groundfish trawl sectors (whiting and nonwhiting, shore-based and at-sea). Three sub-alternatives are evaluated under this Alternative (Alternatives 2a, 2b, and 2c) to compare and contrast certain key elements of the IFQ program. As noted above, Appendix A provides further detail on the elements and options the Council considered for an IFQ program.

This alternative would modify the status quo by establishing an IFQ program for all groundfish trawl sectors, including the nonwhiting and whiting (at-sea and shore-based) fisheries. Alternative 2 is market-centric with a high level of individuality and individual accountability. Alternative 2 is intended to illustrate the effect of market incentives on the program. Illustrating the effect of the market without special provisions limiting market influence serves as a benchmark to help inform other decisions, such as whether to include provisions to hedge against market influence. While many status quo management tools would remain in place under this alternative, the significant difference would be in the way catch is allocated and tabulated. Most cumulative landing limits and, for whiting, season closures would no

longer be used. Other measures, such as RCA boundaries, may be adjusted as experience is gained with the IFQ program.

Alternative 2 focuses on market outcomes to determine the distribution of catch among vessels and timing of harvest by issuing Qs to entities and by requiring that all groundfish species and Pacific halibut³² be covered with Qs. This means that market incentives apply to all groundfish catch and Pacific halibut. If species were not covered by Qs, the market would not have an effect on the distribution and timing of catch, because they would not be directly managed by the rationalization system, which by definition is market-based. Issuing Qs (instead of establishing co-ops) is intended to isolate the effect of the market to individuals by holding them directly accountable for their own catch, through regulatory mechanisms. Co-ops may result in a slightly different outcome because of their collective, community nature (individuals are accountable to the co-ops). This alternative also focuses on market outcomes by establishing three trawl sectors (versus four), allowing more market influence over the harvest strategies of fishing entities for the shoreside fishery. A carry-over is included to provide flexibility in making harvesting choices across years, consistent with a market-driven approach. Accumulation limits are set at the high end of the range specified in the alternatives, and there is also a grandfather clause. This alternative would allow more consolidation in the fishery than other alternatives.

The focus on individuality in Alternative 2 is accomplished by issuing Qs (versus co-ops) for all sectors of the fishery. This creates a more individualistic perspective based on the notion that IFQ tends to make participants focus on their personal perspective, whereas participants in a harvest co-op act within a type of community.

Differences between Alternatives 2a, 2b, and 2c

Alternatives 2a, 2b, and 2c compare and contrast two key elements of the IFQ program, processor initial allocations and adaptive management; both are methods for potentially responding to processor concerns. One method is to make an initial allocation of Qs to processors. The other method is to provide the opportunity to use an adaptive management system to assist processors that are adversely impacted by rationalization. These two mechanisms have substantially different philosophies—and presumably impacts—that are explored in the analysis in Chapter 4. For the processor initial allocations (Section 2.2.4 below), alternatives 2a and 2b use harvester-only allocations to illustrate the effect of the market on the program while disentangling the harvester and processor initial allocation issue and the effects on the program caused by splitting the initial allocation between harvesters and processors. Alternatives 2a and 2b allocate 100 percent to harvesters to better isolate the influence of market incentives on the program. Alternative 2c contrasts alternatives 2a and 2b by allocating processors 25 percent of the nonwhiting groundfish and 50 percent of the whiting Qs to shore-based and mothership processors. For adaptive management (Section 2.2.7 below), alternatives 2a and 2c do not include an AMP because such a provision would be designed to directly influence, or modify, outcomes that are driven by market incentives. Alternative 2b contrasts alternatives 2a and 2c by setting aside 10 percent of the annual trawl allocation for adaptive management.

The following sections describe the main elements of Alternative 2 (including Alternatives 2a, 2b, and 2c), as summarized in Table 2-1.

³² Pacific halibut would be covered by an individual bycatch quota (IBQ) rather than IFQ. A halibut IBQ would be created and required to cover the incidental catch of Pacific halibut in the groundfish trawl fishery. Under an IBQ program, retention would not be allowed.

2.2.1 Catch Control Tool

Under Alternative 2, all groundfish trawl sectors (both whiting and nonwhiting) would be managed with IFQs, which would replace the current two-month cumulative trip limit periods in the nonwhiting fishery and season/quota-based management in the whiting fishery as the primary harvest control tool.

2.2.2 Initial Allocation and Qualification

Alternative 2 would initially allocate IFQ as Qs to fishery participants based mainly on their historic involvement in the fishery. There are different levels of initial allocation in a quota fishery. First, the Council considered which groups should be included in the initial allocation of Qs, and the proportional split among the groups. Options ranged from allocating 100 percent of Qs to permit owners in the nonwhiting trawl fishery and whiting trawl sectors (Alternatives 2a and 2b) to allocating 75 percent to permit owners and 25 percent to processors for the nonwhiting trawl fishery, to allocating 50 percent to permit owners and 50 percent to processors for the whiting sector (Alternative 2c) (processor initial allocations are described in Section 2.2.4 below). There are additional options that would allocate 10 percent of the annual trawl allocation for an AMP (Alternative 2b) (described in Section 2.2.7 below).

Second, the Council considered specific allocation formulas to determine the amount of Qs each eligible entity would receive. These calculations are based on the delivery history associated with a vessel permit or processing company over a set number of years for both target species and nontarget groundfish species, including overfished species. Alternative 2 does not include an equal distribution of buyback history, which is included in the initial allocation formulas for alternatives 3 and 4. Additionally, as explained above, fleet allocations or bycatch limits (for widow rockfish, canary rockfish, darkblotched rockfish, and Pacific ocean perch) could be used instead of IFQs to manage bycatch species in the whiting fishery. If this option is chosen, only whiting Qs would be allocated.

At the start of the program, NMFS would determine who is eligible to own Qs and how much their initial allocation would be.³³ Qs would be initially allocated to fishery participants based on catch history during a qualification period. Thereafter, shareholders are free to buy and sell the Qs thus distributed.³⁴ Qs represent a proportion, or percent, of the TAC (which in groundfish management is called the OY³⁵) of different groundfish stocks.

Each year, these shares are converted from a percent to a quantity by issuing QPs based on the OYs established for the year. The QPs would have to be transferred to a vessel account to be used. The amount of groundfish caught by an LE trawl vessel, even if it is subsequently discarded, must be matched by an equivalent quantity of QPs.³⁶ The QP is expended in this way, with the matched amount deducted from the vessel's account. If there is not enough QP to cover the catch from a trip, there would be a 30-day grace period during which adequate QPs must be transferred into the vessel's account. A vessel's

³³ Catcher/processors are considered harvesters for the purposes of initial allocation and are included here.

³⁴ The Council considered issuing Qs for a fixed time, after which all or a portion of the Qs would be periodically reallocated. Although a fixed duration is not part of this alternative, the MSA restricts the duration of a fishing privilege to 10 years and specifies conditions for automatic renewal.

³⁵ Under revised National Standard 1 guidelines, the Council may instead refer to this amount as the annual catch limit (ACL). Adoption of provisions to comply with the revised guidelines is the subject of a separate FMP amendment process, which may be implemented at about the same time as the trawl rationalization program.

³⁶ Qs/QPs would not be required to cover catch by LE permit holders in a few special circumstances: if they are fishing under an LE fixed-gear permit and using that gear type on their vessel, or if they are using trawl gear in a nongroundfish fishery, such as a shrimp trawl fishery (these nongroundfish trawl fisheries incidentally catch some groundfish).

fishing would be limited, and its permit could not be sold, until the overage is covered. There would be a carry-over provision, which is described in Section 2.2.9. Both QSs and QPs are perfectly divisible and tradable. Making QSs and QPs divisible and able to be acquired in very small increments is intended to allow for new entrants into the fishery; for example, a crew member could slowly purchase amounts of quota.

QSs would be of long duration, so a transfer represents a long-term or permanent divestment. In contrast, QPs must be used within the year for which they are issued (although there is a provision for limited carry-over of unused QPs from one year to the next or QPs issued in the following year to be used in the current year), so QP transfer would not represent a permanent divestment of the harvest privilege, so long as one continues to control the underlying QSs. QS transfers would be prohibited in the first two years of the program so that they would only occur once participants fully understand how the program operates, and stable prices have been reached. QPs would still be fully transferable during the first two years. QSs or QPs could not be transferred between the different IFQ sectors, so there would be stability in the relative amount of fish caught within each sector.

Eligibility to own QSs/QPs would be defined very broadly; the main requirements are a U.S. citizen must be the owner, and a U.S. documented fishing vessel must be registered to a groundfish LE trawl permit must be used to harvest groundfish using QPs.³⁷

2.2.3 Accumulation Limits and Grandfather Clause

Accumulation limits, or the maximum amount of QSs and QPs an entity may control, would be limited, with these limits varying according to the management unit (stock, or stock complex). QS limits are a limit on the amount an individual or entity may control through ownership or other means. QP limits refer to the maximum amount that may be assigned to any one vessel during a given year to cover catch. These vessel limits are generally twice the control limits to allow several QS holders to work together on a single vessel. These limits are intended to limit the consolidation of quota holdings. Alternative 2 QS control limits and QP vessel limits are as follows:

- Shore-based nonwhiting: 3 percent control limit; 6 percent vessel limit
- Shore-based whiting: 12 percent control limit; 25 percent vessel limit
- At-sea mothership whiting (motherships and catcher-vessels): 25 percent control limit; 50 percent vessel limit
- At-sea catcher-processor whiting: 60 percent control limit; 75 percent vessel limit

Alternative 2 contains a grandfather clause under which initial recipients of QSs who exceed the accumulation limits would be allowed to possess excess QSs up to the amount initially allocated to them.

2.2.4 Initial Allocation to Processors

Under Alternatives 2a and 2b, all of the initial allocation of QSs would go to LE permit holders (harvesters). Under Alternative 2c, shore-based processors would receive 25 percent of the initial allocation of groundfish species and would share 50 percent of the allocation of whiting QSs with mothership processors based on their processing history during a qualification period. The catcher-

³⁷ Currently, LE permits include a length endorsement that defines the maximum size of vessel that may be registered to the permit. Permits may be combined to achieve a length endorsement for a larger vessel. The length endorsement would be suspended under the IFQ program.

processors are not included under the initial allocation to processors under Alternative 2, but are included in the initial allocation to harvesters in Section 2.2.2.

2.2.5 Species Covered

Qs/QPs would be issued for all of the current groundfish management units. Management units are fish stocks, or complexes comprising co-occurring or related stocks, for which an OY (ACL) is established. Table 2-2 shows the management units for which IFQ would be established.³⁸ Procedures would be established to reallocate Qs when management units are changed or new ones added. For the whiting fishery (shore-based, mothership, and catcher-processor), IFQ would either be created for all species of groundfish, or IFQ might be created only for the target species, Pacific whiting. Under the second option, the allocation of bycatch to the whiting fishery (or to specific whiting sectors) would be managed as fleet bycatch limits for widow rockfish, canary rockfish, darkblotched rockfish, and Pacific ocean perch. Reaching the fleetwide catch allocation or bycatch limit would trigger closure of the whiting fishery (or a specific whiting sector).

Alternative 2 also includes an IBQ for Pacific halibut. Although functionally equivalent to the IFQ system applied to other species, Pacific halibut are a prohibited species in the groundfish trawl fishery and cannot be retained. Therefore, although accounted for through the IBQ, all halibut must be discarded.

³⁸ Under Alternative 4b (the preferred alternative), IFQ would not be used as the catch control tool for selected management units. Under Alternative 2, these management units would be managed with IFQ.

Table 2-2. Management units considered for IFQ under the alternatives. Overfished species shown in bold.

IFQ Management Units	
Roundfish	Flatfish
Lingcod	Dover sole
Pacific cod	English sole
Pacific whiting	Petrale sole
Sablefish north of 36° N. latitude	Arrowtooth flounder
Sablefish south of 36° N. latitude	Starry flounder
Rockfish	Other Flatfish stock complex
Pacific ocean perch	Additional IFQ species (under Alt. 4b only, these species not managed with IFQs)
Widow rockfish	Shortbelly rockfish
Canary rockfish	Longspine thornyhead south of 34°27'
Chilipepper rockfish	Black Rockfish - coastwide
Bocaccio	Minor Rockfish North Nearshore complex
Splitnose rockfish	Minor Rockfish South Nearshore complex
Yellowtail rockfish	California scorpionfish
Shortspine thornyhead north of 34° 27' N. latitude	Cabezon (off CA only)
Shortspine thornyhead south of 34° 27' N. latitude	Kelp greenling
Longspine thornyhead north of 34° 27' N. latitude	Other Fish*
Cowcod	
Darkblotched	
Yelloweye	
Minor Rockfish North slope species complex	
Minor Rockfish North shelf species complex	
Minor Rockfish South slope species complex	
Minor Rockfish South shelf species complex	

*Starting in 2009, longnose skate is managed under its own OY. However, because the time period used to determine initial allocation of Qs was managed under the Other Fish complex, this species will not be managed with IFQ.

2.2.6 Number of Sectors

Three sectors would be established whereby the two current whiting and nonwhiting shore-based sectors would be combined into a single sector. Participants in this single sector would be free to trade IFQ (Qs or QPs), eliminating any regulatory barrier between targeting whiting and nonwhiting (operational differences among participants may mean that a large degree of specialization in targeting could continue). The whiting mothership and catcher-processor sectors would each be managed separately with their own allocations of catch opportunity and IFQ. IFQ could not be traded between the three sectors.

2.2.7 Adaptive Management

Alternatives 2a and 2c do not have an adaptive management element. Under Alternative 2b, each year up to 10 percent of the trawl sector allocation would be set aside for an AMP. These are fish that would have otherwise been distributed to QS owners. This program is meant to address a variety of objectives, ranging from socioeconomic dislocation resulting from implementation of the trawl rationalization program to encouraging innovative fishing methods, for example to reduce bycatch. The Council would decide how much QP would be set aside every two years for adaptive management use as part of the

biennial harvest specifications process. The harvest specifications process establishes OYs/ACLs for a two-year period and adjusts management measures so that catches will not exceed these limits.

2.2.8 Area Management

Under Alternative 2, no separate Qs would be created for different latitudinal areas. Area-specific QS is considered under other alternatives because this could prevent substantial geographic redistribution of QS holdings and related impacts to communities. Some stocks are currently managed geographically with separate OYs established for each component; for those stocks, Qs/QPs would be denominated accordingly.

2.2.9 Carryover of Unused QPs between Consecutive Years

Under Alternative 2, unused QPs amounting to 10 percent of the used and unused QPs in the vessel account may be carried over for use in the next year. Similarly, to cover an overage (landings that exceed the amount of QPs held in a vessel account), QPs that might be allocated in the next year may be transferred to the current year, reaching up to 10 percent of the used and unused QPs in the vessel account during the current year.

2.2.10 Tracking and Monitoring

All vessels would be required to carry at-sea observers at their own expense to monitor sorting and discarding of the catch and shoreside landings. There would also have to be an electronic system to report bycatch and landings, which may be integrated with the current state fish ticket (landings reporting) system. NMFS would also administer a system to track QS/QP holdings. A comprehensive mandatory monitoring program is expected to require minimal increases in enforcement effort.

A tracking and monitoring program is necessary to ensure that the total catch (including discards) is accurately documented and matched against QPs. The requirements for accuracy are expected to be greater for QP species than they are for species that are monitored for fleetwide catch accounting. Appendix A, Section A-2.3.1, details tracking and monitoring provisions, including discarding, at-sea and shoreside monitoring, catch tracking mechanisms, cost control mechanisms, and program performance measures. For an IFQ fishery, IFQ species may be discarded at sea except for whiting shore-based vessels. Discarded IFQ species would count against QPs, and all discarded catch would be required to be covered by QPs. IBQ species must be discarded by all vessels. Shoreside whiting vessels may be required to participate in a maximized retention program where discarding is prohibited.

At-sea observers would be required on all vessels (100 percent coverage), and cameras may be used to augment the observers and assure compliance. All vessels would be required to carry at-sea observers for full total catch verification (100 percent of the groundfish IFQ species in each haul). Observers would be required to monitor the sorting, weighing, and discarding of catch. Compared to status quo monitoring of less than 25 percent provided by the WCGOP, this would be a substantial increase for a large portion of the shoreside trawl fishery and the catcher vessels in the mothership sector. To resolve ongoing monitoring issues or in response to violations, cameras may be required in place of, or in addition to, observers (feasibility to be determined).

To assure accuracy when QPs are discarded at sea, vessels may be required to meet specified monitoring and weighing provisions, including adequate space for catch sorting, an adequate location for observer monitoring, and the equipment necessary for accurately weighing and documenting QP species at sea. Vessels that are determined to be unsafe for the purposes of carrying an observer would be prohibited

from participating in any of the IFQ trawl fisheries. For shoreside whiting trips, full observer coverage may be required in addition to, or as a replacement for, an EMS system.

Little, if any, change in the number of observers per vessel in the catcher-processor and mothership sector is expected. Because most, if not all, of the processing vessels also participate in the Alaska groundfish fishery, where they are required to have specific equipment for the observers to obtain accurate weights, the changes needed to implement adequate monitoring for a rationalization program are primarily related to the sorting and weighing of catch and interactions with the observers; thus, they are not expected to be a substantial change over status quo.

Vessel-specific monitoring of total mortality would provide more accurate catch data and would, thereby, reduce the risk of exceeding a harvest allocation (ABC, OY, harvest guideline, allocation, or quota). All IFQ deliveries would require full monitoring (100 percent) shoreside for total catch verification. To control costs, landing hours may be limited, as well as landing locations. Landing locations may be certified or licensed by NMFS.

Tracking requirements would include a reporting system using electronic forms for submitting total catch data, including both discards and landings. The reporting system is expected to be integrated with the existing electronic fish ticket system currently required for Pacific whiting shoreside first receivers (72 FR 50906, September 5, 2007). A reporting system to track QS/QP holdings would be administered by NMFS. Additionally, a program for the mandatory submission of economic data are included to facilitate monitoring program performance.

NMFS would develop a fee structure based on the requirements of the MSA at Section 304(d)(2)(A) and on Council recommendations to recover program costs.

2.2.11 Gear Conversion

Within the IFQ program, vessels would be allowed to use a variety of directed groundfish commercial gear, allowing for “gear switching.” There is also an option for gear conversion (switching permanently from trawl to some other gear). Once Qs have been distributed, recipients would be free to use them with any legal groundfish gear, which, aside from trawl, principally means bottom longline and fish pots. There is a separate allocation of catch opportunity to nontrawl sectors, which would be unaffected by any catches resulting from gear conversion under the IFQ program.

2.3 Alternative 3 - IFQs for the Nonwhiting Sector and Co-ops for all Whiting Sectors

This section describes Alternative 3, IFQs for nonwhiting trawl sector and co-ops for the whiting trawl sectors (shore-based, mothership, and catcher-processor). Appendix A provides further detail on the elements and options the Council considered in an IFQ program. Appendix B provides further detail on the elements and options the Council considered in a cooperative (co-op) program.

Alternative 3 uses market-mitigating factors and harvest co-ops (instead of issuing QS under an IFQ fishery) for the whiting fishery and IFQ for the nonwhiting fishery. Alternative 3 places constraints and controls on market outcomes through sector divisions, lack of a grandfather clause, an adaptive management mechanism, relatively small accumulation limits, and area management. This alternative gives more influence to processors by giving them IFQ allocations and requiring that co-ops be linked to shore-based processors and motherships.

While the whiting fishery would not be issued QSs, they would still be issued to the shore-based nonwhiting fishery under an IFQ program in Alternative 3. However, the IFQ program would have some additional differences from those described in Alternative 2, including initial allocation, accumulation limits, lack of a grandfather clause, processor allocations, no halibut IBQ, area management, and no carry-over provision. For the whiting co-op program, imposing harvest co-ops on the three whiting sectors (shore-based, mothership, and catcher-processor) under Alternative 3 is expected to result in different outcomes than issuing QS for these sectors. Harvest co-ops are like a community where members collectively decide the allocation of fishing opportunities. The effect of this type of system is expected to be somewhat different than an IFQ system where harvesters may be more likely to engage in fishing opportunities independently.

The whiting co-ops in Alternative 3 would be managed separately, but the shore-based and mothership co-ops structure would be very similar. The catcher-processor sector currently operates under a voluntary co-op in the status quo fishery (Alternative 1). Under Alternative 3, this voluntary structure would continue with modest changes to the management system.

The following sections describe the main elements of Alternative 3, as summarized in Table 2-1.

2.3.1 Catch Control Tool

Under this alternative, the nonwhiting sector would be managed with IFQs in a program similar to that described under Alternative 2 (differences are summarized below). The three whiting sectors would be managed with cooperatives. A separate co-op structure would be used for each of the whiting sectors.

2.3.2 Initial Allocation and Qualification

IFQ for nonwhiting

Under Alternative 3, the initial allocation of QS would be based on both catch history during the qualification period and an equal allocation of the catch history associated with LE trawl permits that were bought back and retired at the end of 2003 as part of a capacity reduction program. The buyback program is partly funded through a loan to remaining participants, which is being paid back through landing fees. Equal allocations of QSs associated with the buyback permits would result in a more even distribution of QSs among permit holders, compared to allocations based on catch history alone. Alternative 2 did not include buyback history in the initial allocation formula.

Unlike Alternative 2 where all species are allocated based on catch history, a different formula is used for overfished species under this alternative. These species will still be under rebuilding programs after the projected implementation date of the trawl rationalization program (2011), requiring relatively small OYs. Thus, QSs/QPs for these species could act as a primary constraint on target fisheries, to the degree that incidental catch is unavoidable. Furthermore, since regulations prompted a large proportion of overfished species catch to be discarded, landings toward the end of the allocation period (1994 to 2003) do not accurately reflect the actual distribution of historical catch among fishery participants. Therefore, a different formula would be applied to overfished species to allocate QS. This formula takes into account the amount of target species QSs received by including a proportional component for overfished species QSs (as measured by bycatch rates, individual permit logbooks, and the amount of target species QSs that an entity receives). It also factors in areas where fishing occurred, 2003 to 2006, by a vessel associated with an eligible permit to account for geographic variation in overfished species bycatch rates. This approach is intended to better balance individual holdings of target and overfished species QSs and take into account the areas where permit holders have fished in the recent past. Provisions may allow QSs to

be reallocated once a species is rebuilt, recognizing that the annual OY could be increased substantially once the rebuilding restrictions are lifted.

Co-ops for whiting

The existing, status quo allocation of whiting (Alternative 1) between the shoreside whiting, mothership, and catcher-processor sectors would not change (42, 24, and 34 percent, respectively). No portion of one sector's whiting allocation could be transferred to another sector.

Although Pacific whiting comprises the dominant portion of the catch in the whiting fishery, some overfished rockfish do get caught. As discussed in Alternative 1, bycatch limits have been imposed on the whiting fishery. These bycatch limits would continue to be used under Alternative 3, but would include Pacific ocean perch in addition to widow rockfish, canary rockfish, and darkblotched rockfish. There would be a single cap to cover catch in all three whiting sectors for each overfished species managed this way.³⁹ These bycatch caps would be established for those overfished species likely to be caught in the whiting fishery. In addition, the current ESA-listed Chinook salmon bycatch management measure, a triggered 100-fathom closure, and an ESA consultation threshold would continue in effect.⁴⁰ Status quo management (trip limits) would be used for other bycatch species. In addition, an amount would be deducted from allocations to the trawl sector for these species to account for the expected small amounts of bycatch. Caps on overfished species would be expected to indirectly limit bycatch of these other species.

Under Alternative 3, with co-ops for the whiting sector, the following new permits would be created:

- Mothership processor permit: Historically, any vessel with the proper groundfish LE permit could enter this sector as a processor. The Council previously adopted a stopgap measure, under Amendment 15, to limit participation, which would be replaced by a new mothership permit under Alternative 3. Permit qualification would be based on whiting processing history.
- Shore-based whiting processor permit: Similarly, a new shore-based processor permit would be created under Alternative 3 for processors. Only those processors possessing one of these permits could receive whiting during the first two years of the program. Thereafter, any shore-based processor could receive whiting. See Appendix B, Section B-3.2.2 for more details.
- Whiting catcher vessel permit: New, separate LE permit endorsements would be created for catcher vessels participating in either the mothership or shore-based co-op sectors. Qualification for a permit would be based on past participation in the relevant whiting sector.
- Catcher-processor permit: A permit endorsement would be created to limit participation in the catcher-processor sector. Historically, any vessel with the proper groundfish trawl LE permit could participate. The Council previously adopted a stopgap measure, under Amendment 15, to limit participation, which would be replaced by the catcher-processor co-op provisions of the trawl rationalization program. Only vessels with a catcher-processor-endorsed LE permit would

³⁹ Status quo management of bycatch limits in the whiting fishery now includes a bycatch limit of these species for each of the three whiting sectors (shore-based, mothership, and catcher-processor). This was first implemented in 2009. Because this analytical document was developed before this change, bycatch limits for one combined whiting sector remain in this alternative.

⁴⁰ This threshold, based on the total amount of Chinook salmon caught or the Chinook bycatch rate, triggers a reinitiation of consultation under section 7 of the ESA. As part of the consultation process new measures can be required to mitigate listed species take.

be allowed to harvest fish from the sector's allocation. Pacific whiting vessel licenses currently required under status quo (Alternative 1) would no longer be needed. LE permits with catcher-processor endorsements would continue to be transferable.

Whiting catcher vessels would be able to, each year, choose to join a co-op or fish in a non-co-op fishery. If a vessel chooses to fish in a co-op, it would have to deliver all of its catch to the processor in its co-op (a mothership or shore-based processor). If a catcher vessel wishes to change its co-op membership, it would have to first fish for a year in the non-co-op fishery before joining the new co-op.

Each co-op that is formed would receive an allocation of the sector's overall whiting allocation, based on the combined catch history associated with each member's LE permit. Although the co-op allocation would be based on particular LE permits' catch history, vessels in the co-op would be able to arrange to have another vessel harvest all or a portion of their catch if they do not want to actively participate in the fishery.

The non-co-op fishery would receive an allocation based on the collective catch history of vessels that choose not to join a co-op, in a fashion similar to the co-op allocations. However, harvest would be further controlled in the non-co-op fishery through season restrictions. Vessels fishing in the non-co-op fishery would not be obligated to deliver to any one processor. For the duration of any given year, a permitted catcher vessel could participate in the non-co-op fishery, but the structure of this sector is intended to encourage co-op participation. Non co-op fishery participants would not have the surety of a buyer that a processor co-op obligation represents and could not easily coordinate fishing strategy in the way they are expected to in co-ops. In essence, a non-co-op would be expected to function as an Olympic-style fishery with individual vessels competing among one another to catch the largest portion of the allocation.

Co-ops are expected to facilitate coordination and cooperation among members with respect to harvest strategy. Although co-op members would be guaranteed catch opportunity equal to the portion of the allocation they brought into the co-op through their catch history, in general the co-op allocation is pooled. Members could jointly agree on the specifics of harvesting.

Two or more co-ops could reach an inter-co-op agreement to coordinate harvest strategy and pool whiting and bycatch cap allocations. Various standards for co-op and inter-co-op contractual agreements would be established, both to aid NMFS in its fishery management role and to prevent any member from being unduly disadvantaged by co-op participation.

For the catcher-processor co-op, which currently operates as a single, voluntary co-op, there are few changes from Alternative 1. The catcher-processor permit (mentioned above in this section) would be required. Also, there would be a provision to allow for implementing an IFQ program if the current voluntary co-op system were to fail. In such a case, individual quota would be allocated to each CP permit (equally divided among all CP endorsed permits).

2.3.3 Accumulation Limits and Grandfather Clause

Under Alternative 3, accumulation limits are generally lower than in Alternative 2. Shore-based and mothership co-ops would be subject to control limits similar to those described for the IFQ program in Alternative 2. Shore-based whiting catcher vessel permit holders would be limited in terms of their control of co-op shares (recognizing that one entity could own multiple permits). In the mothership sector, the mothership processors and associated catcher vessels would be limited with respect to how

much of the allocation they could process or control through co-op shares. Alternative 3 QS control limits and, for the IFQ program, QP vessel limits are as follows:

- Shore-based nonwhiting: 1.5 percent control limit; 3 percent vessel limit
- Shore-based whiting: 15 percent control limit
- At-sea mothership whiting
 - motherships: 20 percent control limit
 - catcher-vessels: 10 percent control limit
- At-sea catcher-processor whiting: none

Alternative 3 does not contain a grandfather clause; any potential initial allocation in excess of the accumulation limit would instead be redistributed to those permits below the limits.

2.3.4 Initial Allocation to Processors; Co-op Affiliations

IFQ for nonwhiting

In Alternative 3, 25 percent of nonwhiting groundfish would be allocated to shore-based processors. This differs from Alternative 2c because shore-based whiting is not included since that sector would be managed with co-ops. Small amounts of whiting, representing incidental catch by nonwhiting vessels, would be allocated as QS to the nonwhiting sector permit holders.

Co-ops for Whiting

In Alternative 3, there would be 100 percent processor affiliations in mothership and shore-based whiting co-op sectors.

2.3.5 Species Covered

IFQ for nonwhiting

Alternative 3 contains the same groundfish species covered by an IFQ for the nonwhiting fishery as those in Alternative 2 and those listed in Table 2-2. Unlike Alternative 2, Alternative 3 does not include a halibut IBQ. Pacific halibut bycatch would be subject to status quo management. Under status quo management, the allocation to other fishery sectors in the west coast management area (IPHC Area 2A) is determined by reducing the area TAC by an amount equal to an estimate of the previous year's groundfish trawl sector halibut bycatch. This is an approximate method for accounting for trawl bycatch; if the trawl bycatch in a given year exceeds the amount by which the area TAC was reduced, that is factored into the next stock assessment.

Co-ops for whiting

Under Alternative 3, the species covered in the whiting co-op fishery are limited to whiting and bycatch species. This means that the market-based program does not directly influence how many of the species are caught that do not fall under the whiting or bycatch species category. This lessens the impact the market has on harvests and changes the degree of individual accountability associated with the harvest of groundfish species.

2.3.6 Number of Sectors

Unlike Alternative 2, Alternative 3 would have four separately managed trawl sectors: shore-based nonwhiting, shore-based whiting, mothership whiting, and catcher-processor whiting.

2.3.7 Adaptive Management

Alternative 3 would include the AMP described for Alternative 2b. For the whiting co-ops, only participants in a given sector would be eligible for the adaptive management amounts deducted from each sector's whiting allocation.

2.3.8 Area Management

Under Alternative 3, Qs/QPs for each management unit would be divided geographically so that area-specific QPs would be needed to cover catches in each area. Two zones would be established, one north and the other south of 40°10' N. latitude.

2.3.9 Carryover of Unused QPs between Consecutive Years

Alternative 3 would not contain the carry-over provision included under Alternatives 2 and 4.

2.3.10 Tracking and Monitoring

IFQ for nonwhiting

For the IFQ nonwhiting sector of the fishery, Alternative 3 would contain the tracking and monitoring components described in Alternative 2.

Co-ops for whiting

As discussed above under Alternative 2, given the high level of monitoring already in place in the whiting fishery under status quo management (Alternative 1), only moderate changes in monitoring are expected to be needed to implement Alternative 3 for the whiting fishery. NMFS would close the fishery, a particular sector, the co-op or non-co-op fishery within a sector, or individual co-ops, as appropriate, if a whiting catch or bycatch limit is reached. With respect to co-ops, inseason monitoring and closure would be needed only at the highest level of aggregation of the co-ops. For example, if individual co-ops join together to form an inter-co-op that covers the entirety of one of the whiting sectors, then NMFS would track and close the fishery at the sector level.

Additionally, a program for the mandatory submission of economic data would also be included for the IFQ and the co-op programs, to facilitate monitoring program performance.

2.3.11 Gear Conversion

For the IFQ program, gear conversion would be permitted as described under Alternative 2.

2.4 Alternative 4 (Council Preferred) - IFQs for Single Shore-based Sector and Co-ops for the Whiting At-sea Sectors

This section describes Alternative 4, IFQs for a single shore-based sector (shore-based whiting and nonwhiting) and co-ops for the whiting at-sea sectors. Two sub-alternatives are evaluated under this alternative (Alternatives 4a and 4b) to compare and contrast certain key elements of the IFQ and co-op programs. The Council-preferred alternative is Alternative 4b. As noted above, Appendix A provides further detail on the elements and options the Council considered in an IFQ program. Appendix B provides further detail on the elements and options the Council considered in a co-op program. Appendix D provides further detail on the Council-preferred alternative, Alternative 4b.

Similar to Alternative 3, Alternative 4 is a hybrid approach to rationalizing the groundfish trawl fishery using IFQ and co-ops. However, Alternative 4 moves the shore-based whiting sector from being part of the co-op fishery (as in Alternative 3) to being part of the shore-based IFQ fishery. Alternative 4 would modify the status quo by establishing a single shore-based sector (combining whiting and nonwhiting shore-based fisheries) and co-ops for the whiting at-sea sectors (mothership and catcher-processor sectors). Alternative 4 is intermediate to alternatives 2 and 3 by allowing for more market-driven outcomes than Alternative 3, but fewer than Alternative 2. Alternative 4 achieves a more moderate degree of market influence than Alternative 3 by allowing carry-over provisions, allowing for three trawl sectors, establishing accumulation limits that are between those for alternatives 2 and 3, requiring fewer processor linkages in the mothership co-op program, and crediting shore-based processors for landed whiting only.

Differences between Alternatives 4a and 4b

Alternatives 4a and 4b (Council-preferred) compare and contrast some aspects of all of the key program elements, except for the catch control tools and the number of sectors. For the IFQ program under Alternative 4b, a sub-set of species are covered with IFQs in the shore-based fishery, rather than all species in the Council's ABC/OY table for groundfish (Section 2.4.5 below). Those species would continue to be managed with cumulative landing limits. Those species that are not covered with IFQs are excluded because the incidental catch of those species is small relative to management targets, and the inclusion of those species may have negative economic implications with little to no benefit to management. For initial allocation and qualification, alternatives 4a and 4b would differ in how the buyback history is shared among sectors for the IFQ program and in the qualification requirements for the co-op fishery (Section 2.4.2 below). Accumulation limits vary between alternatives 4a and 4b (Section 2.4.3 below). Alternative 4a would include a grandfather clause, while Alternative 4b would not, but would allow QS owners time to divest any overage. For the IFQ program, alternatives 4a and 4b vary in the amount of whiting allocated to shore-based processors (Section 2.4.4 below). For the mothership co-op program, processor affiliations vary between alternatives 4a and 4b. Both alternatives include an AMP (Section 2.4.7 below). Alternative 4a would set aside 10 percent of the shore-based trawl allocation of all groundfish IFQ species, while Alternative 4b would set aside 10 percent of nonwhiting species for the shore-based sector. Alternative 4a would include area management, while Alternative 4b would not (Section 2.4.8 below). Both alternatives would include a carry-over provision; Alternative 4b would decrease the carry-over if the OY declines in the subsequent year (Section 2.4.9 below).

The following sections describe the main elements of Alternative 4 (including alternatives 4a and 4b (Council-preferred), as summarized in Table 2-1.

2.4.1 Catch Control Tool

Alternative 4 uses IFQs as the management tool for a combined whiting and nonwhiting shore-based sector and cooperatives for the two at-sea whiting sectors.

2.4.2 Initial Allocation and Qualification

IFQ for shore-based

The initial allocation of the target and overfished species in Alternative 4 is the similar to that described under Alternative 3 (Section 2.3.2), except for which sectors get IFQ and, under Alternative 4b (Council-preferred alternative), the initial allocation of overfished species IFQ. Under Alternative 4b, there is no equal sharing element for overfished species IFQ based on buyback permits, except for canary rockfish.

In Alternative 4, the shore-based whiting sector would also receive an initial allocation of IFQ and would share the buyback history. Under Alternative 3, the buyback history would be shared within the nonwhiting shore-based sector. Under Alternative 4a, equal sharing of buyback history would apply to the combined shore-based sector only (whiting and nonwhiting). Under Alternative 4b (Council-preferred), the equal sharing provision would apply to both the shore-based sector (whiting and nonwhiting) and the mothership sector, although, as noted above, there is no equal sharing component for overfished species with the exception of canary rockfish for the combined shorebased sector.⁴¹

The equal sharing element for initial allocation of canary rockfish IFQ in the preferred alternative (Alternative 4b) resulted from a reconsideration adopted by the Council at its November 2009 meeting. Canary rockfish bycatch tends to be episodic and unpredictable and has occurred across a range of target strategies. The Council decided that an allocation formula for canary rockfish that included the equal sharing element (so that every permit gets at least some minimum level of canary rockfish IFQ) would lower the risk of some harvesters being forced out of the fishery because they did not possess, and could not obtain (due to expected high cost), the canary rockfish IFQ needed to cover their bycatch.

Co-ops for at sea

Alternative 4 initial allocation and qualification is similar to Alternative 3, except for which sectors are managed under co-ops. The mothership and catcher-processor sectors would be managed under co-ops (i.e., the at-sea whiting fishery).

For the mothership catcher-vessels, Alternative 4a has the same qualification years as Alternative 3, 1997 through 2003 (an LE permit would qualify for a catcher vessel mothership whiting endorsement if it has a total of more than 500 million tons [mt] of whiting deliveries to motherships during those years). Under Alternative 4a, the catch history assignment for the catcher-vessels in the mothership fishery would be based on the best six out of seven years using those same years, 1997 through 2003. Under Alternative 4b (Council-preferred), different years are used for the catcher-vessel mothership endorsement qualification, 1994 through 2003, and the best 8 out of 10 years from 1994 through 2003 are used for catch history assignment.

Under Alternative 4, the catcher-processor structure and permit would be the same as described in Alternative 3. Since the catcher-processor sector would continue to operate as a single voluntary co-op, catch history assignment is unnecessary; the co-op has access to the full sector allocation.

⁴¹ Since the mothership sector would be managed with co-ops under Alternative 4, the equal sharing provision applies to the allocation of catcher vessel co-op shares (i.e., catcher vessel catch history assignments).

The bycatch limits for the co-op fisheries described under Alternative 3 (Section 2.3.2), would also apply to Alternative 4.

2.4.3 Accumulation Limits and Grandfather Clause

Under Alternative 4, IFQ accumulation limits are generally intermediate to Alternatives 2 and 3. For the co-op fishery, they are higher than Alternative 3.

Alternative 4a QS control limits and, for the IFQ program, QP vessel limits are as follows:

- Shore-based nonwhiting: 2.2 percent control limit; 4.4 percent vessel limit
- Shore-based whiting: 25 percent control limit; 12 percent vessel limit
- At-sea mothership whiting
 - motherships: 30 percent control limit
 - catcher-vessels: 15 percent control limit
- At-sea catcher-processor whiting: none

Alternative 4b accumulation limits are similar in structure to Alternative 4a; however, mothership catcher vessels would be subject to a usage limit in addition to a control limit. The usage limit is a limit on the amount any one vessel can catch and deliver to a processor. Since co-op shares would be pooled and the allocation of catch opportunity among vessels would be decided by co-op members, it is not possible to track the accumulation of co-op shares on a vessel in the way that QP vessel limits work in the IFQ program. The usage limit is an alternative approach to achieve the same end. Alternative 4b QS control limits and, QP vessel limits for the IFQ program, are as follows:

- Shore-based nonwhiting: 2.7 percent control limit; 3.2 percent vessel limit
- Shore-based whiting: 10 percent control limit; 15 percent vessel limit
- At-sea mothership whiting
 - motherships: 45 percent control limit
 - catcher-vessels: 20 percent control limit; 30 percent vessel limit
- At-sea catcher-processor whiting: none

Alternative 4a contains the grandfather clause allowing QS holdings in excess of accumulation limits based on initial allocation. Alternative 4b (the preferred alternative) does not contain the grandfather clause. Permit holders who would receive QS in excess of the accumulation limits would have two years to divest their excess QSs to any willing receiver. This would occur in the third and fourth years of the program, since QS transfers are prohibited in the first two years of the program. Any QSs not divested at the end of the fourth year would be forfeited, and these excess QSs would be reallocated to other permit holders below the limit. Before divestiture, these quota holders are free to use the QPs derived from their excess QSs. This is meant to smooth the transition for those fishery participants with historically large catches.

In addition to the overall program control limits and vessel limits, there are also species-specific limits as detailed in Table 2-3.

Table 2-3. QS control limits and QP vessel limits in the IFQ Program under Alternative 4b.

Species Category	Vessel Limit (Vessel Use Limit)	Vessel Unused QP Limit	QS Control Lim
Nonwhiting Groundfish Species	3.2%		2.7%
Lingcod - coastwide	3.8%		2.5%
Pacific Cod	20.0%		12.0%
Pacific whiting (shoreside)	15.0%		10.0%
Sablefish			
N. of 36° (Monterey north)	4.5%		3.0%
S. of 36° (Conception area)	15.0%		10.0%
PACIFIC OCEAN PERCH	6.0%	4.0%	4.0%
WIDOW ROCKFISH *	8.5%	5.1%	5.1%
CANARY ROCKFISH	10.0%	4.4%	4.4%
Chilipepper Rockfish	15.0%		10.0%
BOCACCIO	15.4%	13.2%	13.2%
Splitnose Rockfish	15.0%		10.0%
Yellowtail Rockfish	7.5%		5.0%
Shortspine Thornyhead			
N. of 34°27'	9.0%		6.0%
S. of 34°27'	9.0%		6.0%
Longspine Thornyhead			
N. of 34°27'	9.0%		6.0%
COWCOD	17.7%	17.7%	17.7%
DARKBLOTCHED	6.8%	4.5%	4.5%
YELLOWEYE	11.4%	5.7%	5.7%
Minor Rockfish North			
Shelf Species	7.5%		5.0%
Slope Species	7.5%		5.0%
Minor Rockfish South			
Shelf Species	13.5%		9.0%
Slope Species	9.0%		6.0%
Dover sole	3.9%		2.6%
English Sole	7.5%		5.0%
Petrable Sole	4.5%		3.0%
Arrowtooth Flounder	20.0%		10.0%
Starry Flounder	20.0%		10.0%
Other Flatfish	15.0%		10.0%
Other Fish	7.5%		5.0%
Pacific Halibut	14.4%	5.4%	5.4%

* If widow rockfish is rebuilt before initial allocation of QSs, the vessel limit will be set at limit will be 1.5 times the control limit.

2.4.4 Initial Allocation to Processors; Co-op Affiliations

IFQ for shore-based

Under Alternative 4a, 50 percent of shore-based IFQ for whiting would be allocated to processors based on processing history. Under Alternative 4b, the Council-preferred alternative, shore-based processors would be allocated 20 percent of the shore-based IFQ for whiting.

Co-ops for at sea

The mothership sector is managed with harvest co-ops, and each catcher vessel wanting to participate in a co-op must declare a mothership to which it will deliver in the upcoming year. Unlike harvest co-ops with linkages in Alternative 3 and 4a, the co-op declaration under Alternative 4b (Council-preferred) allows vessels to switch motherships freely from year to year without penalty. However, catcher vessels cannot fish for more than one mothership within a year, unless it is participating in the non-co-op fishery. Under Alternative 4b, catcher vessels would declare which co-op they would join before the beginning of the fishing year. They would then be obligated to deliver their catch to the associated mothership processor for that fishing season. In any subsequent year, they could change their affiliation without first participating in the non-co-op fishery through the pre-season declaration. Provision for a non-co-op fishery would still be included in the program structure. Any vessel not wishing to affiliate with a co-op could participate in the non-co-op fishery and deliver to any willing mothership processor. The declaration element under Alternative 4b was adopted by the Council after hearing from NOAA General Counsel that a mothership linkage may raise some legal issues. The declaration provision is intended to provide some degree of certainty to foster business planning among motherships. Under Alternative 4a, catcher vessels would be obligated to deliver 50 percent of their catch to the processor to which they are tied (compared to all their catch under Alternative 3). They would be free to deliver the remaining 50 percent to any mothership processor willing to receive it. As in Alternative 3, they would have to participate in the non-co-op fishery first to change their processor affiliation.

2.4.5 Species Covered

IFQ for shore-based

Alternative 4a does not include a halibut IBQ (similar to Alternative 3); while Alternative 4b (Council-preferred) does (similar to Alternative 2). Under Alternative 4b, bycatch mortality of Pacific halibut must be covered by IBQ, and mortality would be assessed at the individual vessel level. Under Alternative 4b, a sub-set of species are covered with IFQ in the shore-based fishery, rather than all species in the Council's ABC/OY table for groundfish. Table 2-2 shows the groundfish management units that would have IFQs and those for which IFQs would not be issued under Alternative 4b. Species for which an IFQ is not issued would continue to be managed with current tools, such as cumulative landing limits. Those species that are not covered with IFQs are excluded because the incidental catch of those species is small relative to management targets, and the inclusion of those species may have negative economic implications with little to no benefit to management.

Co-ops for at sea

Similar to Alternative 3, the species covered in the at-sea whiting co-op under Alternative 4 are limited to whiting and bycatch species. Part of the trawl allocation for nonwhiting management unit species taken in the at-sea whiting sectors would be set aside to accommodate catches in those sectors; the remainder would be available for harvest in the shore-based sector.

2.4.6 Number of Sectors

Similar to Alternative 2, Alternative 4 would have three trawl sectors: shore-based (combined whiting and nonwhiting), mothership whiting, and catcher-processor whiting.

2.4.7 Adaptive Management

IFQ for Shore-based

Alternative 4a would implement an AMP for the combined shore-based sector reserving 10 percent of the QS for all species (as in Alternative 2b). Alternative 4b would implement a program where only nonwhiting species QS would be reserved for the shore-based sector. In addition, under Alternative 4b during the first two years of implementation of trawl rationalization the adaptive management QPs would be distributed to QS holders in proportion to their holdings except for canary rockfish. Allocations of QPs under the program would begin in the third year based on further specification of AMP objectives and mechanisms.

Co-ops for at sea

Under Alternative 4, there would be no AMP for the mothership and catcher-processor whiting sectors.

2.4.8 Area Management

Alternative 4a is the same as Alternative 3, where QSs/QPs for each management unit would be divided geographically so that area-specific QPs would be needed to cover catches in each area. Two zones would be established, one north and the other south of 40°10' N. latitude. Alternative 4b would not include area management, same as Alternative 2.

2.4.9 Carryover of Unused QPs between Consecutive Years

Alternative 4 includes the same carry-over provision described in Alternative 2 (Section 2.2.9).

2.4.10 Tracking and Monitoring

IFQ for shore-based

For the IFQ program, Alternative 4 would contain the tracking and monitoring components described in Alternative 2, but would apply to the shore-based (whiting and nonwhiting) sector.

Co-ops for at sea

Alternative 4 is the same as Alternative 3.

A program for the mandatory submission of economic data would also be included for the IFQ and the co-op programs, to facilitate monitoring program performance.

2.4.11 Gear Conversion

For the IFQ program, gear conversion would be permitted as described under Alternative 2.

2.5 Alternatives considered, but rejected from further analysis

There are many different programs that might be used to rationalize the fishery. The Council focused on IFQs and co-op approaches to rationalization. Some other approaches for rationalization that were considered and set aside were permit stacking, processor Qs, community development quotas (CDQs), and a proposal called the Optimum Species Harvesting Unified Allocation Plan (OSHUA).⁴² Under permit stacking, cumulative limits would have been kept in place, but they would have become catch limits instead of landing limits, necessitating 100 percent observer coverage. A vessel would have been able to access an additional set of cumulative limits for each permit it stacked on the vessel (similar to the LE fixed gear sablefish permit stacking program). Under status quo, because not every vessel lands the full cumulative limit, cumulative limits can be set higher than would be the case if each vessel's cumulative limit was fully utilized. Permit stacking would be expected to increase the utilization of cumulative limits, necessitating that the limits be reduced and likely resulting in the limits becoming quotas.⁴³ The prospect of full utilization of each cumulative limit would essentially turn the program into an IFQ program with very limited transferability or flexibility. The Council kept an option for permit stacking (and switching from landing to catch limits) on the table for several years during its deliberative process before finally setting it aside. The main problem with the alternative was that it entailed some of the more significant costs of the IFQ alternative (e.g., full observer coverage) but without the flexibility needed to generate significant economic benefits from rationalization.

Another major alternative considered was processor Qs. Processor Qs are shares that must be held to process fish and, thus, differ from IFQs which must be held to harvest fish (they are also different from the allocation of IFQ to processors). It is arguable whether or not processor shares are an effective or needed tool for rationalization of the fishery. The Council consideration of such an option was stemmed first by a Congressional prohibition on the spending of funds for consideration of quotas for processing and then by a prohibition in the MSA.

The Council also explored rationalization programs that might directly include communities, something similar to the CDQ programs in Alaska. A community representative was assigned to the committee that took the lead in initial program design (the TIQC). However, the Council heard both from that representative and others involved in local governments that local governments on the west coast were not interested in the administrative costs and burdens that would be entailed in running a CDQ program.

The OSHUA plan covered management of sectors (e.g., recreational) far beyond the scope of the proposed action. With respect to the portions of the proposal covering management of the trawl sector, the proposal would have been based on annual (or biannual) reallocations of fishing privileges in a manner that would reward those harvesting the most target species within rebuilding and bycatch constraints. While providing an incentive to reduce bycatch rates, the proposal did not allow for substantial rationalization of the fishery and the generation of the increased benefits needed to counteract the increased management costs. The annual allocations needed to achieve the objectives identified by the plan would have been more complicated than identified in the plan (e.g., requiring consideration of depth and latitudinal strata), administratively costly, and a substantial burden on the resources available

⁴² CEQ regulations covering EISs state “for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated [sic]” (40 CFR 1502.14(a)). This section provides a short summary of the range of approaches considered, both in developing the trawl rationalization and in earlier years. Deliberations before the trawl rationalization proposal was developed are relevant because they helped to shape the range of ideas the Council considered during trawl rationalization program development.

⁴³ The cumulative limits would become quotas when they are reduced to the level at which, if every vessel takes its limit, the total catch will exactly equal the trawl allocation.

for fishery management. Additionally, the plan called for the delegation of responsibilities to Council advisory bodies in a manner that is not allowed under the MSA.

The Council also considered but rejected achieving individual accountability and improved mortality estimates through full retention rules in the nonwhiting fishery with compliance monitored through video cameras. Reasons for the Council recommendations on these management approaches are discussed in Sections 2.6.2 and 2.6.4.

There are a number of provisions (components of alternatives) considered by the Council but ultimately not included in the alternatives. These include fixed terms on QSSs, auctions, zonal management, and gear conversion, among others. These provisions and the reasons for the Council recommendations in regard to them are documented in Appendices A and B.

2.6 Rationale for the Council's Preferred Alternative (Alternative 4b)

The need for a change from status quo is identified in the problem statement. After reviewing the status quo situation and both the beneficial and adverse impacts of the trawl rationalization alternatives (as described in detail in Chapter 2, Chapter 4 and the appendices to this document), the Council's judgment was that the advantages of its final preferred alternative for trawl rationalization, Alternative 4b, outweighed the disadvantages in comparison to continuation with status quo management, the other trawl rationalization alternatives that were considered, and other proposals for modification of status quo (e.g., providing longer cumulative limit periods).

There are two primary drivers in the problem statement that guided this process: the first is the need to account for, control, and reduce bycatch, and the second is the need to provide for an economically sustainable fishery for the benefit of industry participants and fishery dependent communities. These needs are both reflected in the goal for this action:

*Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.*⁴⁴

2.6.1 Trawl Focus

Foremost, this goal reflects the Council's understanding that trawl gear is the only gear that can viably harvest⁴⁵ much of the groundfish that is economically important to the fishery and important as a protein source to the broader public, i.e., it is the only gear that can be effectively used to remove much of the biomass that is available for harvest within conservation constraints. Therefore, the focus is on improving management of the trawl fishery rather than considering direct reallocation of trawl harvest to other gears. While the focus was primarily on improving management of the existing trawl fishery, the Council's action, both in its preferred alternative here, and in the intersector allocation amendment (Amendment 21), takes into account opportunities to reduce bycatch and other possible adverse environmental impacts

⁴⁴ "Bycatch" is defined in the Magnuson-Stevens Act as: "species of fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program."

⁴⁵ "Viably harvest" can be explained in a couple of different ways. For some species, such as many species of sole and other flatfish, trawl gear is the only proven gear that can consistently harvest a quantity that approaches the allowable catch for those species. In other cases, the price per pound received is too low to justify the use of gear that takes species in lower quantities.

by moving some of the harvest toward nontrawl gears. In this action, the potential for movement toward nontrawl gears is accounted for through the scope of the program (which includes an opportunity for vessels with trawl permits to switch to nontrawl gears to take their quota). In addition, the intersector allocation decisions made in Amendment 21 favor nontrawl gears by basing the groundfish allocation on the historic periods most favorable to nontrawl gears, by truncating the trawl groundfish allocation at a maximum of 95 percent,⁴⁶ by imposing further reductions in the trawl allocation for a few other species, and by targeting a 50 percent reduction in the trawl bycatch of halibut.

2.6.2 Bycatch Reduction Objective and Observer Coverage

This action responds to the identified need for bycatch control and the need for conservation through its focus on individual accountability for catch and bycatch. At present, total mortality for all species is measured and controlled by monitoring total landings and sampling 20 percent of the trawl trips to estimate bycatch rates (discard rates) that are then applied to landings to develop an estimate of total catch and mortality. With this approach, there is substantially less certainty about total catch and mortality than there are total landings. Further, while agencies are able to regulate total landings in the nonwhiting trawl fishery through two-month cumulative limit periods and influence bycatch rates with catch area restrictions and gear restrictions, they face difficulties in managing for total catch in the nonwhiting portion of the trawl fishery. The fishery is a mixed stock fishery. When, despite best regulatory efforts, a fisherman encounters amounts of certain species that are in excess of the two-month cumulative landing limits, they may continue to fish for other target species, discarding the species for which they have reached their limit.⁴⁷ The current monitoring system was designed to provide fleetwide total catch estimates over the course of a year. It was not intended as a tool for managing individual vessel discards in the nonwhiting trawl fishery or for providing for individual accountability.

The Pacific whiting fisheries are different in that monitoring is in place that is intended to manage for total catch. The at-sea fisheries use 100 percent observer coverage on both catcher-processors and motherships and document landings and discards that are occurring in those fisheries. The shoreside whiting fishery is exploring the feasibility of cameras intended to verify full retention of catch on board vessels in that fishery. Through a full retention program, the documentation of total catch of species in that fishery occurs dockside.

The Council considered achieving individual accountability and improved mortality estimates through full retention rules in the nonwhiting fishery with compliance monitored through video cameras. However, the practicality of using cameras in the nonwhiting fishery is problematic because of the vessels' need to discard debris and prohibited species and the difficulty of monitoring holds for surreptitious catch sorting and discarding.

The other means identified for providing individual accountability for discarding is to require 100 percent observer coverage for vessels participating in the trawl sector. Full observer coverage, combined with a shift from regulating landings to regulating catch, is a key element of the Council's preferred alternative. These elements provide for individual accountability for catch and some incentive for bycatch reduction.⁴⁸

⁴⁶ For several species, trawl catch typically approaches 100 percent of the available harvest.

⁴⁷ These discards are incorporated into the observer estimates of discard mortality, but the fleet as a whole pays for this activity through reduced fishing opportunity; it impacts the vessel doing the discarding only through its impacts on the fleet as a whole.

⁴⁸ When vessels must stop fishing as soon as they reach their limit of a bycatch species, that provides an incentive to avoid bycatch, at least enough so the vessel is able to catch its target species quota.

2.6.3 Link between Bycatch Control and Need for Rationalization

Full at-sea monitoring and the switch from controlling landings to controlling catch would achieve the main conservation related objectives; however, 100 percent observer coverage for the nonwhiting fishery and observers/cameras for whiting catcher vessels would be costly. Even if the observers/cameras were not paid for by industry, there are still costs that a vessel incurs when it has an observer or camera on board. If vessels must pay for the cost of observers, then the burden is substantial, and it moves the fishery away from achieving social and economic objectives. As identified in the problem statement, the fishery is already under substantial economic stress. The 2003 buyback program improved the economic situation of fishing vessels after the groundfish resource disaster that was declared in 2000.⁴⁹ However, the fleet remained only marginally profitable, as illustrated in a study by Lian et. al. (2008). Imposing large additional costs to carry observers could devastate the fishery unless its overall economic health is also improved. Early on (in its strategic plan and Amendment 18), the Council identified rationalization as a way to improve the economic health of the fishery. Under a perfectly rationalized fishery, capacity would be reduced, and costs would be minimized so that the labor, capital, and other inputs used to capture the fish are no more than is absolutely necessary to fully take the amount that can be harvested while meeting conservation objectives. Thus trawl rationalization is viewed as a necessity for improving the health of the industry. Further, with 100 percent observer coverage, the Council would be able to better monitor total mortality of all groundfish species. Better mortality estimates would improve both stock assessments and the Council's ability to keep catch below the harvest limits developed based on those assessments, substantially contributing to conservation goals. Finally, rationalization based on a system that relies on transferable quotas enhances the incentive to avoid bycatch. Without transferable quota, the incentive is to reduce bycatch only to the point where all targeted species can be harvested. With transferable quotas, fishermen who can lower bycatch rates even further have a potential opportunity to sell their unused quota to others, thus benefiting from reducing their bycatch rate to a level lower than what was necessary for them to take their own available target harvest.

2.6.4 Choosing Between Status Quo and Trawl Rationalization: Broad-Level Council Concerns and Tradeoffs

When taking their preliminary and final actions, Council members noted the goal and eight objectives for the trawl rationalization program, as well as a number of related factors that were important considerations in developing their final recommendation. One important consideration was whether there was a potential for achieving some of the goals and objectives through other types of modifications to status quo. The Council considered whether modifications such as extending the duration of the two-month cumulative trip limit periods and a full retention requirement might achieve some of the important objectives. Extension of cumulative limit periods would decrease the Council's opportunity to make inseason adjustments and would be expected to increase the number of vessels taking their full limits. This would move the fishery in the direction of individual permit quotas without generating the degree of benefits expected from a regular IFQ program. However, extending the two-month cumulative trip limit reduces the number of opportunities the Council has for making adjustments to catch limits to stay within allowable catch levels, thus increasing the possibility of exceeding ABCs and OYs established by the Council. Extension of the length of the cumulative limit periods was an option that had been previously considered and rejected by the Council. For the whiting fishery, there is a need to end the derby because of safety and waste issues; however, the bioeconomics of the fishery does not lend itself to management through cumulative limit periods used in the nonwhiting fishery. While Amendment 15 has resolved some of these issues, the trawl rationalization program would implement a longer-term solution. The Council considered maximized retention in the Pacific whiting fishery, and NMFS is currently considering it for approval as regulations to implement Amendment 10 to the Groundfish FMP.

⁴⁹ The disaster was a result of the harvest reductions imposed to rebuild overfished stocks.

Maximized retention for the nonwhiting fishery was considered as a monitoring option under the IFQ program, but was rejected. The Council was not able to identify other ways to modify status quo that would be as effective as trawl rationalization in moving the fishery toward its most important goals and objectives (described above).

Under status quo, the trawl fishery is viewed as economically unsustainable due to the number of participating vessels, excess capacity, a regulatory approach that constrains efficiency, and the status of certain groundfish stocks along with the measures in place to protect those stocks. At the same time, there are both benefits and costs that have to be considered with respect to trawl rationalization. Regardless of the deficiencies of status quo management, the Council had to determine whether trawl rationalization, on balance, would be an improvement over status quo. In particular, the Council debated whether the economic benefits expected from increased harvest and efficiency would be sufficient and occur early enough in the program to help the fishermen handle the increased costs of the program. Some Council members expressed concern that markets for expanded harvest might take time to develop and that provisions to limit consolidation could also delay benefits. However, while most Council members shared concerns about these possibilities, the broadly held view was that the potential for improving the economics of the fishery through trawl rationalization was substantial enough to overwhelm the risks and uncertainties. Council members noted that, due to cumulative limit management, the amount of one highly marketable fish species that had gone unharvested in a recent year was nearly enough to alone cover observer program costs, and reported discard rates and wastage were unacceptable. Given the under-harvest of available OYs, the Council believed it was important to the fishermen and the public to provide an opportunity to achieve the OYs and develop markets for additional fish products. Furthermore, the program would provide the fishery an opportunity to increase profits, not just through harvest expansion, but also through a variety of mechanisms leading to cost reductions. For the nonwhiting fishery, an economically healthy fishery would also be expected to result in some improvement in safety. For the whiting fishery, an end to the derby would create substantial safety improvements.⁵⁰ In addition to the potential for safety and strong economic benefits, Council members noted the substantial conservation benefits expected from 100 percent monitoring of catch. This would help reduce bycatch and discards and rebuild stocks that are suffering partially because of discards.

While the trawl rationalization program would move the fishery toward some of its most important goals and objectives, in order for the program to realize those benefits, a large amount of consolidation would have to occur, resulting in fewer people employed in the fishery. Council members acknowledged and expressed concern about the expected consolidation and its impacts and noted the need to attend to the potential for disproportionate impacts on some communities. There was also concern that the potential accumulation of wealth under the IFQ program should have corresponding levels of benefit for the nation, and that state implementation costs be addressed. Finally, Council members expressed an interest in maintaining the character of the fleet and a diversified industry. Balancing the need for consolidation to generate adequate levels of benefit with the potential adverse impacts of consolidation was a major challenge. At the same time, continuation of status quo was having its own impacts, with both the buyback program and cumulative limits having caused significant consolidation in the fleet and a redistribution of vessels along the coast. Because of the high degree of concern about impacts on communities and maintaining some sharing of benefits (both among harvesters and between harvesters, processors, and others dependent on the fishery) the Council made a number of tradeoffs in the trawl rationalization program that may prevent the program from reaching the full degree of economic efficiency that might otherwise be achievable through rationalization. For example, accumulation limits would help disperse fishery benefits, but would inhibit consolidation. And some QS were set aside for use in adaptive management to address such objectives as community and processor stability, new entry,

⁵⁰ The catcher/processor sector is an exception because these issues have already been addressed through a self-designed and implemented co-op program.

conservation, and other unidentified/unforeseen adverse consequences. A number of other measures were also considered (documented in Appendices A and B) as the Council struggled to find a balance among sectors, states, vessels, ports, conservation obligations, and its responsibility to try to develop a regime that maximizes economic benefits while simultaneously realizing, recognizing, and honoring the social effects of its decisions.

In taking this action, the Council acknowledged that work will have to continue to monitor the program and to make adjustments in response to program performance. Even prior to implementation, the Council will continue to work on provisions for Community Fishing Associations (CFAs) and an AMP. While there may be unintended and unanticipated consequences, there will be an opportunity to modify the program through a review process, and a data collection process will be implemented to support that review.

Overall, the Council viewed the trawl rationalization program as addressing many of the difficult, time-consuming management problems it has struggled with under status quo. It is expected to provide a basic management framework that will provide the most benefits to the nation for the public resource, including assigning personal accountability for the fisheries, providing opportunities for bycatch reduction, enhancing stock rebuilding through improved fishery information and full observer coverage, providing opportunities to maximize catch of targeted species while protecting species of concern, improving economic performance, helping to maintain community stability, improving safety, guarding against local stock depletion, and addressing unforeseen circumstances through an innovative adaptive management provision. In sum, the Council views trawl rationalization as a program that will help address conservation concerns and take a system that is not economically viable for many and turn it into one that will work for those who remain in the fishery after rationalization.

2.6.5 Choice between IFQs and Co-ops for Each Trawl Sector

Having evaluated the potential of, and set aside, a number of other approaches to status quo and trawl rationalization, the Council focused most of its efforts on considering alternative designs of IFQ and co-op programs to rationalize the fishery. Under an IFQ program, each vessel acquires the quota necessary to prosecute its own fishing strategy, and each vessel is individually responsible to the fishery management agency for complying with the program and covering its harvest with quota. Under a co-op program, an allocation is given to the co-op and the co-op then distributes the allocation to its participating vessels. The co-op agreement and managers determine the amounts each vessel will harvest, and the vessels are responsible to the co-op for complying with the terms of the co-op agreement. In some cases, the allocation received by the co-op is determined by the history associated with each of the permit holders who are members of the co-op. The fishery management agencies do not track the transfer of harvest opportunity among co-op members, nor do they track each vessel's catch against allocations to that vessel. The fishery management agencies hold the co-op as a whole responsible for staying within its limits and the individual vessels responsible for complying with other aspects of the program, such as requirements to carry an observer.

The Council looked at rationalization for the four groundfish trawl sectors: nonwhiting shoreside, whiting shoreside, mothership whiting, and catcher-processor whiting. IFQs were considered for each fishery and co-ops were considered for each of the three whiting sectors.

2.6.5.1 Choice for the Shoreside Nonwhiting Sector

A co-op program was not considered for the shoreside nonwhiting fishery because the diversity of fishing strategies in which vessels participate and the geographic distribution of the shoreside fishery do not lend

themselves to the type of coordination and central operational management that is best facilitated by a co-op program. The whiting fisheries are more homogeneous in terms of fishing strategies, the timing of the fishery, and their geographic distribution. This homogeneity lends itself more to the type of centralized management provided by the co-op.

2.6.5.2 Choice for the Shoreside Whiting Sector

The shoreside whiting fishery is viewed as having greater homogeneity among participants than the nonwhiting fishery, but less homogeneity than the other whiting fisheries. In its preliminary preferred alternative, the Council considered the appropriateness of both IFQs and co-ops in this fishery and chose to specify dual preferred alternatives for the shoreside whiting fishery (IFQs or co-ops for whiting). In that action, it was noted that the Council lacked adequate authority to limit entry for processors or require a permit-processor linkage, both of which were part of the shoreside co-op alternative. Although processors are not part of harvest co-ops, both processor licensing and permit-processor linkages were considered key elements of the co-op alternative considered by the Council. These elements provided a way to maintain a balance of market power between harvesters and processors. Some also viewed processor linkages as a way to provide a central point for the sharing of information within co-ops that might tend to form around similar processors. Such information sharing may facilitate the avoidance of bycatch;⁵¹ however, it is not clear that processor linkage is needed to encourage such information sharing within the structure of a co-op. When it took final action on this issue at its November 2008 meeting, it was clear to the Council that moving ahead with trawl rationalization for the shoreside whiting fishery could most reliably occur through a shoreside program that did not include processor linkage (i.e., did not require Congressional action). Further, representatives of the harvesting and processing sectors reached a compromise agreement and recommended that under an IFQ program there be a 20 percent allocation of whiting QS to processors. This allocation to processors addressed concerns about the effects of trawl rationalization on market power balance between the harvesting and processing sectors. Also contributing to the decision to manage the shoreside whiting sector under IFQs was the opportunity that managing the two sectors together provided for resolving intersector allocation issues between them. The rationale for the 20 percent allocation of whiting QS to processors and the advantages of managing the shoreside trawl sectors together under a single IFQ program are discussed further below in the section on rationale for specific provisions of the IFQ program.

2.6.5.3 Choice for the Mothership Whiting Sector

For the mothership fishery, the Council had more latitude to consider regulating processors, since processing facilities in this sector are on vessels and, therefore, come under the Council's authority within the MSA. While the Council had authority to limit new entry for processing vessels, NOAA General Counsel advised the Council that absent a strong conservation rationale it would not have the authority to regulate economic relationships between vessels and processors that would otherwise be determined in the marketplace; i.e., the Council's authority to recommend processor ties was limited. On this basis, the Council developed a processor tie provision that only required a vessel to commit its production to a particular processor for the coming year and did not extend that obligation to any subsequent year. This requirement came about after hearing public testimony indicating that the absence of certainty regarding catcher vessel deliveries in the mothership portion of the Bering Sea pollock fishery nearly led to the bankruptcy of a mothership company engaged in that fishery. The declaration procedure is intended to

⁵¹ Under a co-op system, the vessels are bound together in a single entity in which the individuals have an interest in ensuring that the entity as a whole does not exceed bycatch limits prior to the time that its allocation of target species is taken. This creates an incentive for them to actively share information about high and low frequency bycatch areas with one another. In the midwater fishery in particular, such areas shift around with changing ocean conditions.

facilitate some business planning certainty to the mothership for the coming year. Even though the processor tie provision had to be severely weakened, the co-op alternative was still viewed as providing some balance of marketing power between mothership harvesters and processors, because it created an LE system for mothership processors, thereby strengthening their position vis à vis harvesters. The co-op alternative also had the advantage of encouraging vessels to work together and share information about catch rates through the co-op structure. Some savings in administrative costs were also expected because the co-op will track transfers of allocation among vessels, alleviating the need for NMFS to handle that task. Finally, some Council members voiced a preference for supporting industry participants by addressing their issues through co-op efforts and less governmental involvement. Under the IFQ program for the mothership sector, the issue of market power balance might have been addressed through an initial allocation of QS to processors (something like the 20 percent that was given to shoreside processors), but the IFQ program alternative did not include an LE system for mothership processors. Additionally, the IFQ program did not provide the incentive and structure for information sharing about bycatch. Finally, the mothership co-op alternative was originally developed through a consensus between the majority of mothership sector harvester and processor participants, and the participants in that consensus continued to support the co-op alternative, even with the substantially weakened processor tie provision.

Managing the mothership sector under an IFQ program would have provided an opportunity to reduce management costs and allocation controversy by combining the mothership and shore-based sectors under a single IFQ program. However, there were also concerns that vessels participating in the mothership sector might have an economic advantage over the traditional shoreside fleet and that if the catcher vessel fishery (shoreside and mothership catcher vessels) were managed under a single IFQ program the mothership catcher vessels might use that advantage to purchase more QS, redistributing harvest within the fleet and among communities, causing disruption and adverse social consequences.

2.6.5.4 Choice for the Catcher Processor Whiting Sector

The catcher processor sector of the whiting fishery is already rationalized under a self-developed co-op program, entered into voluntarily by the participants in that fishery. The self-designed program was initially facilitated by (1) a license limitation program, which created a barrier making it very expensive for new catcher-processors to enter the fishery, and (2) the Council's specification of a whiting allocation for the catcher-processor sector. The program was further supported by Amendment 15, which established a Pacific whiting vessel license based on historical participation. Implementation of Amendment 15 prohibits new entrants and, thereby, maintains the current structure and stability of the catcher-processor co-op. The Pacific whiting vessel license was intended to be an interim measure until the Council fully considered trawl rationalization. During the development of the preferred alternative (Alternative 4b), the Council expressed concern that the structure of the co-op could deteriorate, resulting in a derby fishery. Therefore, it specified that in the event the co-op failed the fishery would be managed with an IFQ program and that an equal amount of QS would be issued to each permit with a catcher-processor endorsement.

2.6.6 Major Decisions in Designing the IFQ Program

With respect to IFQs, the Council considered programs that would manage each trawl sector under a separate IFQ system, one that would manage the shore-based trawl sectors together, but the two at-sea whiting sectors separately, and one that would manage all four trawl sectors under a single program. Under the Council-preferred alternative (Alternative 4b), the Council chose IFQ management for the shore-based whiting sector and the nonwhiting shore-based sectors and recommended managing them together as a single shore-based trawl sector. Managing the shore-based trawl fishery as a single sector is expected to increase the likelihood that available harvest will be fully taken. If the shore-based trawl

sector were managed as two separate IFQ programs, the Council would have to allocate nonwhiting species taken incidentally in the whiting fishery to the shore-based whiting sector and nonwhiting trawl sectors. If the incidental catch allocations the Council provided to the shore-based whiting sector were not sufficient to allow the sector to take all of its whiting allocation, there would be no way for the shore-based whiting sector to acquire additional nonwhiting quota to cover its incidental catch, and whiting would go unharvested. At the same time, if the shore-based whiting sector were allocated more than the amount it needed to cover incidental catch, there would be no mechanism to move the excess back to the nonwhiting shore-based trawl fishery for its use, and the excess allocation would go unharvested. By managing the shore-based trawl sectors together under a single IFQ program, there is an increased likelihood that the market place will overcome constraining species issues as quota holders buy and sell quota to whomever can put it to best private use (i.e., to whomever is willing to pay the highest price for it).

Deciding on the groups which would receive an initial QS allocation was another major decision for the Council. One of the primary issues debated extensively was whether to give an initial allocation of QS to processors and, if so, in what amount. During Council discussion, it was noted that the MSA LAPP provisions in Section 303A(5) require that the Council ensure fair and equitable initial allocations, including consideration of (1) current and historic harvests, (2) employment in the harvesting and processing sectors, (3) investments in and dependence on the fishery, and (4) the current and historical participation of fishing communities.

Congress specifically instructed the Council to fully analyze alternative program designs, including allocation of LAPs to harvest fish to fishermen and processors. Much of the Council's discussion about an allocation to processors revolved around the impact of both status quo and trawl rationalization on market power. It was noted that the U.S. economy relies on competition and on individuals and businesses acting in their own self interest for growth, innovation, price setting, and the allocation of resources. There was a sentiment that government should not interfere in business competition unless it is necessary for the public benefit. It was noted that the Council interferes with harvesting businesses because of problems identified relative to conservation and management both in the nonwhiting and whiting fishery. When the Council intervenes in harvesting, it cannot help but also interfere with the processing businesses by changing the basic bargaining dynamics in the raw fish product market. While ex-vessel price negotiations have to be left to the harvesters and processors, the Council believed it could not ignore how fishery management actions might influence those negotiations. Some Council members opposed any allocation to processors on the grounds that they believed it would have an adverse effect on market power (increasing market power for processors) and that there were ways to address concerns about community stability other than by allocating to processors. They noted that even if processors received no QSs, after initial allocation, processors would likely be in a position to acquire additional shares and achieve the balance of power they want. The real issue of concern in this regard may be the control limits to ensure that the balance does not get out of hand. Others were concerned about small processors and expressed concern that not to allocate to processors might cause more consolidation and a further decline in the number of buyers, increasing the power of remaining processors.

In its preliminary preferred alternative, the Council recommended giving processors 20 percent of the shore-based allocation of QSs for all species except bycatch taken in the shore-based whiting fishery. Council members noted the difficulty of determining the correct percentage for a possible QS allocation to processors. The option for a 50 percent allocation of whiting QSs to processors seemed like far too much. When a 20 percent option was proposed, some Council members believed that when the 20 percent allocation to processors was combined with a 10 percent allocation for adaptive management, and considering that some processors would receive QSs for the permits they hold, the amount remaining for harvesters would be insufficient. In selecting its preliminary preferred alternative, Council members noted that the case for providing QSs to whiting processors seemed to be relatively clear but it was less

clear for nonwhiting processors. For whiting processors, the switch from a derby fishery would immediately result in some of the processing capacity becoming surplus. The shift from two-month cumulative trip limits periods to IFQs would not affect the nonwhiting processors in the same way. However, with respect to nonwhiting processors there was concern for small processors' ability to compete with larger processors. The 20 percent approach chosen for the preliminary preferred alternative was believed by some to be a fair middle ground for public review and comment.

In its final preferred alternative, after further review of the analysis and public testimony, the Council recommended giving processors 20 percent of the Qs only for shore-based whiting and no Qs for shore-based nonwhiting. In taking this action, Council members expressed their concern that an initial allocation of Qs to nonwhiting processors would add too much to the market power of shore-based nonwhiting processors. They noted that there was already considerable consolidation among processors, particularly relative to the number of vessels operating in the fishery. Providing processors with an initial allocation would be expected to further increase consolidation and market power. Additionally, the argument that the larger processors also held vessel permits, which would provide them with QS, held more sway. At the same time, Council members continued to be concerned with the impact of the program on smaller processors. It was noted that if an allocation of nonwhiting Qs to processors were to be made the appropriate amount might be 10 percent of the Qs. Instead the Council favored providing a 10 percent allocation for adaptive management. The AMP could be used not only to provide some amount of certainty and security to the larger processors, but also to provide flexibility to tailor a program that would provide some protection to smaller processors. In making its decision, the Council specified its intent that the AMP be constructed in a manner to ensure that the program accomplishes this as one of its objectives.

With respect to the decision to allocate 20 percent of the whiting Qs to processors, differing conditions between the whiting and nonwhiting sectors were noted. In particular, it was noted that the size of the shore-based whiting fleet was expected to be very small (only 20 vessels), providing the fleet with greater market power relative to the three major whiting buyers than would be experienced by the nonwhiting fleet relative to the major buyers of nonwhiting species. While the shore-based whiting fleet position would be strong, the analysis indicated that with the move from a whiting derby fishery to an IFQ program the amount of processing capital needed in the whiting fishery would decline by 30 to 50 percent⁵² and that competition among whiting processors would tend to increase to continue to attract deliveries to their facilities, leading to a decrease in their market power. In contrast to whiting, the nonwhiting trawl fishery is not a derby-style system; it is managed with two-month cumulative trip limits. Therefore, the shift to IFQs will not create a sudden increase in the amount of excess processing capacity. Even with a 20 percent allocation of whiting Qs to processors, the Council believed it may be uncertain whether the initial allocation of whiting Qs to processors will offset whiting harvester gains in market power, relative to status quo. An initial allocation of whiting Qs to processors functions as a means of guaranteeing supply for processors, granting processors some leverage in bargaining power as they can hold out against harvesters, and providing an incentive to make necessary capital investments to increase product recovery yield.

Consideration was also given to allocating Qs to communities and crew members. As discussed above with respect to the Council consideration of CDQs, up to the very end of the Council's deliberations, communities expressed no interest in receiving an initial allocation of Qs. Therefore, the Council developed other mechanisms to address concerns about communities, including, but not limited to, the AMP, a two-year moratorium on QS transfers, a five-year review that includes a community advisory

⁵² Processors invest in excess capacity to compete with other processors for deliveries by being able to handle peak volumes during the derby fishery. When the derby is over, much of the capital then remains idle. The move to an IFQ program will slow the pace of the fishery resulting in substantial unneeded processor capital.

committee, accumulation limits and a two-year review of some of the limits, the opportunity for communities to receive an initial QS allocation by acquiring a trawl permit, and a trailing action on CFAs. With respect to crew members, an initial allocation is difficult because there is limited historic information on the identity of crew members who have fished on trawl vessels. It is the Council's hope that by providing highly divisible QSs and ensuring that other elements of the program design facilitate crew ownership of QS, that crew members who want to do so will be able to incrementally accumulate QSs. As an example of specific consideration of crew, during GAC discussions, it was proposed that QSs be tied directly to particular vessels. This was rejected because it would have required a complex tracking system if crew members were to be able to hold and independently direct the disposition of their QSs. Initial allocation to community and crews and other provisions benefiting both are discussed further in Chapter 4 and Appendix A.

2.6.7 Major Decisions in Designing the Co-op Program

The most important and broadly controversial elements of the mothership co-op program design were the processor tie provisions and LE for mothership processors. These issues were covered above in the discussion of the Council's decision on whether to go with IFQs or co-ops for each of the whiting sectors. Decisions such as allocations for communities or crew are not usually elements of a co-op alternative because co-op formation relies on cooperation among vessels. Additionally, while it might be feasible to design a system that would provide allocations to others (e.g., communities) that would then use that allocation by joining a co-op, the processing elements of the at-sea fishery are generally tied to major population centers in Puget Sound that are substantially less dependent on the fishery. As with IFQ, a community that wants to secure involvement in the fishery could purchase a permit endorsed for participation in an at-sea whiting fishery; however, the amount of economic activity that would be secured through keeping the catcher vessel based in the community (without the accompanying processing activity) would probably not make such acquisitions worthwhile, because the delivery and processing activity occurs at sea. Also, as with IFQ, elements such as accumulation limits ensure some dispersion of benefits among multiple catcher vessels, increasing the probability that there also may be some dispersion of economic benefits among multiple communities.

For the catcher-processor co-op program, one of the most controversial design elements was the decision whether the catcher-processor co-op would be issued a permit. When the Council developed its preliminary preferred alternative on this issue, there was extensive debate on the question of whether the catcher-processor co-op would be designated as a LAPP and subject to a 3 percent fee. Some Council members opposed such a designation on the grounds that the Council's preferred alternative would not generate substantial new administrative costs or fleet benefits for the catcher-processor fleet. On the other hand, it was argued that the catcher-processor fleet would benefit from the bycatch control mechanisms that were being implemented for other trawl sectors as part of the trawl rationalization program, that they would benefit from being part of the overall LAPP system, that they were being given exclusive access to a public resource, and that their exclusive access is what enabled them to develop their own co-op. With respect to the argument that the catcher-processor sector would benefit from bycatch control provided by rationalization in other trawl sectors, other Council members felt that the catcher-processor sector should not have to pay the cost for regulations needed to clean up a problem in another sector. The Council was advised that if it provided an allocation for the co-op and required a co-op permit, then the program would be a LAPP. On this basis, in June 2008, the Council voted not to require permits for co-ops. This intent was carried through when adopting the final preferred alternative in November 2008 and June 2009. As part of the process of reviewing proposed regulations for program implementation and determining them to be necessary and appropriate ("regulatory deeming"), the Council reconsidered this issue and changed its position at its March and April 2010 meetings. At the March 2010 meeting, the Council gave public notice that it would reconsider the requirement for co-op permits; at its April 2010 meeting, the Council

agreed that the regulations should include the co-op permit requirement. NMFS indicated that the Council will participate in subsequent deliberations on formulating cost recovery provisions. Through that process, the Council may determine what aspects of program cost may be attributed to a given fishery sector.

CHAPTER 3 RESOURCES AND STAKEHOLDER PROFILES

3.1 Introduction

This chapter provides the context for evaluating the effects of the proposed action. It is divided into 19 sections. Section 3.3 describes past, present, and reasonably foreseeable actions, while Section 3.4 enumerates past, present, and reasonably foreseeable trends. Actions are defined as regulatory and programmatic activities affecting the operational environment for groundfish fisheries and the status of related resources. Trends are ongoing changes in baseline conditions that have occurred and may be reasonably expected to continue; these trends can be shaped by either environmental forces (e.g., climate forcing affecting animal populations), or human behavior in the aggregate (e.g., consumption patterns). This information supports the evaluation of cumulative effects in Chapter 4, which is organized around environmental components, definable parts of the human environment such as natural resource and social categories (e.g., marine mammals, groundfish harvesters). The cumulative effects analysis looks at the combined effects of the direct and indirect impacts of the alternatives when combined with these external actions and baseline trends (i.e., those not part of the proposed action and alternatives). In identifying external actions that may combine with the effects of the proposed action, it is important to consider their temporal aspect. While an action may have occurred at some discrete time in the past, it may cause a permanent change in baseline conditions. Alternatively, an action that was initiated in the past may continue; this is common for the types of programmatic actions that have the greatest effect on the management system and managed resources. So, although CEQ regulations reference “past, present, and reasonably foreseeable future actions,” from an analytical standpoint, what is of interest is the net effect on baseline conditions at the start of the trawl rationalization program and any ongoing effects of these actions because they continue to exist programmatically. Table 3-1 shows which environmental components these categories of actions are most likely to affect.

The remainder of this chapter (Sections 3.5-3.19) then describes baseline conditions for the environmental components that are evaluated in Chapter 4 by presenting description and tabular data on conditions in the recent past. These sections are organized so that they parallel the heading numbers for the impact analysis of comparable environmental components. For example, Section 3.6 provides baseline information on groundfish trawl harvesters, and Section 4.6 evaluates the impacts of the alternatives on this environmental component.

Table 3-1. Environmental components affected by ongoing actions.

Environmental Components	Actions						
	Harvest Management	Bycatch Reduction	Rationalization	Sector Allocations	Habitat/Ecosystem Protection	Wind Energy	Trawl Rationalization Mitigation
Limited Entry Groundfish Trawl Harvesters	X	X	X	X	x	x	x
Captain and Crew	X		X				x
Nontrawl Commercial Harvesters	X	x	x	x	x	x	
Shoreside Processors of Trawl Groundfish	X		X				X
Mothership Processors of Trawl Groundfish	X	x	X	X		x	
Trawl Catcher-Processors	X	x	x	x		x	
Processing and Other Labor			x				
Input Suppliers			x				
Communities	x		X	x	x	x	X
Treaty Tribe Harvesters	x		x		x	x	
Management Agencies	X	x	X		X	x	X
Groundfish Resources	X	X	x		X	x	
ESA-listed Salmon	x	X			x		
Other Protected Resources	x				x	x	
California Current Ecosystem	x				x		

x-lesser effect; X-greater effect; blank-minimal or no effect expected

3.2 Data Sets

The major fishery data sets used in describing historical and baseline conditions are derived from the Pacific Coast Fisheries Information Network (PacFIN), which is administered by the PSMFC. PacFIN aggregates data provided by the Washington, Oregon, and California state fishery agencies. These agencies also supply species-composition and catch-by-area proportions developed from their port sampling and trawl logbook data systems. Data are stored in a relational database that, among other things, contains commercial fishery landings data based on fish tickets that must be completed at the time of landing. Because market categories may aggregate similar species, port sampling data are used when processing fish ticket data to derive weights by species. This is particularly the case with rockfish, because there are many species that are similar in appearance and hard to differentiate. PacFIN allows querying of disaggregated landings data, which allows a lot of flexibility to present data in different formats, such as by date, gear type, species composition, dollar value, and regulatory category. In addition to Washington, Oregon, and California information, data from Alaska and British Columbia are included in the database. PacFIN also contains LE permit data provided by NMFS, vessel registration data from the U.S. Coast Guard, and trawl logbook data. Logbooks are filled out by the vessel operator and contain detailed tow-by-two data, which can be used to determine when and where fishing occurred along with a rough estimate of the resulting catch.

3.3 Past, Present, and, Reasonably Foreseeable Actions

3.3.1 Harvest Management, Overfishing and Overfished Species

3.3.1.1 Groundfish Harvest Specifications

Evolution of the harvest specifications process

When the groundfish FMP was originally implemented in 1982, it contained only fixed elements; it did not describe a framework procedure for periodically changing management measures. Numerical OYs were specified for six species (Pacific whiting, sablefish, Pacific ocean perch, shortbelly rockfish, and widow rockfish); OYs for other stocks or stock complexes were simply defined as “all that are landed under regulations adopted by the Council.” Before FMP implementation, foreign fishing—principally for Pacific whiting and various rockfish species—dominated catches in the area that became the EEZ (at that time the Fisheries Conservation Zone [FCZ]) in 1976. In the late 1970s and early 1980s, with the development of midwater gear technology, domestic trawlers rapidly expanded catches of widow rockfish and other rockfish species. This set the stage for a fairly permissive management regime. Domestic management focused on a few species; throughout the 1980s, the main measures were trawl trip limits for widow rockfish, Pacific ocean perch (because at the time it was already overfished), yellowtail rockfish, sablefish, and the *Sebastes* complex, under which other rockfish species were managed. Aside from these trip limits, the FMP contained trawl gear restrictions. A size limit and related landing restrictions were established for sablefish in 1983. The whiting fishery, wholly foreign at the beginning of the decade, transitioned through a joint venture phase (with U.S. catcher vessels delivering to foreign processing vessels) to a fully domestic fishery by the early 1990s.

Amendment 4, adopted by the Council in 1990, made substantial changes to the FMP and established the basic management framework permitting the annual specification of management measures and their modification inseason (during the year), if necessary, to constrain landings to management targets (whether a quota, harvest guideline, or ABC/OY). The amendment also expanded the scope for management to allow establishing OYs for any stock without an FMP amendment and providing a broader rationale for establishing a numerical target beyond stock status concerns. Throughout the 1990s, harvest specifications and management measures became increasingly complex because of the need to allocate yield and manage the various sectors established through LE more explicitly (see discussion below). More proactive management was also prompted by new requirements in the 1996 Sustainable Fisheries Act (SFA), which amended the MSA. In particular, the SFA established a more demanding framework for responding to overfishing and rebuilding overfished stocks. With the incorporation of a rebuilding framework into the FMP, by 2000, five stocks—darkblotched rockfish, Pacific ocean perch, canary rockfish, bocaccio, and cowcod—had been declared overfished due to long-term overfishing by both foreign and domestic fleets from the 1960s onwards. Two more stocks—widow and yelloweye rockfish—were declared overfished in 2001 and 2002; one stock, lingcod, has subsequently rebuilt and is no longer considered overfished.⁵³ Table 3-2 shows stocks for which numerical targets were established at four different times over the life of the FMP. As noted above, in the original FMP, only six stocks had numerical OYs. In 1991, after Amendment 4 was implemented, a few additional rockfish stocks came under management to numerical targets. In the last 10 years, the number of stock-specific targets has expanded substantially. The table somewhat understates the number and complexity of targets in recent years since OYs are specified for numerous components of stock complexes, and the OYs for some stocks

⁵³ Pacific whiting was declared overfished in 2002 and rebuilt in 2004, principally due to highly variable stock assessment results. A rebuilding plan for this stock was never developed because the overfished status only applied to one fishing year, 2003. Lingcod was found to be rebuilt following a stock assessment conducted in 2005.

are also subdivided geographically.⁵⁴ In many cases, catch is managed to these geographic or stock complex subdivision targets.

By the early 2000s, annual harvest specifications were largely driven by the need to constrain catches of overfished species and other target species, such as sablefish, that require precautionary management because stock size is below the management target (B_{MSY} or its proxy). As discussed further below, as landing limits were lowered, bycatch became increasingly problematic for managers, and the need for robust at-sea catch monitoring became more urgent. Figure 3-1 shows changes in landing limits implemented at the beginning of each year for widow rockfish, an important midwater trawl target species in the 1980s that was declared overfished in 2001 (inseason changes to the limits are not included). Because of changes in the way these limits were defined, the graph only attempts to suggest the increasing restrictions by presenting a proxy value for what could be landed in a week. Before 1984, these were simply trip limits with no restriction on total landings. From 1984 to 1992, these were weekly limits with some additional per-trip limits. Beginning in 1992, the limit period was lengthened to four weeks or a month; in 1996, the current two-month cumulative trip limit period management structure was first introduced. From 1999 onward, the limit amount was varied by period, and separate limits were established for different gear types. After 2001, a target fishery could no longer be sustained, and limits essentially allowed for incidental catch to reduce regulatory discards (bycatch).

This period also saw increasing use of spatial management. First, this was achieved indirectly through gear restrictions by defining gear with a footrope larger than 8 inches (large footrope), less than that size (small footrope), and midwater. Differential landing limits were then assigned to these gear types. The intent was to discourage the use of large footrope gear to access rocky habitat at shallower depths, a favored habitat for many vulnerable rockfish species. In late 2002, coastwide depth-based closed areas, RCAs, were established to keep vessels out of areas where overfished species are more abundant. The configuration of these areas varies by two-month cumulative trip limit period and gear type (trawl and fixed-gear). Recreational fishery management has also become more complex as recreational catches became a significant component of the OY for some overfished species, yelloweye rockfish in particular.

Amendment 17 established the current biennial management scheme where harvest specifications are set for a two-year period (with separate OYs specified for each year in the period). The amendment responded to a court decision related to the regulatory process for implementing management measures. It was also, however, an attempt to lengthen the planning horizon for periodic management because of the growing complexity of decisionmaking.

⁵⁴ Many commercially less important or less frequently caught species are combined in stock complexes for the purposes of management. These species are not generally differentiated in reported landings, and most have not had stock assessments. Multi-species complexes currently in use include the minor rockfish (additionally separated into several sub-categories), other flatfish, and other fish categories.

Table 3-2. Stocks managed to numerical targets. Overfished species in bold with year declared overfished in parenthesis.

1982-90 Numerical OYs	1991 Harvest guideline or quota	2000 Numerical OYs	2007-08 Numerical OYs
Roundfish			
		Lingcod (1999-2005)*	Lingcod*
Pacific whiting Sablefish	Pacific whiting Sablefish	Pacific whiting Sablefish*	Pacific Cod Pacific Whiting Sablefish*
Rockfish			
Pacific ocean perch Shortbelly Widow	Pacific ocean perch Shortbelly Widow Canary Chilipepper Bocaccio Yellowtail	Pacific ocean perch (1999) Shortbelly Widow Canary Chilipepper Bocaccio* (1999) Splitnose Yellowtail Shortspine thornyhead* Longspine thornyhead* Cowcod*	Pacific ocean perch Shortbelly Rockfish Widow rockfish (2001) Canary rockfish (2000) Chilipepper Rockfish Bocaccio* (2000) Splitnose Rockfish Yellowtail Rockfish Shortspine Thornyhead* Longspine Thornyhead* Cowcod* (2000) Darkblotched (2000) Yelloweye (2002) Black rockfish** Minor Rockfish North** Minor Rockfish South**
	Remaining Rockfish Sebastes Complex	Minor rockfish N Minor rockfish S	
Flatfish			
	Dover Sole	Dover sole	Dover Sole English Sole Petrale Sole* Arrowtooth Flounder Starry Flounder Other Flatfish
Other			
Jack mackerel	Jack mackerel		Other Fish** California scorpionfish Cabezon (off CA only)

*Stock managed by regional subcomponents
**Stock complex with OYs established for subcomponents, some of which managed separately.

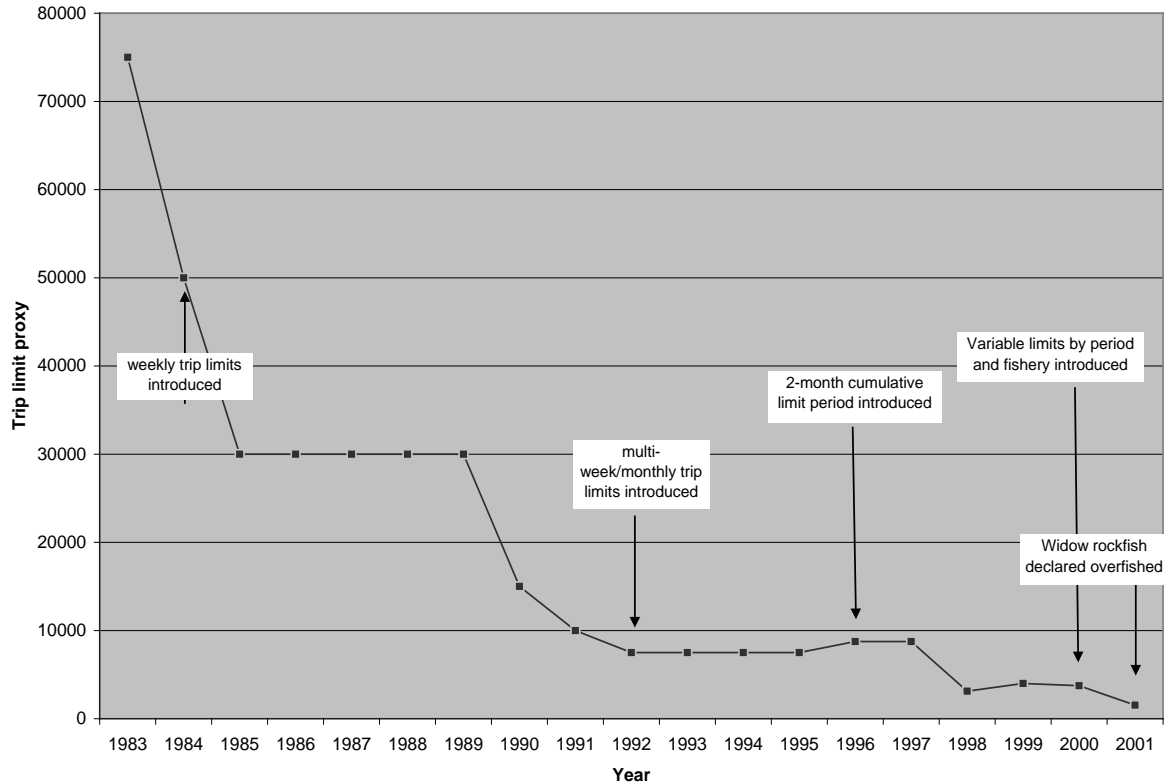


Figure 3-1. Landing limits for widow rockfish.

Current Commercial Fishery Management Measures

Biennial management of commercial fisheries is currently based on four elements: seasons, bimonthly cumulative landings limits, management areas, and exclusion zones or GCAs. These are described in Section 3.16.1.

3.3.1.2 Optimum Yield Management Framework (Amendments 11, 12, 16-1)

Chapter 4 in the groundfish FMP describes the framework used to determine stock status and set OYs accordingly. This framework was incorporated through Amendments 11, 12, and 16-1 in response to provisions of the SFA reauthorizing the MSA. These amendments were adopted in 1998, 2000, and 2004, respectively. Amendment 16-1 responded to litigation on the previous amendments and established a new framework for the development and adoption of rebuilding plans. Subsequent amendments, discussed below, incorporated elements of rebuilding plans, and changes to them, into the FMP. Previously, stocks were managed to ABC, the MSY harvest level associated with current stock abundance. Under the new framework, ABC is considered a limit (the maximum fishing mortality threshold [MFMT]), and OYs can only be reduced from that value. The framework mandates a progressively larger precautionary reduction from the ABC for stocks whose biomasses are below the B_{MSY} proxy ($B_{40\%}$ ⁵⁵). It is called the 40-10 policy because it is a linear adjustment so that the OY would be set to zero at $B_{10\%}$. However, $B_{25\%}$ is the minimum stock size threshold (MSST); stocks below this level are considered overfished, and a rebuilding plan must be developed. In practice, therefore, OYs are

⁵⁵ This notation represents the current spawning stock size in relation to unfished biomass, usually denoted B_0 . Thus, $B_{40\%}$ denotes a stock size that is 40 percent of the size expected if no fishing were occurring.

determined differently when biomass falls below 25 percent. Section 4.5.1 in the FMP describes the methodologies used for determining OYs under stock rebuilding. Of course, these calculations can only be made for stocks that are fully assessed, a small proportion of the total number of management unit species. If an ABC value can be determined (for example, from a partial or relatively old assessment), an OY is set with a precautionary reduction. If no ABC value can be determined, the OY is set as a precautionary reduction from trend information, such as historical catches. Nonetheless, the framework does mandate managing to numerical harvest stocks at either the stock or stock complex level; previously, not all stocks came under a numerical target or threshold (see Table 3-2).

3.3.1.3 Rebuilding Plans (Amendments 16-2, 16-3, 16-4)

NMFS is required to report to Congress any managed species considered to be overfished or approaching a condition of being overfished. For any fish stock determined to be overfished, the Council is required to prepare a plan to rebuild that stock. As described above, rebuilding plans have been developed for seven groundfish stocks. Key provisions of these plans were incorporated into the FMP through Amendments 16-2 and 16-3, adopted in 2003 and 2004. A fourth rebuilding plan amendment, Amendment 16-4, was adopted by the Council in 2006 to update some of the previously adopted rebuilding plans. The framework established by Amendment 16-1, based on National Standard 1 guidelines (50 CFR 310), identifies several key parameters to guide management. Principally, these are a target year, T_{TARGET} , by which time the stock is estimated to rebuild to $B_{40\%}$, and an associated harvest rate, presented in terms of the spawning potential ratio (SPR), which is a representation of the resulting reproductive output compared to the output of an unfished population. The choice of the target year is determined by two additional parameters: T_{MIN} , defined as the time needed to rebuild the stock in the absence of fishing, and T_{MAX} , T_{MIN} plus one mean generation time, a stock-specific biological parameter.⁵⁶ A target year closer to T_{MIN} implies reducing harvests to rebuild the stock in a shorter amount of time, while a target year closer to T_{MAX} favors higher harvest levels and a longer time to rebuild. Each time an overfished stock is assessed, this information is used to reestimate these parameters, and it is common for them to change. Depending on the degree to which the rebuilding strategy has to be revised in response to these new estimates, the changes may or may not be incorporated into the FMP through an amendment.

Revisions to rebuilding plans have been made as a part of the biennial specifications process. For the first biennial period (2005-06), the development of Amendments 16-2 and 16-3 coincided with harvest specification decisionmaking. Table 3-3 shows the target years originally adopted and subsequent changes.

The changes incorporated by Amendment 16-4 were developed in concert with decisionmaking for the 2007-08 period. In addition to revisions prompted by new stock assessments, Amendment 16-4 responded to an opinion rendered by the Ninth Circuit Court of Appeals in *Natural Resources Defense Council, Inc. and Oceana, Inc. v. National Marine Fisheries Service et al.*, 421 F.3d 872 (9th Cir. 2005). This opinion, referring to the controlling language in the MSA (§304(e)(4)(A)(i)), stresses that the rebuilding strategy (essentially the target year and related harvest control rule and associated management measures) must rebuild stocks in as short a time as possible, taking into account (1) the status and biology of the stocks, (2) the needs of fishing communities, and (3) interactions of depleted stocks within the marine ecosystem. In essence, the rebuilding strategy must favor rapidly rebuilding the stock, but may take into account adverse socioeconomic impacts (effects to fishing communities) as a mitigating factor. Decisionmaking should also take into account the marine ecosystem.

Additional changes to target years and harvest rates were proposed as part of the 2009-10 biennial decisionmaking process; since these changes are more modest, however, no FMP amendment is

⁵⁶ T_{MIN} is calculated from the year in which the stock was declared overfished.

required.⁵⁷ If a new rebuilding analysis projects the stock rebuilding in an earlier year, the Council has the option of not formally changing it to this earlier value and continuing to apply the same harvest rate. This was the case with bocaccio, Pacific ocean perch, and widow rockfish for modifications proposed in 2008. The estimated rebuilding years for these stocks are shown in parenthesis in Table 3-3. Since stock assessments are an integral part of the biennial management cycle, it is likely that Council will continue to modify rebuilding strategies in response to stock assessment results as part of future harvest specifications decisionmaking. More information on stock status may be found in the groundfish stock assessment and fishery evaluation (SAFE) (PFMC 2008c) and in the EIS for the 2009-10 harvest specifications (PFMC 2008a).

Table 3-3. Target year specifications for overfished stocks.

Stock	2005-06	2007-08	2009-10
Bocaccio	2023	2026	2026 (2023)
Canary rockfish	2074	2063	2021
Cowcod	2090	2039	2072
Darkblotched rockfish	2030	2011	2028
Lingcod	2009	Rebuilt	
Pacific ocean perch	2027	2017	2017 (2011)
Widow rockfish	2038	2015	2015 (2009)
Yelloweye rockfish	2058	2084	2084

3.3.1.4 Ongoing Effects of Harvest Management Related to Trawl Rationalization

Harvest management, through the setting of OYs and driven by the requirement to rebuild overfished species, has a broad, continuing effect on the groundfish trawl fishery. Trawl rationalization measures in the alternatives (IFQs, co-ops) would mainly replace the current cumulative landing limit regime; other management measures, such as the RCAs and gear restrictions, are likely to remain in place for the foreseeable future. Setting OYs determines the amount of fish available for harvest. Allocations, either permanent or for a biennial cycle, determine the portion of the OYs available to the trawl fishery. For IFQs, this equates to the translation of QSs into QPs each year; for co-ops, it determines the actual allocation to each co-op based on the catch history shares of each co-op member.

OYs are determined through the specifications framework, based on the requirements of MSY management. The accuracy of these specifications (whether fishing mortality, over time, maintains the stock at MSY) depends both on knowledge of underlying stock productivity and how it may vary over time due to nonanthropogenic factors, such as climate forcing. In the past, harvest specifications either were not made, or landing limits were set too high, resulting in the depletion of several groundfish stocks. This has led to the need to set OYs at low levels to rebuild the stocks. Constraining low OYs will continue for several stocks after implementation of trawl rationalization. Although scientific understanding of stock dynamics has improved, there is continued risk that exogenous factors, such as cyclical or long-term climate change, could reduce stock productivity. OYs would have to be reduced accordingly for those stocks or, if not reduced (because such changes are not detected through stock assessments), could lead to other stocks becoming overfished. OYs set low relative to the potential to catch that species increase risk of catch exceeding a fisherman's QP holdings. This would impose a cost of having to purchase additional QSs/QPs. Scarcity could drive prices up or make price setting difficult due to "thin market" conditions. These impacts are discussed in detail in Chapter 4.

⁵⁷ The framework requires that the target year and the harvest rate, or harvest control rule, are specified in Federal regulations, and changes to them can be made by a regulatory, rather than FMP, amendment.

3.3.2 Bycatch Reduction and Monitoring

In 1996, the Sustainable Fisheries Act (SFA) amended the Magnuson Fishery Conservation and Management Act (renamed the Magnuson-Stevens Fishery Conservation and Management Act). The SFA required that FMPs establish a standardized reporting methodology to assess the amounts and types of bycatch in a fishery and that FMPs identify and rebuild overfished stocks.

There are currently two Federal observer programs being operated by the NMFS Northwest Fishery Science Center in the Pacific coast groundfish fishery: the At-sea Hake Observer Program and the WCGOP. These two programs are very different from each other particularly in how they are funded, the type of sampling and fishery data that are used to derive total catch, and availability of data for inseason management.

The two types of funding mechanisms are currently used to fund observers on the Pacific coast groundfish fishery: federally funded observers and third-party or pay-as-you go observers. The WCGOP is federally funded and currently provides observer coverage in the LE and open access nonwhiting fisheries. Federal funds are used to run the program infrastructure (training, debriefing, and data management) and to hire, equip, insure, and transport observers. Observers are employed by the PSMFC, through a Federal contract. The third-party, or pay-as-you-go, funding approach is currently used in the mothership and catcher processor sectors of the Pacific whiting fishery. In the federally regulated third-party system used in the Pacific whiting fishery, participants are responsible for making arrangements with a NMFS-permitted observer provider, having an observer available for their vessels, and, paying the observer providers directly for the observer costs. The NMFS-permitted observer providers collect the fees directly from the vessels, recruit qualified individuals, provide insurance and benefits to the observers, deploy the observers, and ensure that the observer data are delivered to NMFS. Federal funds are used to run the program infrastructure (training, debriefing, and data management) and to equip the observers.

3.3.2.1 Groundfish Observer Programs

The WCGOP is a year-round program that provides observers for all of the commercial groundfish fisheries except the Pacific whiting fishery. Because monitoring of the Pacific whiting shoreside sector has been carried out under EFPs, WCGOP observers have not been used to provide coverage for that sector. All WCGOP sampling protocols and coverage strategies are defined by NMFS. Because there are few observers relative to the number of vessels in the groundfish fishery, observer sampling coverage has focused on obtaining bycatch data at sea that can be combined with state fish ticket data to derive bycatch ratios for different fishing areas and target fishing strategies. Vessel logbook data are used to estimate fleetwide fishing effort. Using observer, fish ticket, and logbook data, the fishery is modeled to derive an estimate of total catch by species. Due to the delayed availability of fish ticket and logbook data, and the time needed to process observer data, the final analysis of estimated total catch by species is typically not finalized until well over one year after the fishing year has ended.

Observer coverage goals for the WCGOP are detailed in a coverage plan (NMFS 2006a). Observers initially covered about 10 percent of the west coast LE trawl fleet effort, selected via a stratified random sample. Trawl fleet coverage has since increased to about 25 percent and has also been expanded to include the LE fixed-gear and open access vessels.

Mothership and Catcher-processor Sector

Since 1991, the whiting processors in the mothership and catcher-processor sectors have carried third-party observers to estimate total landed catch and discards, monitor the attainment of annual groundfish allocations, estimate catch rates of prohibited species (salmon, halibut, and Dungeness crab), and assess stock conditions. Mandatory observer coverage requirements were codified in 2004 (69 FR 31751;

June 7, 2004). From 1992 to July 2004, the motherships voluntarily carried observers. Prior to 2000, most motherships each carried one observer. Since 2000, the motherships have, for the most part, carried two observers. Having two observers allows all or almost all hauls to be sampled and increases the accuracy of data used to monitor fishery allocations and estimate incidental catch. To date, catcher vessels in the mothership sector have not been required to have onboard monitoring, nor have they voluntarily been monitored.

The Shoreside Hake Observer Program (SHOP) is a seasonal program. Observer coverage levels are defined in regulation for each processing vessel and are based on overall vessel length: all processing vessels over 125 feet are required to carry two observers, and processing vessels 125 feet and under are required to carry one observer. These coverage levels allow very large samples to be taken from almost every haul. Each processing vessel makes the necessary arrangements and pays directly to third-party companies that provide observer services and are licensed by NMFS Alaska Region to provide such services. NMFS provides training and sampling gear for the observers. Sampling protocols are also defined by NMFS. An at-sea hake observer's primary duties include recording haul information, determining the official total catch, and sampling hauls for species composition. Each observer submits electronic data files to NMFS for inclusion in the NorPAC database one or more times per day. These data are available within hours for inseason catch evaluation. Because there is such a high level of sampling coverage, NMFS expands these data during the season to unsampled portions of hauls and unsampled hauls to derive total catch by species (species groups). The data are finalized a few days after the observers return from sea, and finalized data are available within weeks after the end of the season.

As noted above, catcher vessels in the mothership sector are currently unmonitored. In recent years, the Council has raised concern about increased incentives to discard bycatch-limit species to prevent the fishery from being closed. To ensure the integrity of sector-specific bycatch limits in the Pacific whiting fishery, as part of the Harvest Specifications and Management Measures for 2009-10, the Council recommended that NMFS require catcher vessels delivering to motherships to pay for and use electron monitoring systems (EMS) at all times to ensure that catch is being retained similar to the recommendation for the whiting shore-based sectors. NMFS has determined that EMS is a suitable tool for monitoring full or maximized retention in the shore-based sector of the Pacific whiting fishery. The EMS requirements for catcher vessels in the mothership sector recommended by the Council are not being implemented by this action. Because the infrastructure necessary to support EMS monitoring was not in regulation at the time that the Harvest Specifications and Management Measures for 2009-10 were being implemented, and because the impacts of the requirement were not analyzed, NMFS is considering the Council's recommendation in this analysis. NMFS has not yet implemented these requirements.

Pacific Whiting Shore-based Sector

In 1996, to address the treatment and disposition of salmon in the Pacific whiting shoreside fishery, an EA was prepared to analyze amendments to both the groundfish FMP (FMP Amendment 10) and salmon FMP (FMP Amendment 12) (PFMC 1997). The preferred alternative included a provision for the salmon FMP to be amended to allow retention of salmonids in the trawl fishery when a Council-approved monitoring program (one that is sufficient to define the Chinook bycatch rate, detect and changing patterns in bycatch, assure compliance with specified management limitations, and provide for the collection of coded wire tags) was established in the Pacific whiting shoreside fishery (PFMC 1997). At its October 21 to 25, 1996, meeting the Council recommended the preferred alternative, including the temporary use of EFPs to monitor the incidental take of salmon until a permanent monitoring program could be implemented. Both the salmon and groundfish FMPs were amended to include the provisions of the preferred alternative; however, implementing regulations for the Pacific whiting shoreside fishery were never adopted.

Each year since 1992, NMFS has issued EFPs to vessels in the Pacific whiting shoreside fishery to allow unsorted catch to be landed at Pacific whiting shoreside fishery first receivers. Each year, most if not all Pacific whiting shoreside vessels apply for and carry EFPs. EFPs specify the terms and conditions that participating vessels must follow to be included. Vessels fishing under the Pacific whiting EFPs are allowed to land unsorted catch at Pacific whiting shoreside fishery first receivers, including species in excess of the trip limits and species such as salmon that would otherwise be illegal to have on board the vessel. Without an EFP, groundfish regulations at 50 CFR 660.306(a)(2) and (a)(6) require vessels to sort their catch at sea and discard all prohibited species (including salmon and halibut) and protected species as soon as practicable. The groundfish regulations also require vessels to discard groundfish species in excess of cumulative limits at sea.

Between 1992 and 2007, monitoring and catch accounting of EFP landings were coordinated by the SHOP. Participants in the SHOP include catcher vessels that have been issued EFPs, designated processing plants along the Pacific Coast, Council, NMFS, PSMFC, Oregon Department of Fish and Wildlife (ODFW), California Department of Fish and Game (CDFG), and Washington Department of Fish and Game (WDFW). The SHOP coordinated the collection and compilation of catch data to provide information needed to monitor attainment of the Pacific whiting shore-based allocation and to evaluate incidental catch, particularly Chinook salmon and other prohibited species. In recent years, the SHOP has also coordinated the collection of inseason data needed to monitor bycatch limits that have been established for overfished groundfish species.

From 1992 to 1994, catch composition sampling was given highest priority in the management of the EFP fishery. During the 1992 to 1994 period, SHOP set a goal of having observers sample 30 percent of the deliveries while at sea and having observers sample 20 percent of the unobserved deliveries while at the processing facility (M. Saelens, pers. comm., ODFW, October 12, 2006). The at-sea observer's role was to confirm retention of the catch. By 1995, the SHOP sampling goal had declined to 10 percent of the landings, and the sampling priority had shifted, with more emphasis being given to the collection of biological information (otoliths, lengths, weight, sex, maturity) on Pacific whiting and select bycatch species such as yellowtail rockfish, widow rockfish, darkblotched rockfish, canary rockfish, sablefish, bocaccio, Pacific chub mackerel, and jack mackerel. The sampling rate was decreased following a statistical analysis that had indicated that there was no significant difference between the fish ticket data and observer data during the early 1990s. Given the fishery management needs of the Pacific whiting fishery in 1995, it was determined that fish ticket data were an adequate representation of species composition for landed catch.

To explore the possibility of increasing biological sample data and increasing the precision of statistical estimates leading to improved stock assessments, a project referred to as the Fishing Industry and Research Scientists Together (FIRST) project was conducted in Oregon in from June 1998 to November 1998 (Builder 2000). The specific goal of this project was to examine the feasibility of collecting additional fish length data by training and using plant workers. Similar studies had found that it was feasible to have plant workers collect fish lengths, which was considered easier than having plant workers obtain data on fish age or species compositions (Gallucci, *et al.* 1996). In most groundfish fisheries, fishery-dependent data, including length data, are collected by port biologists hired by the states. However, port biologist sampling has been constrained by financial and logistical considerations. During the FIRST project, plant workers sampled 150 sablefish, Dover sole, and yellowtail rockfish deliveries. When the length data collected by plant samplers was compared to the port samplers, the quality of the length data was similar. However, time constraints on the plant workers, work priorities, and motivation to take samples were identified as being somewhat problematic during the project (Builder 2000).

In 1998, at a Pacific whiting shoreside fishery first receiver in Oregon, plant samplers began to be used to increase the collection of biological information (length, weight, age, maturity) from the Pacific whiting shoreside fishery. Data were collected from Pacific whiting and selected bycatch species (yellowtail

rockfish, widow rockfish, sablefish, Pacific mackerel, jack mackerel, and prohibited species) (Weeks and Hutton 1998). In Washington and California, port samplers continued to collect biological data. In California and Washington, port samplers monitor a portion of all deliveries and collect biological data and species composition data that is used to distinguish the species on fish tickets. In all three states, port samplers collect fish ticket data during the Pacific whiting shoreside fishery and provide information to the SHOP, where it is compiled for inseason monitoring.

In 1999, language was added to the EFPs to require vessels to deliver EFP catch to state-designated processors. It was determined that there was a need to better define the roles of shoreside processors and the state agencies in monitoring incidental catch and enforcing management measures, specifically for yellowtail rockfish. Designated processors are identified by each of the states, and they have signed written agreements that specify the standards and procedures they agree to follow when accepting unsorted EFP catch.

The proportion of landings observed by shoreside plant samplers and port biologists varied substantially among processors/first receivers and between years. Table 3-4 compares the percentage sampled at each designated Pacific whiting shoreside processor from 2002 to 2005. In 2005, the overall sampling rate was 36 percent of the deliveries or 29 percent of the Pacific whiting by weight. In 2006, the overall sampling rate was 48 percent of the deliveries or 43 percent of the Pacific whiting by weight.

Table 3-4. Percent of trips observed by SHOP at each processor, 2004-06 (Jesse and Saelens 2007; Nottage and Parker 2006; Weidoff and Parker 2004).

State	Port	Deliveries					
		2004		2005		2006	
		percent sampled	sampled /total	percent sampled	sampled /total	percent sampled	sampled /total
Washington	Westport, Ocean Gold	11.0	19/172	12.5	24/192	18.8	36/192
		13.2	5/38	9.8	82/8	38.3	36/94
	Illwaco, Jessies						
Oregon	Astoria						
	DeYang	--	--	--	--	100.0	34/34
	Bornstein	--	--	--	--	73.0	27/37
	Del Mar	--	--	--	--	100.0	17/17
	Warrenton						
	Pacific Coast	17.3	32/185	0	0/202 /a	30.8	60/195
	Newport						
	Ocean Beauty	19.3	11/57	34.4	61/21	42.2	19/45
Trident	22.0	53/241	20.3	51/251	28.7	47/164	
Pacific Shrimp	61.5	139/225	100.0	227/227	100.0	163/163	
Charleston	100.0	106/106	100.0	87/87	100.0	93/93	
California	Crescent City	10.3	3/29	13.3	2/15	25.0	7/28
	Eureka	5.0	4/80	3.0	2/66	12.3	9/73
	Moss Landing	--	--	100.0	1/1	--	--

a/ Plant sampler observed 23 deliveries; however, data reported to SHOP was incomplete and deemed unusable.

Since the beginning of the SHOP program in 1992, the costs associated with operating the program increased. Table 3-5 shows the in-season budget history for the SHOP between 1995 and 2005. In 1995, the budget was approximately \$93,000, with approximately \$25,000 for samplers and \$68,000 for coordination/data processing costs) as compared to approximately \$141,560 in 2005 (approximately \$27,000 for plant samplers and \$114,560 for coordination/data processing costs) (Nottage and Parker 2006) . The costs to the state governments included sampling personnel, infrastructure, data summary and analysis during winter months, data tracking, and Council support on bycatch issues. In 2005, an additional \$70,000, which is not included in Table 3-5, was needed to fund additional ODFW staff. In the past, the costs were relatively minor. However, the costs have become increasingly substantial over time as management agencies have increased their focus on bycatch issues, which requires the data to be available sooner, as well as months of staff time for data analysis.

Table 3-5. In-season Budget History for the Shoreside Hake Observation Program, 1995-2005 (Nottage and Parker 2006).

Year	State Budgets for SHOP (\$)		Industry Funding Oregon (\$)	Industry Samplers Oregon (\$)	Total Funds All Sources (\$)	Cost per day (\$)	Cost per mt whiting (\$)
	Oregon	Washington and California					
1995	~20,000	18,000	~30,000	25,000	93,000	912	1.23
1996	~20,000	18,000	~30,000	29,000	97,000	815	1.11
1997	17,706	27,000	30,294	30,000	105,000	1,522	1.21
1998	19,000	27,000	30,000	30,000	106,000	876	1.22
1999	18,000	27,000	33,339	32,544	110,883	1,218	1.32
2000	18,000	27,000	38,152	32,544	115,696	1,244	1.38
2001	18,000	27,000	46,738	35,770	127,508	1,678	1.76
2002	17,926	27,000	38,371	29,808	113,105	3,649	2.52
2003	18,000	18,000	40,519	29,808	106,327	3,544	2.09
2004	22,000	18,000	53,467	27,000	120,467	2,008	1.33
2005	28,693	18,000	67,867	27,000	141,560	2,178	1.45

In 2007, the cost of monitoring the Pacific whiting shoreside fishery under EFPs was \$168,326 to the state of Oregon alone (Table 3-6). The salary of industry paid plant samplers is not included in this value. Similar cost information is was not available for the States of Washington or California.

Table 3-6. Costs to the State of Oregon for monitoring the shoreside fishery in 2007 categorized as requested (data provided by ODFW staff).

Pre-season preparation	\$8,547
State samplers	
Training	\$1,400
Salary and benefits	\$54,130
Travel	\$4,460
Housing	--
Sampling supplies	\$3,525
Infrastructure	\$6,118
Data collection, processing, and analysis	\$73,026
Other costs	
Inseason coordination	\$8,573
Post season reporting	\$8,547
Total costs	\$168,326

Vessels fishing under EFPs have been required to retain all catch, with a few exceptions such as very large species (greater than 6 feet in length) and hauls that resulted in a concern about vessel safety. In 2004, a pilot study was initiated and funded by the Northwest Fisheries Science Center (NWFSC) in which a video-based EMS was used as a tool to verify full retention of catch by Pacific whiting EFP vessels. The 2004 study field-tested EMS on 26 fishing vessels for 100 percent data capture of on-deck fishing operations. EMS systems consist of two or more closed circuit television cameras, GPS, hydraulic and winch sensors, and on-board data storage. In 2004, the EMS was in place throughout the 61-day season for the shore-based sector. During this time, the EMS captured virtually the entire fishery, with sensors recording 98 percent and the cameras recording 96 percent of the 1,762 fishing events and 1,019 fishing trips.

From the EMS pilot study, it was determined that EMS could be used to accurately identify the time and location of discard events. As a result of the study, EFP criteria were revised to define maximized retention (most catch is retained) rather than full retention (all catch is retained). The EMS technology (EMS equipment installed on the vessels and data analysis) was again used and funded by the NWFSC during the 2005 and 2006 seasons. Following the 2004 and 2005 seasons, the NWFSC participated in public meetings with fishery participants to discuss the types of information that had been collected, EMS performance, and participants' behavior relative to the catch retention standards, as well as to seek input on mechanism for further reducing documented discard events in the fishery. EMS has moved beyond the experimental stage and has been identified as an effective tool for monitoring full and maximized retention as defined in EFPs for the Pacific whiting fishery. Since 2007, vessels fishing under the EFP have been required to pay directly to the EMS provider for services, as no Federal funding is available for EMS coverage.

In 2008, NMFS choose to manage the 2008 whiting fishery maximized retention and monitoring program under EFPs issued to vessels and, for the first time, EFPs issued to first receivers in 2008. The EFPs incorporated provisions that NMFS expects to be necessary eventually in regulations implementing a maximized retention and monitoring program. For Pacific whiting shoreside vessels, the EFPs included requirements for retention of all catch with exceptions of very large species and minor levels of operational discards and EMSs to monitor maximized retention, as well as requiring leasing of equipment from a NMFS-approved EMS provider. The Pacific whiting shoreside first receiver EFP included catch monitor coverage provisions; requirements for paying for and procuring the services of a NMFS-certified catch monitor; catch monitoring plan submission and inspection requirements; prohibited action regarding the treatment of catch monitors; restrictions on the acceptance of unsorted catch; provision regarding the

abandonment of prohibited species and overage catch; and requirements pertaining to sorting, weighing, and recordkeeping. The issuance of EFPs to vessels and first receivers in 2008 allowed the provisions of a maximized retention and monitoring program to be tested before regulatory implementation and provided NMFS with much needed information on effective implementation of a catch monitoring and verification program.

Table 3-7. Provisions of the 2008 EFP issued to the Pacific whiting shoreside fishery.

	Vessels	First Receivers
VMS with declaration report	X	
State paper logbooks	X	
EMS	X	
WCGOP Observers	(optional)	
Catch monitors		X
Electronic fish tickets		X
State paper fish tickets		X

As noted above, unsorted Pacific whiting EFP catch is generally delivered to the Pacific whiting shoreside fishery first receivers, where it is sorted and processed. In a few cases, however, catch has been transported by truck from the original processing facility to a secondary processor. This has primarily occurred during the early season fishery off California when catch has been trucked out of state for processing; during the coastwide season, when catch from coastal areas in Washington has been trucked to a Puget Sound processor; and in Oregon, where sorted catch was trucked to a nearby facility.

Table 3-8. Estimated per-vessel costs of EMS in the 2008 EFP Fishery, expressed as direct costs.

Direct Costs of EMS to NMFS		
	Total Fishery Cost 2008	Average per Vessel Cost
Outreach	\$17,755	\$455
EMS equipment	\$0	\$0
Installations/removals	\$0	\$0
Service	\$0	\$0
Review and cataloguing of data and video imagery	\$23,500	\$603
Analysis and final report	\$35,635	\$914
Certification program for EMS providers	\$0	\$0
Staff training on analyzing EMS data	\$12,644	\$324
TOTAL	\$89,534	\$2,296
Direct Costs of EMS to Industry		
	Total fishery cost 2008	Average per vessel cost
Outreach	\$0	\$0
EMS equipment	\$151,970	\$3,897
Installations/removals	\$71,380	\$1,830
Service	\$46,200	\$1,185
Review and cataloguing of data and video imagery	\$23,500	\$603
TOTAL	\$293,050	\$7,514

Beginning in 2008, under EFPs, Pacific whiting shoreside first receivers were required to procure the services of a single catch monitor from a NMFS-specified service provider. Catch monitors are third party employees paid for by industry and trained by NMFS in techniques used for the verification of fish ticket data. These individuals are trained in species identification, observation techniques relative to the verification of fish ticket data, the types and use of commercial scales, documentation procedures for compliance purposes, and recordkeeping. NMFS has defined the acceptable verification methods and coordinates or conducts the training of these individuals.

If catch monitors were unable to monitor all deliveries for fish ticket verification, they randomly selected deliveries to monitor using a random numbers table. It is reasonable to expect an individual catch monitor would be limited to working at the first receiver 14 hours per day. Therefore, only a portion of deliveries at first receivers in operation more than 14 hours per day were monitored in 2008. With a coverage requirement of a single catch monitor, assuming a 60-day season and 16 first receivers participating throughout the entire season, the cost to all first receivers assuming catch monitors' average daily cost ranges from \$200 to \$300 dollars per day; the total ranges from approximately \$192,000 to \$288,000, including, training, debriefing, housing, and travel time.

In 2009 under EFPs, Pacific whiting shoreside first receivers were required to have full catch monitor coverage. With full coverage of all deliveries, a catch monitor must be present throughout offloading, sorting, and weighing of each Pacific whiting delivery. With a full coverage requirement, assuming a 60-day season and 16 first receivers participating throughout the entire season, the cost to all first receivers

assuming catch monitors average daily cost ranges from \$200 to \$300 dollars per day; the total ranges from approximately \$338,000 to \$507,000, including, training, debriefing, housing, and travel time.

Federal groundfish catch sorting requirements are currently specified at 50 CFR 660.370(h)(6) for species or species groups with trip limits, size limits, quotas, harvest guidelines, or OYs. Under Federal regulations at 50 CFR 660.306(a)(7), it is unlawful for any person to fail to sort the catch prior to the first weighing after offloading. The groundfish must be sorted to the appropriate species or species groups for the fishery in which the vessel is participating. The state of landing may have additional sorting requirements, including requirements for nongroundfish species. Sorting requirements for vessels are also specified in the terms and conditions of the EFP. Since 2007, Federal groundfish regulations have required individuals who receive unsorted catch on land to sort and weigh the catch before it can be transported to another location (NMFS April 2007). In addition, Federal law at 50 CFR Subpart K, 300.160-161 requires that fish transported between states be marked with an accurate packing list, bill of lading, or other similar document that lists species and number by species or specifies other appropriate measure of the quantity such as weight.

Current Federal groundfish regulations recognize that each state has recordkeeping and reporting laws or regulations that address records that have to be kept and/or reports that have to be filed. The Federal groundfish regulations concur with state law by requiring fishery participants to report all data in the exact manner required by applicable state law or regulation. Regulatory requirements that require first receivers to submit electronic fish tickets within 24 hours of landing and prior to transporting catch from the port of first landing were implemented in October 2007 through a related action (NMFS April 2007). The electronic fish tickets are based on information currently required in state fish receiving tickets or landing receipts (hereafter referred to as state fish tickets). Requiring electronic fish ticket data to be submitted within 24 hours allows NMFS to track catch allocations, bycatch limits, and prohibited species catch. First receivers would provide the computer hardware and software (Access 2003 or later) necessary to support the electronic fish ticket program.

Each state requires the submittal of fish tickets that include the actual weight or an estimated weight of each groundfish species or species group. In the state of Oregon, weights reported on fish tickets for the Pacific whiting fishery must have been derived from a certified scale. The states of Washington and California do not specifically require that processors record actual scale weights on fish tickets. For all three states, other data such as the date of landing, gear, vessel, dealer, etc., are also included on the fish tickets. The weights reported on fish tickets are used to determine the total catch by species or species group in the Pacific whiting shoreside fishery. Catch in excess of trip limits, unmarketable catch, and nongroundfish catch are included on the fish tickets. Unlike groundfish, prohibited species are managed by number of individuals.

Each state has laws and regulations that pertain to the use of scales and scale performance by businesses for commercial purposes. Each state has an agency (county or state) that oversees weights, measures, and standards, as well as conducting or overseeing scale performance testing for commercial scales. Commercial scale requirements and how those requirements apply to seafood processors and catch reports differ substantially between states.

In Oregon, all weighing and measuring devices being used commercially in the state must be licensed with the Department of Agriculture prior to being used. Each scale must meet state standards for design, readability, accuracy, and reliability, based on National Institute of Standards and Technology (NIST) Handbook 44. Oregon Measurement Standards approval seals are applied only to those examined devices that meet all appropriate design, installation, and accuracy requirements. However, the state recognizes that knowledgeable, concerned personnel operating correct equipment result in correct weighing and measuring. Oregon requires an approved means of sealing any mechanism used for adjusting a measurement element on a commercial weighing or measuring device. The state also recommends that all

devices be placed under appropriate planned maintenance and service programs to avoid unexpected correction expense. The user of the device is responsible for the accuracy of the scale at all times.

In Washington, Pacific whiting deliveries are sorted, and, though not required by law, the catch is weighed on commercial scales that vary in type and performance. There is current Washington State regulatory code pertaining to weighing and measuring devices installed after July 5, 1997, that are used for commercial purposes (Chapter 16-664 WAC). Like Oregon requirements, commercial scales must be traceable to a National Type Evaluation Program (NTEP)⁵⁸ Certificate of Conformance.⁵⁹ In Washington State, the owner or operator of weighing or measuring equipment is responsible for the maintenance and accuracy of weighing or measuring devices at all times. Washington Weights and Measures approval seals are placed on devices that meet all appropriate design, installation, and accuracy requirements. The seal indicates that the device passed the inspection during the specified month and year. Weights and Measures officials perform unannounced inspections.

In the state of California, the Division of Measurement Standards is responsible for weights and measures. California requires that any scale used commercially be “type approved” for such use. Commercial use of a non-type-approved scale is illegal in California. Additionally, each commercial scale must have a registered service agent place it into service, or be inspected by a local weights and measures official prior to use. There are a number of requirements such as suitability, position, environmental factors, level, interface with other devices and accessories, etc., that affect proper legal use of the equipment and that require the knowledge of a service agent. County weights and measures inspectors inspect and test various types of weighing and measuring devices. The inspector certifies the devices by affixing a paper seal to them. From time to time, inspectors conduct inspections for compliance with the requirements set by laws and regulations. At the time this document was being prepared, it was not clear how California laws for commercial scales apply to Pacific whiting shoreside processors or what has been in practice in the Pacific whiting fishery. Though weights reported to the state on the landing and receipt of fish must be “accurate,” there appears to be no specific requirement for the weights to have been derived from a scale.

3.3.2.2 Vessel Monitoring System

To maintain the integrity of closed areas (primarily RCAs and EFH areas), NMFS implemented a VMS monitoring program, which includes satellite tracking of vessel positions and a declaration system. VMS transceiver units transmit hourly position reports to NMFS. VMS is a tool NMFS uses to monitor fishing vessel location in relation to closed areas, including areas that are closed for habitat protection. Midwater trawl gear makes little contact with the ocean floor; therefore, there are few habitat protection measures restricting the use of the gear.

VMS was initially implemented on January 1, 2004, for all vessels registered to LE groundfish permits. In 2007, the VMS requirement was expanded to all commercial vessels that take and retain, possess, or land Federally managed groundfish species taken in Federal waters, which includes all directed and incidental groundfish open access fisheries (these fisheries are described in Section 3.3.3.5). Each trawl vessel operator is currently required to file a declaration report with NMFS to indicate the intent to use a

⁵⁸ A program of cooperation between the National Conference on Weights and Measures, the NIST, the states, and the private sector was created for just this purpose. Through 12 participating laboratories, NTEP evaluates the performance, operating characteristics, features, and options of weighing and measuring devices against the applicable standards.

⁵⁹ An official NTEP Certificate of Conformance is issued by NCWM following successful completion of the evaluation and testing of a device. This certificate indicates that the device meets applicable requirements for commercial weighing and measuring equipment in the U.S.

particular gear. Those fishing under EFPS also have to identify the intent to target Pacific whiting with the midwater trawl gear. The EA NMFS prepared for this action contains detailed description and analysis of the VMS monitoring program (NMFS 2003).

3.3.2.3 Electronic Fish Tickets

On September 5, 2007, NMFS published a final rule to establish catch accounting requirements for persons who receive, buy, or accept Pacific whiting (whiting) deliveries of 4,000 pounds (1.18 mt) or more from vessels using mid-water trawl gear during the primary whiting season (72 FR 50906). The final rule became effective on October 5, 2007. The rulemaking included requirements for first receivers to have and use a NMFS-approved electronic fish ticket program (or other NMFS-approved software) and to send daily catch reports to the PSMFC. First receivers provide the computer hardware, operational software (Microsoft Office with Access 2003 or later if PSMFC software is used), and internet access necessary to support the electronic fish ticket program and daily e-mail transmissions. For companies that have developed their own software programs that meet the reporting requirements, provisions were included to allow the software to be NMFS-approved if it meets requirements specified by PSMFC. Electronic fish tickets must be submitted within 24 hours from the date the catch is received. The electronic fish tickets are used to collect information similar to the information currently required in state fish receiving tickets or landing receipts (state fish tickets). The data are used to track catch allocations, bycatch limits, and prohibited species catch.

3.3.2.4 State-Based Landing Reports and Receipts

Various state, Federal, and tribal catch monitoring systems are used in west coast groundfish management. These are coordinated through the PSMFC. PacFIN is the commercial catch monitoring database. There are two components to total catch: (1) catch landed in port and (2) catch discarded at sea. Sorting requirements are now in place for all species with trip limits, harvest guidelines, or OYs, including all depleted species. This provides accounting for the weight of landed depleted species when catches are hailed at sea or landed. LE groundfish trawl fishermen are also required to maintain state logbooks to record the start and haul locations, time, and duration of trawl tows, as well as the total catch by species market category (i.e., those species and complexes with sorting requirements).

Landings are recorded on state fish receiving tickets. Fish tickets are designed by the individual states, PSMFC coordinates recordkeeping requirements between state and Federal managers. Poundage by sorted species category, area of catch, vessel identification number, and other data elements are required on fish tickets. Landings are also sampled in port by state personnel to collect species composition data, otoliths for ageing, lengths, and other biological data.

3.3.2.5 Bycatch Mitigation (Amendment 18)

The Council took final action on Amendment 18 in 2005. It incorporated the preferred alternative into the FMP in the September 2004 *Pacific Coast Groundfish Fishery Management Plan Bycatch Mitigation Program Final Environmental Impact Statement* (NMFS 2004c). The preferred alternative from that FEIS identifies the use of sector-specific total catch limits, or sector bycatch caps, as a way of motivating fishery participants to reduce bycatch, especially of depleted groundfish species. Sector bycatch caps have only been used in limited circumstances, such as in the at-sea whiting sector, because of the need for real-time monitoring systems to make this approach workable. The amendment also incorporated a description of current standardized bycatch monitoring methodologies and other measures for bycatch reduction into the FMP.

3.3.2.6 Amendment 10

In 1996, the Council adopted a combined amendment to the groundfish and salmon FMPs: Amendment 10 to the groundfish FMP and Amendment 12 to the salmon FMP. Under the combined amendment, the FMPs allowed for salmonids to be retained in the whiting trawl fishery (otherwise prohibited for all net gear) when the fishery was managed with a Council-approved monitoring program. As discussed in Section 3.3.2.1, the whiting shore-based sector is currently managed under annually issued EFPs that provide for the required monitoring program. An EFP is normally issued as a short-term and temporary measure with the expectation that the need will be addressed by permanent regulations.

Implementing regulations for Amendment 10 would create the regulatory structure necessary to efficiently prosecute and effectively manage the whiting shore-base sector without EFPs while providing accurate catch data such that the ESA and MSA requirements are adequately met. The whiting shore-based sector has to have a catch monitoring system in place to adequately track the incidental take of Chinook salmon as required in the ESA Section 7 Biological Opinion for Chinook salmon catch in the Pacific whiting fishery; to meet the standardized reporting methodology defined by the MSA; and to track the catch of target and overfished groundfish species such that the fishing industry is not unnecessarily constrained and that OYs, harvest guidelines, sector allocations, and bycatch limits are not exceeded. Amendment 10 implementing regulations would implement a program that is similar to the program being run under the 2008 and 2009 EFPs. A full analysis of the 2009 EFP program can be found in the March 2009 EA titled “Issuance of an Exempted Fishing Permit for a Maximized Retention and Monitoring Program for the Pacific Whiting Shoreside Fishery.”

At its June 2007 meeting, the Council recommended that NMFS implement Federal regulations for a maximized retention program that requires participating vessels to procure and pay for EMS services whenever the vessel participates in the shore-based sector and for Pacific whiting shoreside first receivers to procure and pay for the services of independent catch monitors. The vessel EMS responsibilities would include paying for the purchase or lease of EMS equipment, the installation and removal of EMS systems, all EMS maintenance, and a portion of the initial cataloging of information collected from the vessel. Any additional analysis of EMS data for enforcement or management purposes would be paid for by NMFS, as would all administrative costs related to the monitoring program. The first receiver responsibilities would include paying for the services of a certified catch monitor, including the days in which the catch monitor is trained by NMFS, the days in which catch monitors are assigned to the first receiver, and post-deployment days in which the catch monitors are interviewed by NMFS and submit finalized data. Any additional data analysis costs for enforcement or management purposes would be paid for by NMFS, as would all administrative costs related to the monitoring program.

Under the Amendment 10 implementing regulation, vessels would be required to retain all catch with the exception of minor amounts of very large species and operational discards. Allowed discards include very large animals, those in excess of 6 feet in length, which rarely occur in the catch, and a single basket of operational discards (whiting only) from each haul. All events would be recorded by the vessel operator in the required logbook. Operational discard would include catch that is cleaned from the net and deck after the haul is dumped into the hold, but may only include Pacific whiting. Any additional amounts of nonwhiting catch cleaned from the net or deck must be retained and offloaded at the first receiver with the delivery. Any incidentally caught marine mammals discarded at sea would be documented in the vessel logbook and reported to the NMFS Office of Protected Resources by completing and submitting a Marine Mammal Authorization Program mortality/injury report form as required by regulations at § 50 CFR 229.4.

The Council’s recommendation included requirements for vessels to obtain a Pacific whiting shoreside fishery certification. Such a certification would be issued to any vessel, provided it was registered to a LE permit with a trawl endorsement. The primary purpose of the certification would be to indicate the vessel

owner's intent to use a particular vessel to fish in the whiting shore-based fishery so that an adequate amount of EMS monitoring equipment can be available for monitoring each vessel.

To ensure that only qualified businesses could provide EMS services, the implementing regulations would include EMS provider certification requirements. NMFS would certify providers through an application and review process in which businesses provide information regarding their ability to provide adequate services to support the EMS monitoring, data storage, and data processing needs. An appeals process would be established for businesses that were not issued a catch monitor service provider certifications, or businesses that have been decertified.

Dockside monitoring of unsorted whiting catch at Pacific whiting shoreside first receivers would be conducted by catch monitors. Catch monitors are individuals who monitor the sorting and weighing of unsorted primary season whiting catch as it is received, purchased, or taken custody, control, or possession of by first receivers. In general, these activities occur at shoreside processing facilities in the port of landing, but may occur at other dockside facilities where catch is offloaded onto trucks that transport the catch to other processing facilities.

In June 2007, the Council recommended that catch monitors be trained by NMFS or to NMFS specifications, that they be responsible for all shoreside observation responsibilities, and that the initial level be based on the level of program funding for the shoreside observation program with an evaluation of the appropriateness of the coverage level being conducted following the initial year of data collection. Given the available cost data, NMFS determined that the level of coverage provided by the Council's recommendation would be for each first receiver to be required to procure the services of one catch monitor for every day that deliveries are received from the Pacific whiting shoreside fishery.

At the Council's June 2008 meeting, when the Council considered specifications and harvest measures for all of the 2009 and 2010 groundfish fisheries, an assortment of management measures were considered for the whiting fishery, including mandatory monitoring of all Pacific whiting deliveries for fish ticket verification to ensure the integrity of sector-specific bycatch limits. The Council also recommended that NMFS increase the catch monitor coverage requirements from what had been recommended in June 2007 (one catch monitor per facility) to full coverage in which all Pacific whiting deliveries are monitored by catch monitors (the number of individual catch monitors per facility would vary depending on the hours of operation and the number of whiting deliveries received each day). In response to the Council's June 2008 request, further analysis was completed (NMFS 2009b), and the proposed coverage requirements were revised to be consistent with the recommendation for full catch monitor coverage.

To ensure that only qualified businesses provide catch monitoring services, Pacific whiting catch monitor provider certifications would be provided to businesses that hire and support qualified catch monitors. Like EMS service providers, NMFS would certify providers through an application and review process. An appeals process would be established for businesses that were not issued catch monitor service provider certifications, or businesses that have been decertified.

The Amendment 10 implementing regulations would also establish qualification and certification requirements for catch monitors. Catch monitor certifications would be provided to individuals who meet the qualifying criteria, successfully complete the required training, and pass all proficiency testing. Similar to the existing regulations for observers, an appeals process would be established for individuals who were not issued a catch monitor certifications, or who have been decertified.

Recordkeeping and reporting requirements would be specified in Federal regulation and would be adequate to support a real-time inseason data system (i.e., preliminary catch weights would be available in a central database within one to two days from the date the catch was landed) as is needed for fleetwide or sector bycatch limit management. To the extent possible, Federal recordkeeping and reporting

requirements would be consistent with state regulatory requirements so that the burden of unnecessary duplication can be avoided.

3.3.2.7 Ongoing Effects of Bycatch Reduction Related to Trawl Rationalization

Trawl rationalization is intended to improve monitoring in the trawl sector and create incentives to reduce bycatch. The monitoring requirements for IFQ and co-op programs are likely to continue and expand current monitoring programs. Since the at-sea whiting fleet currently enjoys 100 percent observer coverage, which is partially financed by industry, little change in monitoring would be required. The nonwhiting trawl fishery is subject to partial observer coverage; the current program infrastructure may continue, but observer coverage will increase to 100 percent (potentially with some augmentation by electronic means, such as cameras). Like the current at-sea whiting sector, participants in a rationalized trawl fishery would likely bear most of the direct costs of hiring observers through private contracting firms.

Both an IFQ and co-op program would require establishing a new infrastructure to track QS/QP holdings and match catches to QP holdings in order to set ongoing account balances. This tracking program is likely to be complicated given the large number of units involved (all stock units for which OYs are identified plus any area subdivisions that may be assigned). NMFS would be responsible for running this tracking program, although partial cost recovery may be instituted subject to limits imposed by the MSA.

3.3.3 Rationalization and Fleet Consolidation

The Council completed its Strategic Plan on managing the groundfish fisheries in October 2000 (Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee 2000). One element of the Strategic Plan was an evaluation of overcapacity in the commercial groundfish fleets. This was done by comparing the potential harvest capacity of participating vessels with the amount of fish actually available for harvest. For the nonwhiting groundfish trawl fishery, the Scientific and Statistical Committee (SSC) calculated that 26 to 40 percent of the vessels then participating in the fishery were capable of taking all of the groundfish available for trawl harvest. The Strategic Plan noted that, while the number of groundfish trawl vessels fleeted had to be reduced by at least half, rationalization of the fishery would not be complete until the capacity level was in balance with the economic value of the resource.

The Strategic Plan recommended a trawl vessel buyback program as a near-term objective, and a trawl IFQ or mandatory permit stacking program as a longer-term objective.⁶⁰ An IFQ program for the LE trawl sector has been on the Council's official workload list since soon after the adoption of the Strategic Plan.

Prior to development of the Strategic Plan, two important FMP amendments comprised initial steps towards rationalizing groundfish fisheries. The most important was Amendment 6, described below. Amendment 14 rationalized the LE fixed-gear sablefish fishery through a permit stacking scheme. Although only indirectly affecting the LE trawl fishery, this approach was considered early in the trawl rationalization process as a means to rationalize the LE trawl fishery.

3.3.3.1 Limited Entry (Amendment 6)

In 1991, the Council adopted Amendment 6 to the Groundfish FMP, a groundfish license limitation program that led to the creation of Federal LE permits. At that time, the Council acknowledged that the program, while expected to limit the growth of harvesting capacity, would not resolve the problem of

⁶⁰ Mandatory permit stacking reduces capacity in the fishery by requiring permit holders to acquire an additional permit to continue fishing.

overcapacity in the groundfish fishery. An IFQ program was also considered as an alternative to the license limitation program. However, there was a great deal of opposition to IFQs across all sectors of industry at that time. The license limitation program was seen as a first step toward rationalization of the fleet with further capacity reduction measures to follow. NMFS implemented Amendment 6 in 1993, issuing, for use in 1994, 388 initial LE permits with trawl endorsements, in addition to permits issued with endorsements for longline and/or pot (trap) gear. Within the LE fishery, gear endorsements were used to constrain the number of participants using a particular gear type (trawl, longline, or pot) in the LE segment of the groundfish fishery. Vessels using other gear types (or using longline or pot gear without an endorsement) were allowed to continue as part of a so-called open access fishery (access to some of these fisheries may be limited under state programs). An allocation was established between the LE and open access fisheries. The open access allocation is generally much smaller than the limited entry allocation.

Under the Amendment 6 license limitation program, the ability to combine permits has resulted in a substantial reduction in the number of trawl vessels. Limited entry permits were issued with capacity endorsements that matched the length of the vessel that originally qualified for the permit. At the recommendation of the Council, NMFS issued a final rule in 1994 allowing permit owners to combine two or more permits to create a permit with a longer length endorsement than any of the original permits. Because a vessel's harvesting capacity increases geometrically (i.e., volumetrically) with an increase in vessel length, NMFS implemented a conversion formula for permit combinations that assigned a certain number of capacity rating points per foot of vessel length. Under this point system, a vessel owner wishing to permit a longer vessel must purchase enough existing permits to create a combined permit with capacity points sufficient for the length of the vessel (59 FR 17726, April 14, 1994). By 2003, this permit combination requirement had resulted in the effective removal of 114 trawl permits from the fishery. Of the 388 trawl permits originally issued, 274 permits remained until the 2003 buyback program.

3.3.3.2 Limited Entry Fixed-gear Permit Stacking (Amendment 14)

The fixed-gear sablefish fishery is the first Council fishery managed under a LAPP. Amendment 8 to the Groundfish FMP was an attempt to implement an IFQ program in the fixed-gear sablefish fishery. However, this program languished, first because of a congressional request for delay and then because of the MSA moratorium on the creation of new IFQ programs. Instead, Amendment 9 was adopted in 1997, establishing additional entry limits on this economically valuable fishery. Amendment 9 required that (April 1 to October 31) participating vessels possess a new sablefish endorsement in addition to a fixed-gear LE permit to fish in the primary fixed-gear sablefish fishery. Amendment 14, implemented in 2001, attempted to further rationalize this fishery by establishing a permit stacking system. Permit stacking allows a sablefish-endorsed, fixed-gear permit holder to acquire up to two additional permits and stack them for use on a given vessel. Each sablefish-endorsed permit is assigned to one of three tiers based on the original catch history associated with the permit. Each tier has a different landing limit. A vessel with stacked permits is then eligible to take the landing limit associated with the tier of each permit assigned to the vessel. For example, a vessel with three permits (all of the same tier) is eligible to land up to three times as much sablefish as a vessel with only one permit for that same tier. The duration of the season during which these limits may be taken is long enough so that each tier limit effectively functions as a vessel quota.

Since the stacked permits confer additional harvest opportunity only for sablefish and only during the primary sablefish season, the main effort-reducing effect of Amendment 14 was to reduce the number of vessels using fixed-gear to take species other than sablefish. Vessels surrendering their permits for stacking by another vessel may still shift to other nonpermitted fisheries if a viable opportunity exists. The sablefish quota (tier) for each permit—created in association with the sablefish endorsement, extended season, and permit stacking regime—has also succeeded in eliminating many of the characteristics of a derby or Olympic fishery that plagued this fishery in the past. Derby fisheries result

when overcapacity, combined with restrictive catch limits, serves to concentrate fishing into a very short season. By 1995, the primary sablefish season lasted only one week, followed by a brief mop up period to reach the established limit or allocation. Permit stacking essentially gives each vessel a fixed quota, which can be caught at any time during the seven-month primary season. Although the quota is not tradable separate from the permit, this system confers a set amount of sablefish harvest opportunity and allows it to be more efficiently allocated among vessels through permit transactions. The permit seller also captures economic rent through the sale. The transferable unit associated with a sablefish endorsed permit and its associated tier is limited to either the whole tier amount (meaning the tier has not been fished at time of transfer) or a residual tier amount (the unfished balance remaining on the tier at the time of transfer). By contrast, with Qs under an IFQ system, QS can be traded in one pound increments.

According to the latest permit data,⁶¹ the 164 sablefish-endorsed permits were registered to 90 vessels, based on the vessel name in the permit database. For 18 permits the vessel name was listed as “unidentified”; in these cases, the permits were assigned to unique permit owner names for tabulation purposes. Of these 90 vessels (or permit owners), 41 vessels had one permit, 24 had two permits, and 25 had three permits.

3.3.3.3 Trawl Vessel Buyback Program

A line item in a 2003 Federal budget bill (PL 108-7) instructed NMFS to implement a fishing capacity reduction program for the nontribal west coast groundfish trawl fleet (excluding Pacific whiting catcher-processors). See page 129 for some additional discussion of the purposes of the buyback program. This bill funded the buyback with a \$10 million appropriation and a \$36 million loan approved by an industry referendum. The loan would be repaid by members of the participating fleets (LE groundfish trawl, Dungeness crab pot, and pink shrimp trawl fleets) through landings fees collected over the course of the next 30 years. On August 8, 2005, NMFS published a notice (70 FR 45695) announcing that collection for repayment of the loan would commence on September 8, 2005.

Under the buyback program, NMFS retired 91 trawl vessels, their associated state fishing permits, and Federal LE trawl permits, effective December 4, 2003. The program reduced the available pool of LE permits for vessels delivering to shore plants and motherships to 172 permits (an additional 10 permits are associated with the whiting catcher-processor fleet). Since December 2003, two additional permits were retired through permit combination, leaving 180 LE trawl permits remaining in the fishery. The 91 vessels retired under the buyback program accounted for 40 percent of the \$32 million in ex-vessel revenues delivered by all LE groundfish trawlers in 2002 (including deliveries to nontribal motherships).

Following completion of the buyback program, NMFS analyzed permit latency in the LE trawl fleet to determine whether a significant number of unused or infrequently used permits remained in the fishery. The agency’s concern over latent capacity stemmed from public comments observing that permit/vessel owners who had been bought out under the buyback program could rejoin the fishery by simply purchasing a latent permit and vessel. The Council found no need to take remedial action given evidence for relatively low occurrence of highly latent permits and the apparent lack of concern among industry members who bear responsibility for repaying the \$36 million loan that funded the buyback.

3.3.3.4 Entry Limitation Measures for the Whiting Sector (Amendment 15)

Amendment 15 to the FMP was considered by the Council through two separate iterations. During the Council’s first-round discussions on Amendment 15 (1999 to 2001), Amendment 15’s focus was responding to the 1998 American Fisheries Act (AFA) for west coast fisheries, including the whiting fishery. The Council tabled its first-round discussions in 2001 and did not reexamine Amendment 15

⁶¹ NMFS Northwest Region permit database, accessed May 5, 2008.

until 2006. In its second-round discussions, the Council moved from just looking at the effects of the AFA on west coast fisheries to a more broad examination of participation, overcapitalization, and the resulting conservation impacts, in the Pacific whiting fishery by both AFA- and non AFA-vessels.

In 2006, vessels with no previous participation in the whiting fishery entered the fishery. Additionally, participation shifts between the whiting sectors occurred in 2006. The increased participation resulted in concern by fishermen and managers that more vessels may want to enter the fishery or shift between sectors of the fishery. New entry into the Pacific whiting fishery is likely, given the increased whiting ex-vessel prices; increased prices for headed and gutted whiting, as well as for fillet products; declining west coast trawl opportunities due to overfished species rebuilding measures; and declining pollock quotas off of Alaska. Action was taken to restrict new vessels from entering into the fully capitalized whiting fishery. If fishing capacity increases (becomes further overcapitalized), the intensity of fishing may rise such that fishermen strive to catch as much Pacific whiting as possible as quickly as possible (also referred to as a derby fishery or the race for fish). This race constrains the available time for vessels to search for whiting, which can cause fishermen to neglect safety and bycatch concerns to which they would otherwise be more attentive. This accelerated race for fish would likely increase the incidental catch of nonwhiting species and management costs, while decreasing the economic returns to historical participants and communities.

In September 2006, the Council recommended that NMFS take emergency action to prevent new entry into the Pacific whiting fishery in 2007. The basis for the Council's recommendation was conservation concerns that could arise from an accelerated race for fish due to new entry of AFA-permitted vessels to the fishery. Members of the Council expressed concern that a race for fish could result in excessive harvest of whiting early in the season, greater bycatch of overfished rockfish, and higher levels of incidental catch of endangered and threatened salmon in the early season. The Council also noted its concern that new entry of AFA-permitted vessels could result in early achievement of the U.S. directed harvest whiting quotas, leaving west-coast-based vessels facing no fishing or very limited fishing while the AFA-permitted vessels could return to the rationalized Alaska pollock fisheries, in which they also had an interest. The Council's proposal would only have prohibited AFA-permitted vessels from entry into the Pacific whiting fishery in 2007 and only if they did not have a history of involvement in the fishery prior to 2006. Other non AFA vessels could still have entered the fishery. In a letter of January 11, 2007, the NMFS Northwest Regional Administrator denied the Council's request for an emergency rule. The letter noted that the Council action was intended to address actual or potential harm to west coast fisheries from the AFA; however the earlier closure of the whiting shore-based fishery in 2006 (compared to 2005) was due to new participation by both AFA-permitted vessels and non AFA vessels. While acknowledging that new market conditions were likely to attract additional vessels, the Regional Administrator pointed out that the proposed action would have denied new entry to a selected category of vessels (i.e., AFA-permitted vessels), but not to all vessels. The Regional Administrator noted that the guidelines for the use of emergency rules call for use of notice-and-comment procedures when there are controversial actions with serious economic effects, except under extraordinary circumstances. Therefore, the proposal, as with other allocation decisions, would more appropriately be handled through the Council's full rulemaking process.

The NMFS Regional Administrator subsequently advised the Council on February 13, 2007, that if it were to submit a proposal that dealt more broadly with the issue of conservation risks and management problems due to potential new entry of any new vessels into the directed whiting fishery, NMFS would review that proposal on its own merits. NMFS would continue to be concerned if the request based the proposed action on the AFA, rather than on the MSA.

At its March 2007 meeting, the Council discussed a schedule for final Council action for Amendment 15 to take place at either its June or September 2007 meeting. As an interim protective mechanism, the Council voted to request that NMFS enact an emergency rule for the 2007 nontribal season to prohibit

participation in the 2007 nontribal Pacific whiting fishery by all vessels without sector-specific history in the fishery prior to January 1, 2007 (72 CFR 27760). In addition to the factors that were presented in the 2006 Council emergency rule request, four new pieces of information were presented at the March 2007 Council meeting. The new information exacerbated concern for an accelerated race for fish. First, the price for whiting continued to increase to unprecedented levels; ex-vessel prices increased from \$77.00 per ton in 2004 to \$137.00 per ton in 2006—nearly doubling since 2004 and increasing by more than 22 percent compared to 2005. Industry projections for the 2007 season indicated that prices would continue to increase to over \$176.00 per ton. Second, the U.S. OY of whiting was reduced by 10 percent for the 2007 season compared to 2006. Third, because of higher than projected canary rockfish bycatch rates in the nonwhiting fishery, the Council took action in March 2007 that placed more severe constraints on the LE nonwhiting trawl fishery. Vessels with reduced opportunities due to the expanded rockfish conservations areas may have had an incentive to join the whiting fishery. Fourth, the quota for Alaska pollock was reduced in 2007. All of these recent changes increased the likelihood that there could be an accelerated race for fish: the first by making entry more lucrative for additional vessels, the second by constraining supply of whiting and leading to more pressure among vessels to quickly capture the more limited supply of whiting, and the third and fourth by increasing the relative attractiveness of entering the whiting fishery this year.

Faced with this information, the Council adopted and submitted a proposal to NMFS to address the anticipated issues in 2007. The Council's proposal was to 1) prohibit via NMFS emergency action participation in the shore-based, catcher-processor, and mothership sectors of the fishery by any vessel that had no sector-specific history of participation prior to January 1, 2007; and 2) commit the Council to complete Amendment 15 to the FMP to address concerns regarding increased participation by AFA vessels for the long term, consistent with the MSA, the AFA, and other applicable law.

NMFS approved Amendment 15 to the Groundfish FMP on June 18, 2008. Amendment 15 revised the FMP to include provisions for a vessel license limitation program for the nontribal sectors of the whiting fishery. Amendment 15 is intended to serve as an interim measure to limit potential participation in the whiting fishery within the U.S. west coast EEZ until implementation of a trawl rationalization program under Amendment 20 to the Groundfish FMP. Amendment 15 implementing regulations required vessels to qualify for a whiting vessel license limitation program to harvest and/or process in the nontribal whiting fishery. This is in addition to the requirement for harvesting vessels to be registered to a groundfish LE permit. Amendment 15 restricts participation in the nontribal sectors as follows: catcher vessels in the whiting shoreside fishery would be required to have made sector-specific whiting landings in any one calendar year during the period from January 1, 1994, through January 1, 2007; vessels participating in either the catcher-processor or mothership sector would be required to have either caught and processed whiting (catcher-processor sector,) caught and delivered whiting (catcher vessels in mothership sector,) or processed whiting (motherships) in any one calendar year during the period from January 1, 1997, through January 1, 2007. This was the first participation requirement for motherships, which, unlike catcher vessels, have not needed a groundfish LE permit registered to them. The Council preferred the 1994 qualifying period start date for the shore-based sector because that was the first year the groundfish LE program was in effect. For the at-sea sectors, however, 1997 was the preferred qualifying period start date because that was the first year that whiting was specifically allocated among the three whiting sectors. Prior to 1997, whiting catch was allocated between vessels that landed on shore and those that caught whiting for processing at sea.

3.3.3.5 Open Access Limitation (Amendment 22)

As noted above, when the groundfish LE program was established in 1993, some fishing was allowed in the so-called open access sector. These fishermen used gear other than trawl or fixed-gear, or could fish with fixed-gear under small landing limits. The open access sector has what are called directed and incidental segments. The directed component comprises fishermen who are targeting groundfish as

demonstrated by the fact that a majority of their catch is groundfish species. The incidental segment consists of those targeting species other than groundfish but catching some groundfish in the process. In practice, while this distinction can be made at the level of a fishing trip, participants in this sector may be nonspecialists—participating in a variety of fisheries throughout the year—or part-time fishermen.

In its 2000 strategic plan (Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee 2000), the Council identified the need to reduce capacity in the open access sector. In response, the Council initiated Amendment 22 in September 2006. Previously, a control date of November 5, 1999, was set, which may be used to decide eligibility requirements for a new LE program (i.e., catch history after this date may not be considered for deciding permit eligibility). Implementation of the expanded VMS program (discussed above) created a de facto means of determining participation in the open access sector, which, heretofore, was difficult to characterize. In March 2008, the Council reviewed a preliminary EA containing a range of alternatives and made recommendations for further modification of the alternatives. The Council considered alternatives that would create two permit classes, a B permit authorizing directed groundfish harvests and a C permit authorizing incidental groundfish harvests in Federal waters. Catches in state waters, and of designated species that occur exclusively in state waters, would be exempt. These alternatives range from a basic permit program, which would not limit participation, but would allow better tracking and monitoring, to alternatives with increasingly higher capacity reduction goals for the directed fishery under the B permit program. In March 2009, the Council selected its preferred alternative, recommending the basic permit program without a LE requirement.

3.3.3.6 Impacts of Past Rationalization Measures Related to Trawl Rationalization

The principal actions with ongoing effects to the groundfish trawl fishery are LE and the vessel buyback program. Both of these programs reduced capacity; more than 300 trawl vessels were active in the 1980s, while the number today is about 120. This relatively smaller fleet size is likely to make the transition to a rationalized fishery easier than otherwise would be the case because less consolidation needs to occur.

The other actions either do not have continuing effects (Amendment 15, with its provisions sunseting with implementation of the trawl rationalization program) or indirect effects (Amendments 14 and 22, affecting other groundfish fisheries). Ongoing indirect effects could be felt in fishing communities. Amendment 14 encouraged some consolidation in the LE fixed-gear sablefish and greater individual flexibility due to the assignment of individual nontradable quotas.

3.3.4 Sector Allocations to Support Trawl Sector Rationalization, Amendment 21

The action alternatives for the trawl rationalization program are premised on the distribution of shares, which translate into a right to catch a quantity of fish, to some combination of individual permit holders, cooperatives composed of affiliated vessels, and groundfish processors. Since various other fisheries target groundfish or catch them incidentally, some process must be used to allocate a portion of the OYs/ACLs, which are established biennially based on assessments of stock status, to the groundfish trawl sector. Pacific whiting and sablefish are already allocated between sectors using fixed percentages; all other groundfish species, however, are implicitly allocated through the management measures established biennially. Instead of these implicit allocations, fixed percentages have to be established for these species as a precursor to assignment of catch privileges envisioned under the trawl rationalization alternatives. Although such fixed allocations could be adopted and modified periodically through the biennial specifications process, the Council decided that it would be simpler and perhaps ultimately less controversial to establish permanent allocations by FMP amendment. These percentages are then applied to the OY/ACL quantities established biennially to determine the actual pounds of each species or species complex that would be allocated during the two-year period.

Groundfish FMP Amendment 21 establishes allocations to support trawl rationalization. The Council adopted a range of allocation alternatives at the November 2007 meeting. They are based on the historical share of catch by sectors for 2003 to 2005 total catch or 1995 to 2005 landed catch. Total catch estimates have only been available since 2003 when observer data became available. Overfished species not principally caught in trawl fisheries, species that already have fixed allocations, and other fish and minor shelf rockfish complexes were excluded from consideration. These species would be periodically allocated as part of the biennial specification process. This action also establishes the allocation for Pacific halibut, which is a prohibited species in the groundfish trawl fishery (meaning that it cannot be retained). Under the trawl rationalization, preferred alternative bycatch of Pacific halibut would be managed with IBQ for the shoreside component of the fishery. Pacific halibut are rarely caught in the at-sea component of the fishery, because the gear they use rarely goes near the bottom where halibut normally reside.

The Council took final action by choosing preferred sector allocations in April 2009. Table 3-9 shows allocations the Council adopted under Amendment 21 compared to trawl sector landings from 1995 to 2005. Landings are presented as the average share of OYs/ACLs and average share of landings from all groundfish sectors (which, in addition to trawl, is fixed gear, open access, tribal, and recreational). Landings of some trawl dominant species are a smaller percentage of the OY/ACL, because only a portion of the OY was caught.

Amendment 21 would establish allocations among the whiting at-sea sectors (mothership and catcher-processor) and the shoreside sector (which, under the preferred alternative, would be managed as a single sector with IFQs, combining both whiting and nonwhiting trawl) for Pacific ocean perch, widow rockfish, and darkblotched rockfish. The catcher-processor and mothership sectors would be allocated 58 percent of the whiting sectors' allocation for these three species. For Pacific ocean perch, the whiting sectors are allocated the greater of 17 percent of the trawl allocation or 30 mt, making the at-sea sector allocation 9.9 percent of the overall trawl sector allocation (9.4 percent of the total OY/ACL) or 17.4 mt. For widow rockfish, allocation schemes were established for the stock as overfished and rebuilt, since current projections indicate the stock may be declared rebuilt within a few years, and harvest limits could then be increased. While widow rockfish is declared overfished, the three whiting sectors are allocated 52 percent of the trawl allocation, resulting in the combined catcher-processor and mothership sector allocation 30.2 percent of the overall trawl sector allocation (20.9 percent of the total OY/ACL). When rebuilt, either 10 percent of the trawl allocation, or 500 mt of widow rockfish, whichever is greater, would be allocated to the catcher-processor and mothership sectors combined, making the at-sea sector allocation 5.8 percent of the overall trawl sector allocation (4 percent of the total OY/ACL) or 290 mt. For darkblotched rockfish, the whiting sectors are allocated either 9 percent of the trawl allocation, or 25 mt, making the at-sea sector allocation 5.2 percent of the overall trawl sector allocation (5 percent of the total OY/ACL) or 14.5 mt.

For Pacific halibut, Amendment 21 would establish a trawl mortality limit that would be applied to both legal and sublegal size fish. The groundfish trawl allocation would be set at 15 percent of the Area 2A (waters south of the U.S./Canada border) constant exploitation yield (CEY) for legal size halibut, not to exceed 130,000 pounds for the first four years of the trawl rationalization program, and not to exceed 100,000 pounds starting in the fifth year. The allocation scheme would represent a reduction by about half of halibut bycatch in the groundfish trawl fishery compared to current, status quo catches. Under the trawl rationalization preferred alternative, halibut bycatch would be managed by transferable quotas (IBQ). It is anticipated that the greater flexibility and accountability afforded by IBQ (similar to IFQ for species which may be retained) would provide both opportunities and incentives for trawl harvesters to operate under this tighter constraint. However, this total bycatch limit may be adjusted downward through the biennial management process in future years in response to fishery performance. Part of the overall total catch limit is a set-aside of 10 mt of Pacific halibut to accommodate bycatch in the at-sea whiting fishery and bottom trawl bycatch south of 40°10' N. latitude.

The impacts of intersector allocation relate to the actual amount of QPs and/or co-op allocations available to the trawl fishery each year. Establishing permanent allocations for most or all stocks would simplify future decisionmaking, because the allocations would be formulaic (i.e., the application of a percent value to the OY/ACL). On the other hand, permanent allocations reduce flexibility to adapt to changing conditions. In particular, the importance of a given quantity of fish over a range of possible allocations may vary. For example, a particular sector may be less able to avoid a particular species in comparison to another sector (because of fundamental technological reasons). This could create a floor in terms of the actual amount of an allocation to that sector, because below that amount the fishery can no longer operate. With a fixed percentage allocation at a low OY/ACL, the actual quantity allocated may fall below this floor. More generally, the socioeconomic value placed on different fishery sectors may change; as a result, the Council may wish to increase that sector's allocation (with the increase taken out of another sector's allocation). Without permanent allocations, the Council could consider these types of adaptations for each biennial management cycle.

Table 3-9. Allocation of harvest opportunity between the trawl sectors and other groundfish sectors as adopted by the Council in Amendment 21 compared to LE trawl landings, 1995-2005. Overfished species shown in bold.

Management Unit	LE Trawl Landings, 1995-2005		Allocation to LE Trawl Sector Under Amendment 21
	As % of the OY	As % of Total Landings ^{b/}	
Lingcod – Coastwide	24.2%	28.2%	45.0%
Pacific Cod	33.6%	98.5%	95.0%
Pacific Whiting (Coastwide)	86.0%	-	‡
Sablefish N. Of 36 ^{o a/}	38.9%	50.9%	47.5%
Sablefish S. Of 36°	27.0%	43.3%	42.0%
Pacific ocean perch	64.4%	99.2%	95.0%
Shortbelly Rockfish	0.1%	-	†
Widow Rockfish	69.4%	95.7%	91.0%
Canary Rockfish	52.7%	-	**
Chilipepper Rockfish S. of 40°10'	9.3%	82.1%	75%
Bocaccio	16.6%	-	**
Splitnose Rockfish S. of 40°10'	22.3%	97.3%	95%
Yellowtail Rockfish N. of 40°10'	53.1%	90.1%	88%
Shortspine Thornyhead N. of 34°27'	36.7%	97.8%	95.0%
Shortspine Thornyhead S. of 34°27'			50 mt
Longspine Thornyhead N. of 34°27'	25.7%	99.0%	95.0%
Longspine Thornyhead S. of 34°27'	<0.1	-	†
Cowcod	<0.1	-	**
Darkblotched	72.2%	98.2%	95.0%
Yelloweye	3.5%	-	**
Black Rockfish – Coastwide	0.1%	-	†
Minor Rockfish North Nearshore Complex	0.2%	-	†
Minor Rockfish North Shelf Complex	4.4%	-	**
Minor Rockfish North Slope Complex	13.3%	84.1%	81.0%
Minor Rockfish South Nearshore Complex	0.0%	-	†
Minor Rockfish South Shelf Complex	0.8%	-	**
Minor Rockfish South Slope Complex	17.4%	69.0%	63.0%
California Scorpionfish			†
Cabezon (Off CA Only)	<0.1	-	†
Dover Sole	92.4%	99.4%	95.0%
English Sole	28.1%	97.8%	95.0%
Petrale Sole (Coastwide)	78.7%	98.2%	95.0%
Arrowtooth Flounder	39.2%	99.6%	95.0%
Starry Flounder		55.9%	50.0%
Other Flatfish	19.3%	94.0%	90.0%
Kelp Greenling			†
Other Fish			†

^{a/}Equivalent to current allocation recalculated as a percent of the total nontreaty available yield or 90.6 percent (the total LE sector allocation) x 58 percent (the LE trawl sector allocation)

^{b/}Data provided only for those species for which there is an Amendment 21 trawl allocation

[‡]Existing allocation

[†]Not managed with IFQs, no fixed allocation

**Allocation determined during biennial specifications

3.3.5 Habitat and Ecosystem Protection

3.3.5.1 Amendment 19

Amendment 19 revised the groundfish EFH definition, specified habitat areas of particular concern (HAPCs), and delineated area closures to mitigate the adverse impacts of fishing on habitat (NMFS 2005). These include 43 areas closed to bottom trawling in waters off all three West Coast states and 17 areas off Oregon and California closed to all bottom-contact gear. Furthermore, all waters deeper than 700 fm would be closed to bottom trawling. Figure 3-3 shows these closures, and Table 3-10 shows the areal extent of these closures. An existing measure prohibiting the use of large footrope trawl gear shoreward of a line approximating the 100 fm depth contour was incorporated into the FMP as a habitat protection measure. Footrope gear larger than 19 inches is prohibited, as is the use of dredge and beam trawl gear as part of the amendment. Implementing regulations for these measures became effective May 11, 2006.

Table 3-10. EFH closed area extent (sq. miles).

Closure Type	Adjoining State			Coastwide 700 fm	Grand Total
	CA	OR	WA		
Bottom contact gear	346.93	545.06			891.99
Bottom contact gear or other gear deployed deeper than 500-fm	775.40				775.40
Bottom trawl gear		1,843.14	918.07	129,843.90	132,605.11
Bottom trawl gear other than demersal seine	8,934.85				8,934.85
Grand Total	10,057.18	2,388.20	918.07	129,843.90	143,207.35

3.3.5.2 Essential Fish Habitat Review

Federal regulations (50 CFR 600.815(a)(10)) require that EFH provisions in FMPs are periodically reviewed and revised, as warranted, and at least every 5 years. Section 6.2.4 in the groundfish FMP describes the habitat conservation framework. It establishes a standing committee to review proposed modifications to the closed areas. Section 7.3.2 describes a process for modifying HAPC designations. Council Operating Procedure 22 details the composition and responsibilities of a review committee, intended to meet the general requirement of 50 CFR 600.815(a)(10) and specifically to make recommendations on modifications to closed areas and HAPCs. In June 2008, the Council finalized the composition of, and appointments to, the EFH Review Committee (EFHRC). An initial task of the EFHRC is to review Council Operating Procedure 22 and propose modifications to the Council. Once these procedures have been worked out, the committee will be in a position to review the EFH designation and entertain proposals for modifications to current mitigation measures.

3.3.5.3 Implementation of Marine Protected Areas at the Federal and State Level

The term “marine protected area” (MPA) covers a variety of designations for place-based conservation and management. EO 13158 defines an MPA as “any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.” Most or all extractive activities are prohibited in marine reserves. With respect to the cumulative effects of trawl rationalization, marine reserves, or “no take” zones, where most or all types of fishing are prohibited are most relevant; however, fishing may be restricted in a variety of ways in other MPA types.

Table 3-11 shows data from the National MPA Center on the extent of MPAs off the west coast (National Marine Protected Areas Center 2008). However, the closure of all groundfish EFH in depths greater than 700 fm to bottom trawling accounts for about 130,000 square miles of the 145,159 square miles in

Federal waters where commercial fishing is restricted (Table 3-10). Because of the depth, this area was not previously trawled to a great degree. Of the remaining MPAs, all fishing is prohibited in 1.2 percent of the combined area, while all fishing is restricted in 28 percent, and commercial fishing is restricted in 45 percent of the combined area.

Table 3-11. Marine areas restricted to fishing on the West Coast (square miles).

	Federal	Local	Partnership	State	Grand Total
No Restrictions to Fishing	7,198.70	0.03	20.31	1,249.60	8,468.64
All Fishing Prohibited	6.05	0.00	308.06	91.14	405.24
Commercial Fishing Prohibited	14.26	0.00	1.78	20.11	36.15
Recreational Fishing Prohibited	0.00	0.00	0.00	13.77	13.77
All Fishing Restricted	8,863.20	0.00	17.84	612.41	9,493.45
Commercial Fishing Restricted	145,159.00	0.00	1.51	39.71	145,200.22
Recreational Fishing Restricted	239.08	0.00	0.00	4.97	244.06
Fishing Unrestricted	0.78	0.00	0.00	0.00	0.78
Grand Total	161,481.07	0.03	349.49	2,031.71	163,862.31

Channel Islands National Marine Sanctuary

In 2002, the California Fish and Game Commission (CFG) established a network of MPAs within the nearshore waters of the Channel Islands National Marine Sanctuary. NOAA expanded the MPA network into the sanctuary’s Federal waters in 2006 and 2007. The MPA network consists of 11 marine reserves, where all take and harvest is prohibited, and two marine conservation areas that allow limited take of lobster and pelagic fish (Figure 3-2). This MPA network encompasses 241 square nautical miles (or 318 square miles), making it the largest network off of the continental United States.

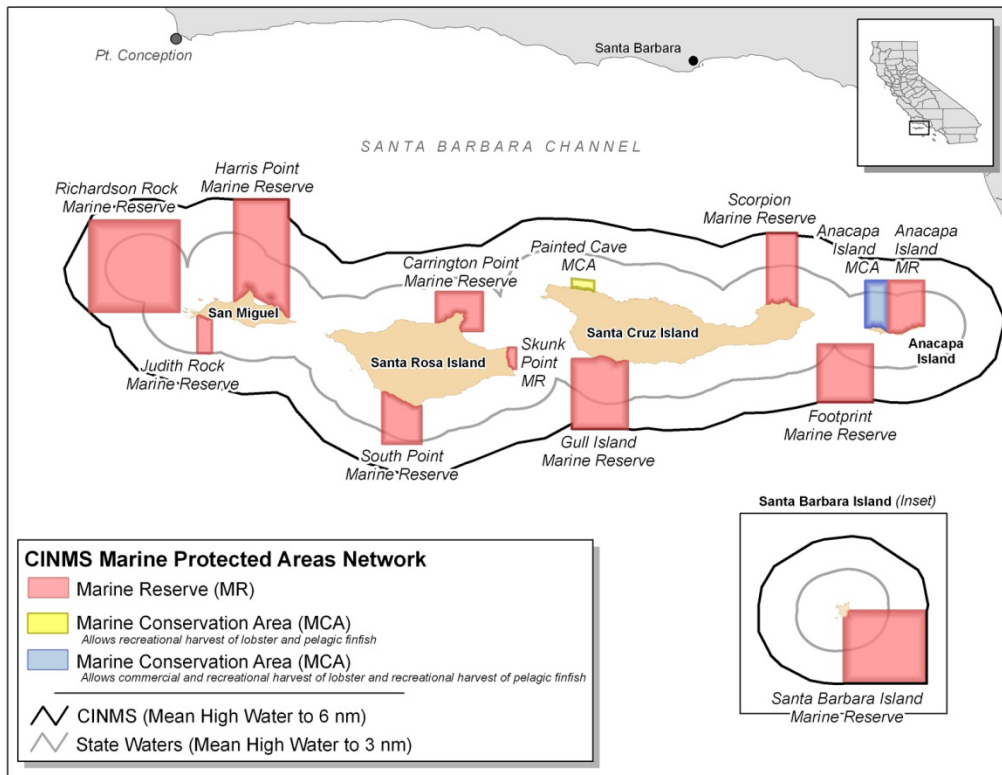


Figure 3-2. Channel Islands National Marine Sanctuary marine reserves (Source: Channel Islands National Marine Sanctuary 2008).

Monterey Bay National Marine Sanctuary

In the summer of 2007, the Monterey Bay National Marine Sanctuary (MBNMS) began considering criteria and thresholds to define the need for MPAs in Federal waters of the sanctuary. The MBNMS MPA Workgroup and the Sanctuary Advisory Council (SAC) characterized these generally as follows:

1) There is a need for areas where the natural ecosystem structure and function are restored and maintained; 2) there is a need for research areas to examine human impacts to the marine environment; and 3) there is a need to preserve some areas in their natural state for future generations.” At the time, the MBNMS Superintendent contacted the Council as a stakeholder to solicit input on the need for MPAs. In April 2008, the Council’s SSC reviewed materials provided by MBNMS staff on their process for developing need criteria. However, as noted in an April 15, 2008, letter from the Superintendent to the SAC, NOAA’s Office of National Marine Sanctuaries “has decided to move forward with a process to propose MPAs in federal waters of the MBNMS.

The letter goes on to provide a lengthy rationale for the decision to pursue designation of MPAs. Given the stated rationale, MPAs that may be proposed and ultimately designated will likely restrict or prohibit fishing.

Oregon Marine Reserve System

The state of Oregon is currently soliciting public input on areas within state waters to designate as marine reserves. In 2008, Governor Ted Kulongoski directed state agencies to work with the Oregon Ocean Policy Advisory Council (OPAC) to identify marine reserve sites in state waters through a public process. OPAC is currently seeking proposals from the public for specific sites, which will be further evaluated. A deadline of December 1, 2008, has been set for OPAC to recommend up to nine sites for more detailed evaluation. A target implementation date of July 2011 has been set for this marine reserve system.

California Marine Life Protection Act

In 1999, the California State Legislature passed the Marine Life Protection Act (MLPA), which initiated a process to create a statewide network of MPAs in California state waters. The objective of this network is to protect marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational, and study opportunities provided by marine ecosystems (California Department of Fish and Game 2008). Various types of MPAs may be designated, including marine reserves, with varying prohibitions or restrictions on fishing. Implementation of the network is proceeding sequentially according to five study regions. The process has been completed in the central coast study region with the implementation of 29 MPAs in September 2007. As of summer 2008, recommendations have been made to the CFGCs for designation in the north central coast study region. The planning process for the south coast study region was initiated in July 2008. The remaining two study regions are the north coast and San Francisco Bay.

The 29 MPAs implemented in the central coast study region (Pigeon Point to Point Conception) cover about 18 percent of state waters within the study region (

Table 3-12). Thirteen are no-take state marine reserves covering 7.4 percent of the study region (MLPA Initiative 2007). Fishing is restricted in the other areas.

Table 3-12. MPAs in the central coast study region (Source: MLPA Initiative 2007).

Type of MPA	Area (mi ²)	Percent of Central Coast Waters
State Marine Reserve	85.34	7.42%
State Marine Park	6.35	0.55%
State Marine Conservation Area	112.19	9.76%
Total	203.88	17.73%

3.3.5.4 Pacific Council Ecosystem FMP

In November 2006, the Council indicated its intention to develop a Fishery Ecosystem Plan (FEP) that would incorporate ecosystem-based fishery management (EBFM) principles. The plan is intended to serve as an “umbrella” plan over the four existing FMPs, helping with coastwide research planning and policy guidance and creating a framework for status reports on the health of the west coast’s California Current Ecosystem. The plan envisioned by the Council would not replace the existing FMPs, but would advance fishery management under these FMPs by introducing new theories, new scientific findings, and new authorities to the current Council process. Relevant concepts in EBFM include predator-prey interactions, the role of climate and oceanographic regimes on productivity, habitat protection for ecosystem resilience and long-term productivity, and consideration of the effects of fishing on the ecological role of fish stocks.

Subsequently, the Council moved to establish a plan development team for the FEP. However, to date needed funding has not materialized, so work has not begun on the FEP.

3.3.5.5 Impacts of Habitat Conservation and Ecosystem Management Measures Related to Trawl Rationalization

Habitat conservation proposals will have an ongoing effect on the groundfish trawl fishery, principally through the closure of areas to fishing, specifically trawl fishing. State proposals and closures in the National Marine Sanctuaries are likely to have a limited effect, because groundfish trawl vessels are not especially active in these areas.

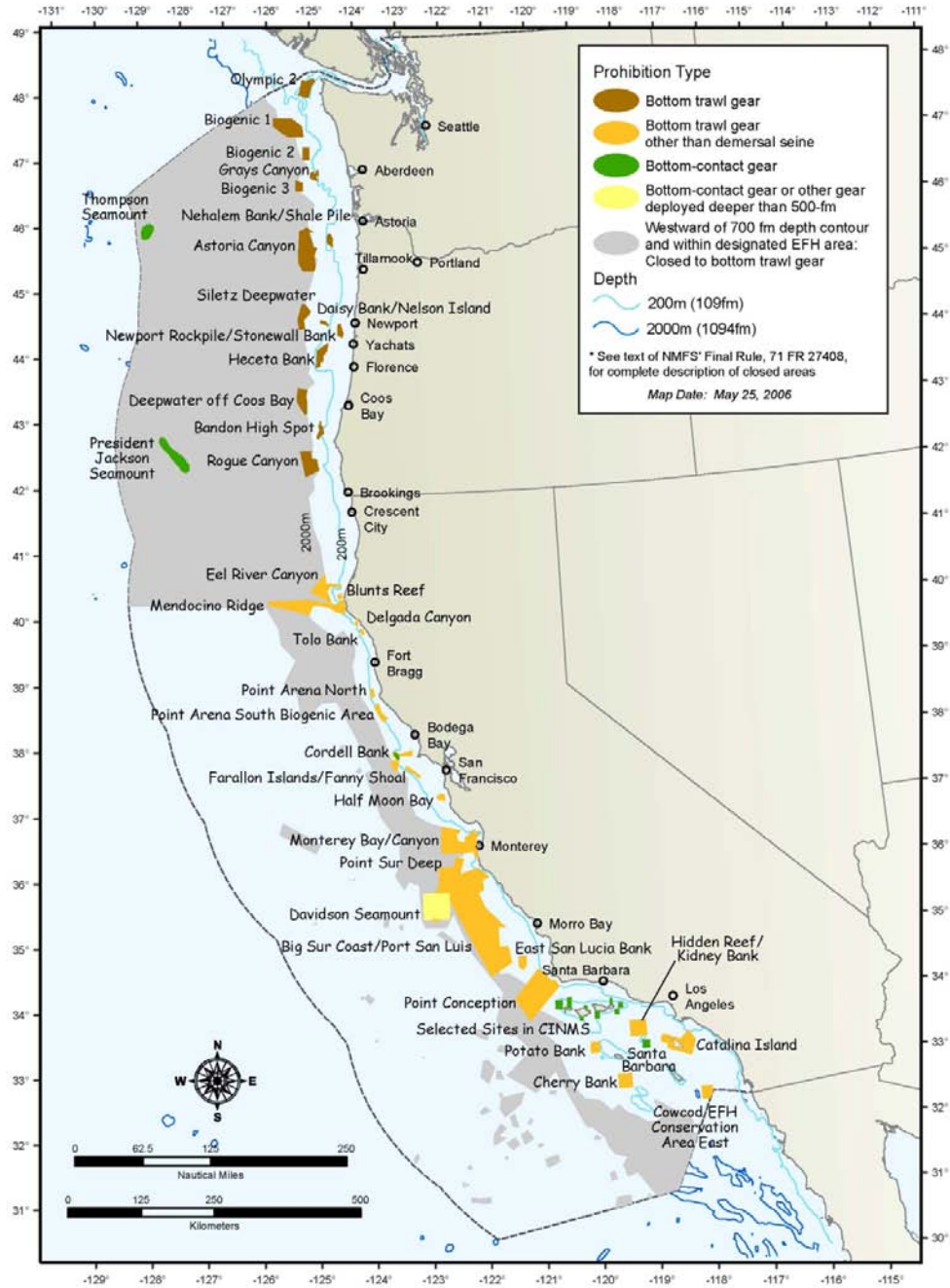


Figure 3-3. EFH closed areas.

(Source: http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Groundfish-Closed-Areas/Index.cfm#CP_JUMP_30292)

3.3.6 Wave Energy Proposals

Interest in wave energy (using hydraulic buoys, underwater turbines, and other technology) has surged along the coast as developers scramble to find and profit from alternative energy sources. To date, the Federal Energy Regulatory Commission (FERC), which licenses hydroelectric projects—including wave energy projects—has received preliminary applications for 23 wave energy projects along the west coast—10 in Washington, 8 in Oregon, and 5 in California. Most of the proposed projects would be placed in state waters, less than 3 miles offshore. All of the Washington permits have been granted, five

of the Oregon permits have been granted, and one of the California permits has been granted. A preliminary permit maintains priority of application for a license while the permittee studies the site and prepares to apply for a license. It does not authorize construction.

The installation of wave energy facilities has the potential to affect habitat, fish, and fisheries. Among other effects, the area encompassed by these facilities will likely be closed to all activities, including fishing. Although the area impacted by a single buoy or turbine is small, some projects would include hundreds of buoys. For example, a Reedsport, Oregon, project proposes 200 buoys, while developers of a proposed underwater turbine farm in San Francisco Bay propose 60 tidal in-stream energy conversion (TISEC) devices per square mile, eventually generating enough power for the entire city of San Francisco.

Questions about licensing, public involvement, and community input have been raised by the new proposals. For example, it is unclear who would have the authority to close waters around a wave farm to fishing. FERC has exerted its authority under the Federal Energy Act as the lead agency for this type of hydropower project; however, the Minerals Management Service also asserts authority over projects on the continental shelf, over which it has jurisdiction. In Oregon, the Oregon Division of State Lands (DSL) claims ownership of the seabed in state waters and is concerned about FERC's exertion of regulatory authority in this situation. DSL has drafted rules governing the placement of wave energy projects.

The West Coast Governors' Agreement on Ocean Health Action Plan (Gregoire, *et al.* 2008) provides information on current activities in the three west coast states related to offshore energy development. Interest in wave and tidal energy generation focuses on coastal and offshore areas from San Francisco Bay north. In Washington State, FERC has issued 10 permits for preliminary studies on wave or tidal energy projects in Puget Sound and other estuaries. Oregon now has eight active preliminary permit applications before FERC, four of which already have been approved. In California wave energy projects have been proposed for areas offshore of Mendocino, Humboldt, and Sonoma Counties.

The development of wave energy projects may affect the trawl fishery by limiting the ocean area available to trawling. Trawling in areas with wave energy platform arrays is likely to be prohibited, constrained, or impractical because of the potential conflict between the platforms and towed gear. For example, trawl gear could become entangled in the anchor lines of buoy arrays, damaging both the gear and the wave energy facility. The practical constraint will depend on the location and size of arrays. Arrays located in nearshore or untrawlable areas would have little or no effect; however, most of the proposed projects would be located in sand bottom areas. The habitat impacts of anchoring such arrays in these areas (e.g., rocky habitat) would, however, be greater than locating them on sand or mud bottoms, which are preferred habitats for bottom trawling (many rocky areas have already been closed to trawling, either as EFH conservation areas or within RCAs). Midwater trawl gear used in the Pacific whiting fishery may be less affected than bottom trawl gear, to the degree it can access the water column over rocky areas, if wave energy facilities are not located in rocky habitat.

3.3.7 Mitigating the Effects of Trawl Rationalization

3.3.7.1 Adaptive Management Program

In selecting a preferred alternative, the Council decided to include an AMP, but recommended deferring implementation until the third year after the overall trawl rationalization program is implemented (or 2013, based on the projected trawl rationalization date). The AMP included in the preferred alternative is briefly described in Chapter 2 and in more detail in Appendix A. Under the program, 10 percent of the QSs of nonwhiting groundfish would be set aside for use in the program to be distributed annually as QPs. The Council established several broad goals for the program, which would be addressed by distribution of the QPs derived from the adaptive management set aside. During the first two years of the

trawl rationalization program, the details of the AMP would be worked out, including more specificity on program focus and the mechanism for distributing adaptive management quota.

Because of the way the AMP is characterized in the preferred alternative, it may be considered both part of the proposed action and a reasonably foreseeable future action, because implementation would occur at a later date.

3.3.7.2 Community Fishing Associations

In March 2009, the Council considered whether to include provisions to establish CFAs in the proposed action, but ultimately decided to defer this topic to a separate, trailing action. CFAs would be local associations composed of community members, organizations, and local government that could hold QSs and distribute them for socially beneficial purposes, mitigating some of the adverse effects of the trawl rationalization program. The Council also discussed the possibility of CFAs holding QSs in excess of the control limits established under the proposed action. However, since developing provisions for CFAs will occur in a separate action, no detailed specifications for their structure and function have yet been worked out.

3.4 Past, Present, and, Reasonably Foreseeable Trends

As described above, many of the past actions will have continuing effects. Reasonably foreseeable future actions (RFFAs) can also affect prevailing conditions within which the trawl rationalization program will operate. There are also a wide variety of environmental and social phenomena that will collectively change baseline conditions from their current status. These are characterized as trends in discrete indicators, summarized below. Additional data substantiating these trends are provided in subsequent sections of this chapter.

- Changes in the use of ocean areas
 - Increased application of habitat protection measures will reduce the ocean area open to trawling, especially bottom trawl.
 - Energy projects will be implemented, potentially further limiting trawlable area due to conflict between wave or wind energy arrays and fishing operations.
- Changes in coastal economies and land use
 - Human population will increase in affected fishing communities. Disproportionate population increases will be driven by labor demand and will stimulate infrastructure and private construction. In general, growth will be in nonfishing economic sectors. In some communities, this growth will be due to tourism and recreation-related investment. A British study found fishery-related heritage tourism eclipsing actual fishing in North Sea fishing towns (Brookfield, *et al.* 2005). Another possible growth area is demand for retirement-related infrastructure and services, reflecting an aging population and natural amenities in coastal areas. A report on New England fishing communities found “gentrification” a growing phenomenon (Hall-Arber, *et al.* 2001). According to the report, “[g]entrification ... of a fishing community implies a shift in power from the working men and women of the fishing industry to ‘those from away,’ those in white-collar jobs, or tourist (service) industries, and/or those who do not value the reality of a working waterfront.” Growth in these sectors could compete with fishing-related activities for labor and coastal access.
- Increased demand for protein affecting real prices
 - Global population growth and rising living standards are likely to increase demand for protein sources, including fish. U.S. consumption has fluctuated over the past 30 years with an

- overall increase. Per capita consumption of seafood and shellfood increased rapidly in the 1980s, from 12.5 lb in 1980 to 15 lb in 1990, with little further net increase in the 1990s and a modest increase in the 2000s from 15.26 lb in 2000 to 16 lb in 2008 (NMFS 2009a). Any future increase in consumption is likely to lead to an increase in real prices for wild-caught fish. Price increases may be mitigated by lower cost production methods in aquaculture and agriculture. Any such effect on prices will depend on demand elasticity for wild-caught fish (consumer willingness to substitute, degree of product differentiation in the market).
- Changes in relative production costs
 - The real cost of agricultural production is likely to increase because of limits on arable land and inputs (e.g., petroleum-based fertilizer, animal feed), although this could be mitigated over the long term by technological change. Improvements in aquaculture technology, including cost-lowering techniques and an increase in the range of cultured species, could lower real prices for cultured fish. Costs of fishery production are likely to be affected principally by the cost of petroleum-based fuel, since fish harvesting is highly energy intensive. The cost of other inputs (labor, new vessels) is likely to increase, but not disproportionately in comparison to other modes of production. In combination with changes in demand, described above, these factors are likely to affect real prices for wild-caught fish. Overall, real prices are expected to increase.
 - Increased consumer awareness affecting purchasing decisions
 - Consumers will be increasingly willing to pay a premium for products and services that can be produced with demonstrably lower environmental impacts. In fisheries, this is evidenced by various consumer awareness and certification programs (Duchene 2004). For example, the Monterey Bay Aquarium sponsors the Seafood Watch seafood guide (<http://www.mbayaq.org/cr/SeafoodWatch.asp>). The guide has three ratings (best choice, good alternatives, and avoid), and it rates fish products by species and fishery. The Marine Stewardship Council [MSC] (<http://www.msc.org/>) is a London-based nonprofit that certifies fisheries it determines are environmentally sustainable. In order to qualify, the fishery is subjected to an extensive review process, and products must meet chain of custody requirements. Once certified, products may be labeled with the MSC “eco-label.” This allows consumer product discrimination. Fisheries are willing to submit to MSC certification because increasingly consumers are willing to pay a premium for labeled products. This trend could reduce demand (prices) for fish caught by bottom trawl, because this gear type has greater adverse impacts on habitat in comparison to other gear types. Investment in new technology that mitigates adverse impacts, if understood by consumers, could mitigate consumer aversion to trawl-caught fish. But such technology could represent an increased input cost.
 - Overfished species will continue to rebuild to their target biomass levels. Because of management constraints on groundfish fisheries, it is unlikely that additional stocks will be declared overfished. Although unlikely, several factors could lead to overfishing and additional overfished stocks. A substantial number of groundfish stocks have not been fully assessed, and rockfish (*Sebastes* spp.) are especially vulnerable to overfishing. As a result, the information necessary to implement management responses to prevent overfishing may be unavailable. Cyclical and ongoing changes in ocean conditions due to climate forcing can change stock productivity; depending on management response, this could result in overfishing. Rebuilding plans include a number of parameters used to estimate when the stock will reach the target biomass, given current harvest policies. The target year (T_{TARGET}) is chosen by the Council as a policy objective for the year by which the stock will be rebuilt under current harvest policies. The median year (T_{MEDIAN}) is the year having a 50 percent probability of the stock having been

rebuilt under the current harvest policy. For some stocks, as indicated below, T_{MEDIAN} is a more recent year than T_{TARGET} . T_{MAX} is an estimate of the maximum time within which a stock will rebuild, based on both policy constraints and biological characteristics of the stock. These estimates are used to assume when stocks will be rebuilt within the short term (5 years from program implementation), within the analytical timeframe (20 years from implementation), and in the long term (past the analytical timeframe or greater than 20 years from program implementation). Once a stock is rebuilt, the policy for determining OY changes, allowing the harvest limit to be increased substantially and loosening that constraint on the fishery.

- In the short term (2011 to 2016), widow rockfish ($T_{\text{TARGET}} = 2015$, $T_{\text{MEDIAN}} = 2009$) and Pacific ocean perch ($T_{\text{TARGET}} = 2017$, $T_{\text{MEDIAN}} = 2011$) are likely to be rebuilt.
 - In the analytical timeframe past five years (2017 to 2031), bocaccio ($T_{\text{TARGET}} = 2026$, $T_{\text{MEDIAN}} = 2023$), canary rockfish ($T_{\text{TARGET}} = 2021$), and darkblotched rockfish ($T_{\text{TARGET}} = 2028$) are likely to be rebuilt.
 - In the long term, all stocks are projected to be rebuilt. The remaining two overfished stocks are cowcod ($T_{\text{TARGET}} = 2072$) and yelloweye rockfish ($T_{\text{TARGET}} = 2084$). All stocks are expected to be rebuilt by at least 2098. This is the longest duration T_{MAX} value among the seven overfished species, that for cowcod.
- Cyclical and continuing climate change will affect stock productivity in the northeast Pacific. Cyclical events include El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Both events have been linked to changes in the relative productivity of different marine organisms, affecting ecosystem components on the regional scale (California Current ecosystem). These changes, in turn, affect the abundance of fishery resources. Global warming will have unidirectional effects on the biophysical characteristics of the California Current ecosystem with potentially permanent changes in stock productivity.

3.5 Environmental Components Where No Significant Impact are Anticipated

Subsequent to the detailed outline contained in the Stage 1 Document (NEI 2006), the analytical team determined that certain groups or resources identified in the initial outline were unlikely to be significantly affected by the proposed action. Baseline data for these components are provided in this section.

3.5.1 Fisheries Managed by Adjacent Councils

There are two adjacent Federal fishery management councils, although their management areas are not contiguous with the U.S. west coast. The North Pacific Fishery Management Council (NPFMC) is responsible for Federal waters off of Alaska. The Western Pacific Council covers Federal waters around the state of Hawaii, the Territory of American Samoa, the Territory of Guam, the Commonwealth of the Northern Mariana Islands, and several uninhabited Pacific Remote Island Areas.

The NPFMC has five FMPs: the Bering Sea/Aleutian Islands (BSAI) Groundfish FMP, the Groundfish of the Gulf of Alaska (GOA) FMP, the BSAI King and Tanner Crab FMP, the Alaska Scallop FMP, and Salmon Fisheries in the EEZ off the Coast of Alaska. The Salmon FMP prohibits fishing for salmon in the EEZ except by a limited number of vessels using troll gear, and all management of the salmon fisheries is deferred to the state of Alaska. The scallop FMP controls fishing effort in a small fishery of nine vessels; the Alaska Department of Fish and Game is responsible for ongoing (inseason) management of the fishery. The remaining three FMPs thus represent the principal ongoing responsibility of the NPFMC. The two groundfish FMPs are complementary plans for their respective regions. These FMPs cover all species of groundfish (pollock, cod, flatfish, sablefish, rockfish, etc.) fished commercially by vessels using trawl, longline, pot, and jig gear. The king and Tanner crab FMP covers all species, and the

Alaska Department of Fish and Game in Kodiak manages fisheries for king and Tanner crab (red, blue, and brown king crab, Tanner crab, and snow crab).

The Western Pacific Fishery Management Council (WPFMC) reorganized its fishery-based FMPs into four Archipelagic Ecosystem FMPs, which cover each of the island jurisdictions, plus the pelagic ecosystem. However, Secretarial approval of this reorganization is pending. Fishery-based FMPs covered deep-slope bottomfish (deepwater snappers, jacks and a single species of grouper concentrated at depths of 30 to 150 fm), lobster fisheries in the Northwestern Hawaiian Islands, precious corals, and pelagic fisheries for highly migratory species (HMS) (tunas and billfish). Both the lobster fishery, which targets spiny and slipper lobsters in the Northwestern Hawaiian Islands, and the precious corals fishery, prosecuted in a limited area of the Main Hawaiian Islands, are currently dormant. The pelagic longline fishery is the most commercially valuable fishery in Hawaii. One segment of the fishery targets tropical tunas, principally bigeye, while the other targets swordfish. Total bigeye tuna landings in 2008 were worth about \$50 million dollars, slightly less than 60 percent of the value of all commercial fisheries in the state.⁶² Swordfish landings were worth about \$7 million in 2008. Snapper and grouper landings were worth about \$1.3 million in 2008.

Figure 3-4 compares total landings and revenue for Alaska, Hawaii, and the west coast states. Although these figures are for all fisheries, not just those managed by the respective Councils, it suggests the general magnitude of fisheries in each region. It can be seen that Alaska dominates in terms of the volume of landings, while west coast fisheries posted the highest value.

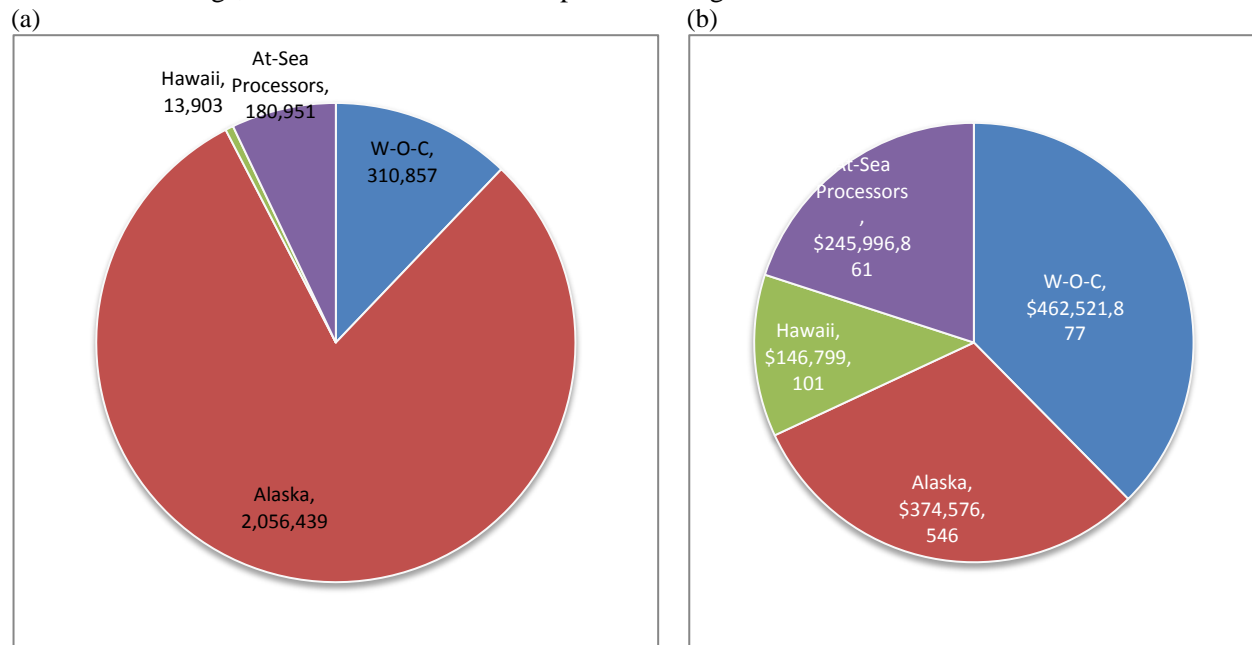


Figure 3-4. (a) Landings (mt) and (b) revenue by region, 2008. Source: NOAA Office of Science and Technology Annual Commercial Landings Statistics.

⁶² Commercial fishery statistics presented here were obtained from the NOAA Office of Science and Technology Commercial Fisheries Statistics website (<http://www.st.nmfs.noaa.gov/st1/index.html>). These statistics represent landings by species from all fisheries, not just those managed by the WPFMC. However, Council-managed fisheries represent a large proportion of these values.

3.5.2 Processors Who Do Not Purchase Trawl-caught Groundfish

PacFIN provides information on west coast processors. To compare processors who do not process trawl-caught groundfish, data were assembled for processors who do not process groundfish and those who do for 2007 and 2008. In 2007, there were 882 first receivers who did not receive any groundfish landings (counted by processor identification number in the database), and 345 who did receive groundfish. Nongroundfish processors processed approximately 246,000 mt of other species, while groundfish processors processed approximately 230,000 mt, 51 percent of which was groundfish. Figure 3-5 shows the breakdown by management group for 2007, which aggregates species according to how they are managed. Of the 345 receiving groundfish in 2007, 75 received trawl-caught groundfish amounting to 113,623 mt. In 2008, there were 821 first receivers who did not receive any groundfish and 317 who did. Nongroundfish processors processed approximately 192,000 mt in 2008, while groundfish processors processed approximately 203,000 mt, 48 percent of which was groundfish. Figure 3-6 shows a similar breakdown of species processed for 2008. Of the 317 receiving groundfish in 2008, 80 received trawl-caught groundfish amounting to 93,363 mt. Although there are undoubtedly processors who specialize, individual processors may vary the mix of species they process between years, meaning that the year-to-year changes in the numbers of nongroundfish versus groundfish processors may be somewhat arbitrary.

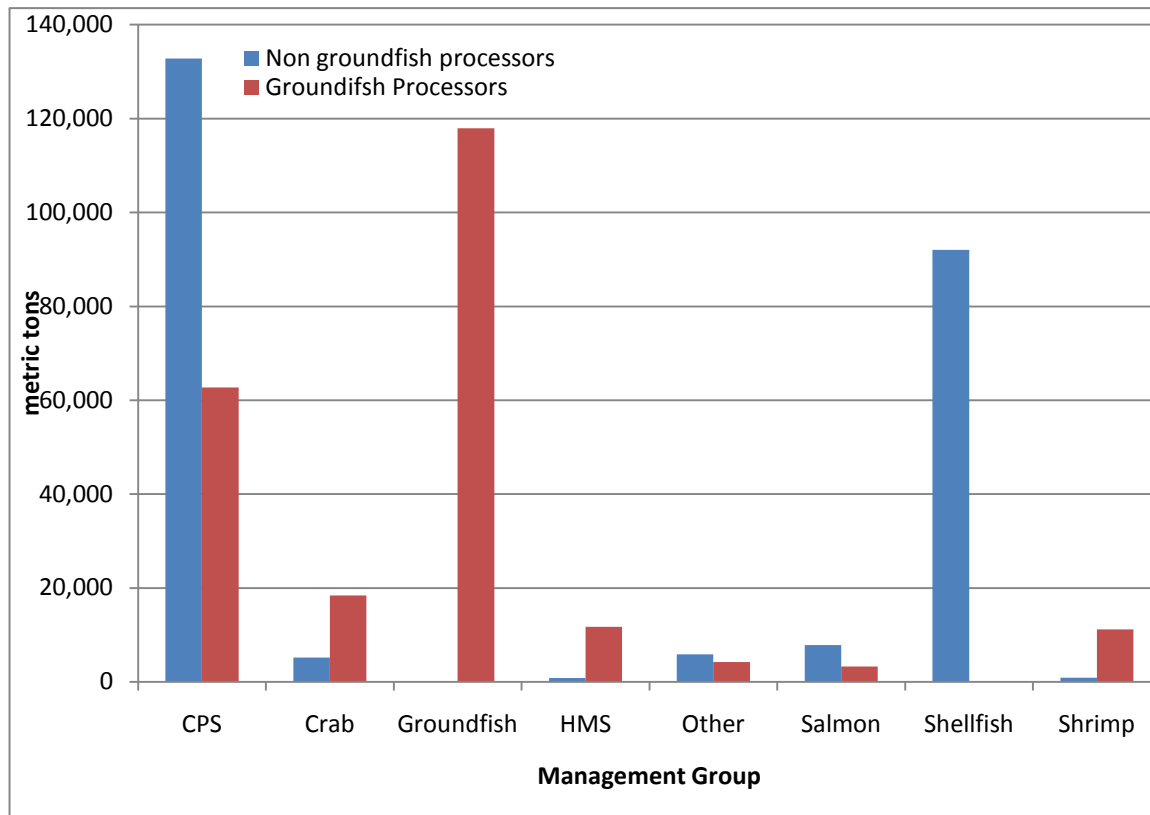


Figure 3-5. Amount received by processors by management group, 2007 (source: PacFIN).

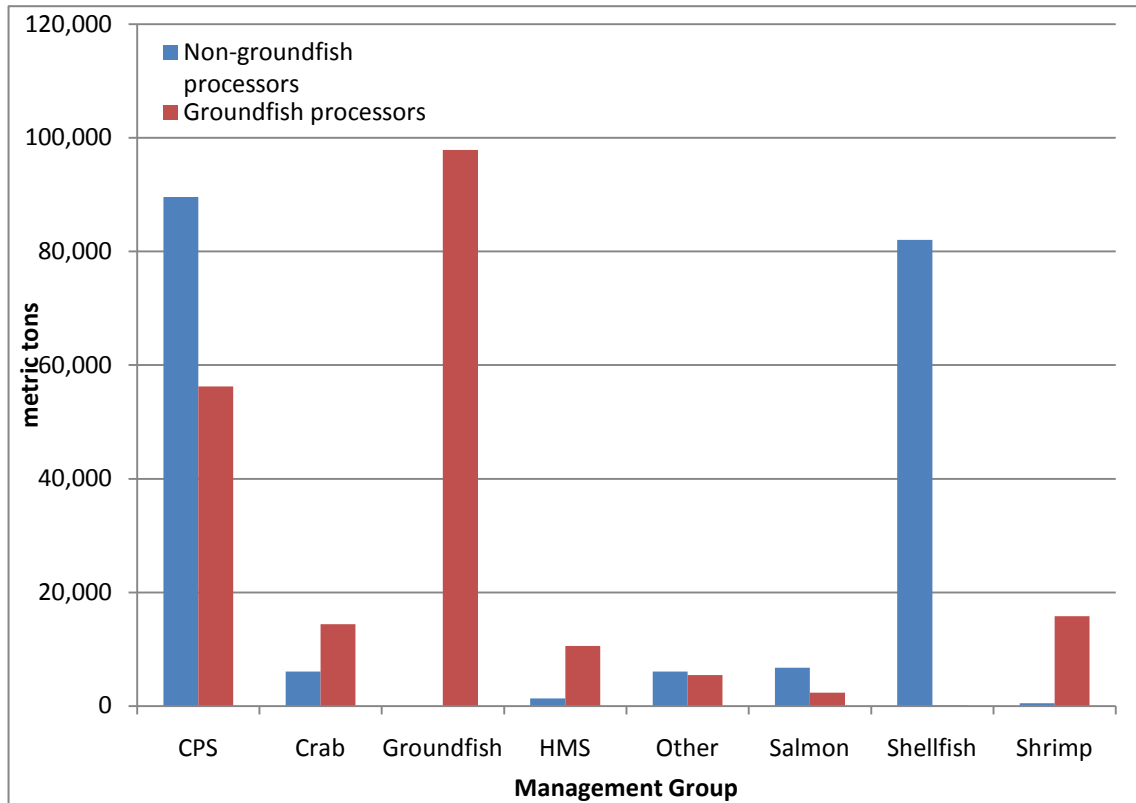


Figure 3-6. Amount received by processors by management group, 2008 (source: PacFIN).

3.5.3 Recreational Harvesters

In the U.S., more than 12 million anglers took part in 87 million marine recreational fishing trips in 2007 (NMFS 2008). In comparison, according to Table 3-13, there were 1.32 million boat-based marine recreational angler trips on the west coast; 77 percent of these trips were made off California, 8.7 percent off Washington, and 14.3 percent from Oregon.

Recreational fishing is an important economic contributor to the west coast in general, and to some communities specifically. The recreational fishing sector can be divided into the charter fleet and the private fleet. The private fleet typically is made up of vessels owned by residents living in or near areas where they fish. The charter fleet is a for-hire fleet that plays a large role in the tourism sector of many west coast communities, and opportunities to fish on a charter vessel can be a substantial draw for tourists considering a visit to the coast.

The Council's GMT estimated total angler trips by mode and by target for each west coast state between 2005 and 2007 as part of the 2009-10 groundfish harvest specifications process. In terms of total trips, there was a decline in angler trips coastwide from 1.45 million trips to 1.32 million trips (Table 3-13). However, results were mixed along the coast with increases in the number of angler trips observed in Washington and Oregon in 2007. The overall decline was driven by the California private boat mode.

Table 3-14 shows the estimated share of angler trips targeting groundfish by region. The percentage of marine area trips targeting groundfish ranges from 15.5 percent in Washington in 2005 to 52.6 percent in southern California in 2007. Overall, about 40 to 44 percent of total boat-based marine area angler trips targeted groundfish between 2005 and 2007.

Groundfish are caught incidentally when other species, such as salmon, are targeted. While the contribution of groundfish catches to the overall incentive to engage in a recreational fishing trip is uncertain, it seems likely that the possibility or frequency of groundfish catch on a trip adds to the overall enjoyment and perceived value of the trip.

Fishing effort is related to weather, with relatively more effort occurring in the milder months of summer, and relatively less in winter (Figure 3-7). As might be expected, this effect is more pronounced in higher latitudes, although the reasons include opportunity as well as climate. Salmon seasons are longest in California, second longest in Oregon, and shortest in Washington. Until recently, groundfish seasons were also more restrictive in Washington, with the lingcod season being closed from November through March.

Table 3-13. Total boat-based angler trips in marine areas by state for recent years.

State	Mode	2004	2005	2006	2007
Washington	Charter	63,000	50,947	46,863	47,862
	Private	134,000	80,581	58,499	66,820
	TOTAL	197,000	131,528	105,362	114,682
Oregon	Charter	58,000	51,933	49,920	54,821
	Private	160,000	121,699	111,874	135,409
	TOTAL	218,000	173,632	161,794	190,230
California	Charter	689,000	363,442	263,725	311,295
	Private	536,000	786,445	838,221	709,792
	TOTAL	874,000	1,149,887	1,101,946	1,021,087
Coastwide Total	Charter	810,000	466,322	360,508	413,978
	Private	830,000	988,725	1,008,594	912,021
	TOTAL	1,640,000	1,455,047	1,369,102	1,325,999

Table 3-14. Share of boat-based angler trips targeting groundfish.

Region	Trip target	2005	2006	2007
Washington	Groundfish	20,407	22,727	21,635
	Total	131,528	105,362	114,682
	% groundfish trips	15.5%	21.6%	18.9%
Oregon	Groundfish	71,427	71,674	66,665
	Total	173,632	161,794	190,230
	% groundfish trips	41.1%	44.3%	35.0%
Northern California	Groundfish	64,340	110,774	76,340
	Total	260,142	289,216	215,641
	% groundfish trips	24.7%	38.3%	35.4%
Southern California	Groundfish	427,508	333,045	423,788
	Total	889,745	812,730	805,446
	% groundfish trips	48.0%	41.0%	52.6%
Coastwide	Groundfish	583,681	538,220	588,428
	Total	1,455,047	1,369,102	1,325,999
	% groundfish trips	40.1%	39.3%	44.4%

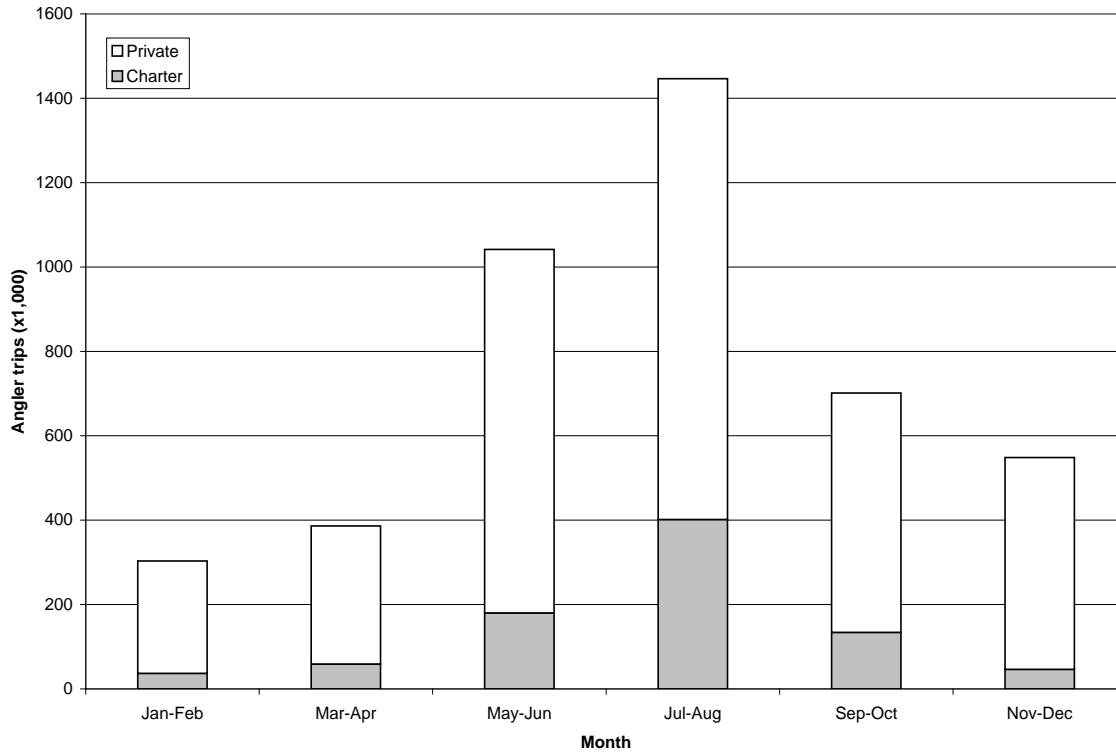


Figure 3-7. Seasonal distribution of west coast recreational marine angler boat trips for all fisheries including groundfish in 2003 by mode and region (thousands of angler trips) (Source: PFMC 2004a).

3.5.4 Seafood Consumption, Including Groundfish Products

Section 5.3.4 of the 2008 Groundfish SAFE document describes markets for groundfish products and consumption and is incorporated by reference here.

West coast groundfish compete in a global market, not only with similar species produced in other regions of the world, but also with other fish species such as salmon and tuna. In addition, fish compete with other sources of protein in consumers' budgets. About 4.2 million mt of fish and other seafood were landed in the U.S. in 2007, close to the amount landed in 2006, which was 4.3 million mt.⁶³ In comparison, total west coast groundfish landings in 2007 were 236,452 mt.⁶⁴ Pacific whiting typically comprises about two-thirds of west coast groundfish landings by weight, but only around 10 percent of groundfish ex-vessel revenue.

Most west coast groundfish compete in the fresh and frozen fish product markets. In 2006, the U.S. imported about 2.4 million mt of edible fishery products, including 2.1 million mt of edible fresh and frozen fish products (DOC 2007) and exported about 1.3 million mt of edible fishery products, including 1.2 million mt of edible, fresh or frozen products. The largest destination for exported fish products in 2006 was Japan at 19 percent. While surimi was the single largest component of total fresh and frozen exports by weight in 2006, scallops, groundfish, and salmon were the most valuable exports, at 371 million dollars, 369 million dollars, and 367 million dollars respectively (DOC 2007) Asia was the

⁶³ NOAA Fisheries, Office of Science and Technology Annual Commercial Landing Statistics, http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html.

⁶⁴ GMT PacFIN Report 2, <http://www.psmfc.org/pacfin/data/r002.p07>.

largest export region, absorbing 52 percent of U.S. fishery exports by volume. Next to Japan, China and Canada were the largest export destinations at 15 percent and 10 percent, respectively. Table 3-15 shows export and import quantities and values for 2000 to 2005 derived from the FAO FishStat database.

Table 3-15. U.S. trade in fishery products, amount (mt) and value, 2000-05.

	2000	2001	2002	2003	2004	2005
Export Quantity	967,816	1,158,311	1,083,348	1,079,595	1,256,174	1,321,791
Export Value	\$2,955,877	\$3,206,706	\$3,134,511	\$3,283,009	\$3,512,829	\$4,089,337
Import Quantity	1,697,364	1,756,299	1,893,751	2,085,178	2,120,886	2,196,814
Import Value	\$10,410,598	\$10,242,669	\$10,005,167	\$11,588,121	\$11,882,828	\$11,896,774

Source: FAO FishStat database.

From 1910 through the early 1970s, annual per capita fish consumption in the U.S. generally ran between 10 pounds and 12 pounds edible weight. Beginning in the early 1970s, per capita consumption increased. In the mid 1980s, per capita consumption began shifting upward again to the 15-pound to 16-pound range where it has generally remained since 1985. In 2006, annual per capita U.S. fish consumption was estimated to be 16.5 pounds. U.S. seafood consumption reached a record 16.6 pounds per capita in 2004.

3.5.5 General Public

Table 3-16 presents comparative demographic statistics for the U.S. as a whole and for selected western states including Washington, Oregon, and California as means of characterizing the general public that may be affected by the proposed action. These data are derived from the U.S. Census Bureau's American Community Survey. The 2008 population estimate indicates that the three west coast states made up 15.5 percent of the U.S. population. Of the three states, California has by far the largest population, estimated at 36.8 million, followed by Washington at 6.5 million and Oregon at 3.8 million.

Looking at Table 3-16, California stands out as a younger, more ethnically diverse, but, on average at least, higher income population, compared to both the U.S. as a whole and the other two west coast states. California has a median age of 34.9 compared to the national average of 36.9. In contrast, Washington and Oregon are older than the national average at 37.3 and 38 median age respectively. The relatively young median age of California is in part a function of a higher birthrate; in 2007, the California birthrate was 15.5 births per 1,000 population versus a national average of 14.3 (Hamilton, *et al.* 2009). Washington and Oregon, in contrast, have birth rates of 13.8 and 13.2, respectively. Of the western states shown in Table 3-16, Utah has the lowest median age, 28.7, and a birth rate of 20.8, the highest in the nation. Nonwhites make up 37.5 percent of California's population compared to the national average of 25 percent. Washington and Oregon are less racially diverse than the national average, at 19.6 percent and 13.3 percent nonwhite, respectively. California and Washington both have median household incomes substantially higher than the value for the U.S. as a whole, \$61,029 and \$58,078, respectively compared to \$52,079. Oregon's median household income is slightly below the national value at \$50,169. However, the median household income does not reveal income distribution across the population. A study conducted by the Center on Budget and Policy Priorities, a Washington think tank, compared average income of the top quintile of families compared to the bottom quintile to estimate income inequality (Bernstein, *et al.* 2008). Although the study focuses on changes in income distribution over time, it includes state-by-state comparisons. For the mid-2000s period, the study found that for the U.S. as a whole, the top quintile's average family income was 5.9 times that of the lowest quintile. For California, the value was 7.9, while it was 6.9 for both Washington and Oregon. In all three states, the employment rate shown in Table 3-16 is lower than the national average. According to September 2009 data from the Bureau of Labor Statistics, California has the fourth highest unemployment rate at 12.2 percent; Oregon has the sixth highest at 11.5 percent, and Washington ranks nineteenth at 9.3 percent, in a ranking of states including the District of Columbia (<http://www.bls.gov/web/laumstrk.htm>).

Table 3-16. Demographic characteristics of selected western states. (Source: U.S. Census Bureau 2008 American Community Survey.)

Geographic area	Median Age of the Total Population	Margin of Error (+/-)	Percent of the Total Population Who Are White Alone	Margin of Error (+/-)	Employment/Population Ratio for the Population 16 to 64 Years Old	Margin of Error (+/-)	Median Household Income (In 2008 Inflation-Adjusted Dollars)	Margin of Error (+/-)	Percent of Civilian Employed Population 16 Years and Over Who Were Private Wage	Margin of Error (+/-)
United States	36.9	0.1	75	0.1	70.2	0.1	52,029	73	79	0.1
Alaska	33	0.3	69.1	0.4	68.8	1.1	68,460	1,917	67.8	1.5
Arizona	35.1	0.1	80.1	0.4	69	0.4	50,958	511	79	0.5
California	34.9	0.1	62.5	0.2	67.8	0.2	61,021	236	76.8	0.2
Hawaii	38.3	0.2	27.1	0.3	70.4	0.9	67,214	1,868	72.1	1.1
Idaho	34.4	0.2	92.7	0.3	71.7	0.7	47,576	961	77.1	0.8
Montana	39.1	0.4	89.6	0.2	72.5	0.9	43,654	1,263	71.6	1.2
Nevada	35.9	0.1	77.3	0.5	71.5	0.5	56,361	793	82.5	0.5
Oregon	38	0.2	86.7	0.3	70.6	0.5	50,169	523	78.4	0.5
Utah	28.7	0.2	91	0.2	73.9	0.5	56,633	705	79.7	0.5
Washington	37.3	0.2	80.4	0.2	70.7	0.4	58,078	575	77.6	0.4
Wyoming	36.6	0.4	91.9	0.4	76.3	1.2	53,207	1,992	71.7	1.5

3.6 Groundfish Limited Entry Trawl Harvesters

3.6.1 Overview

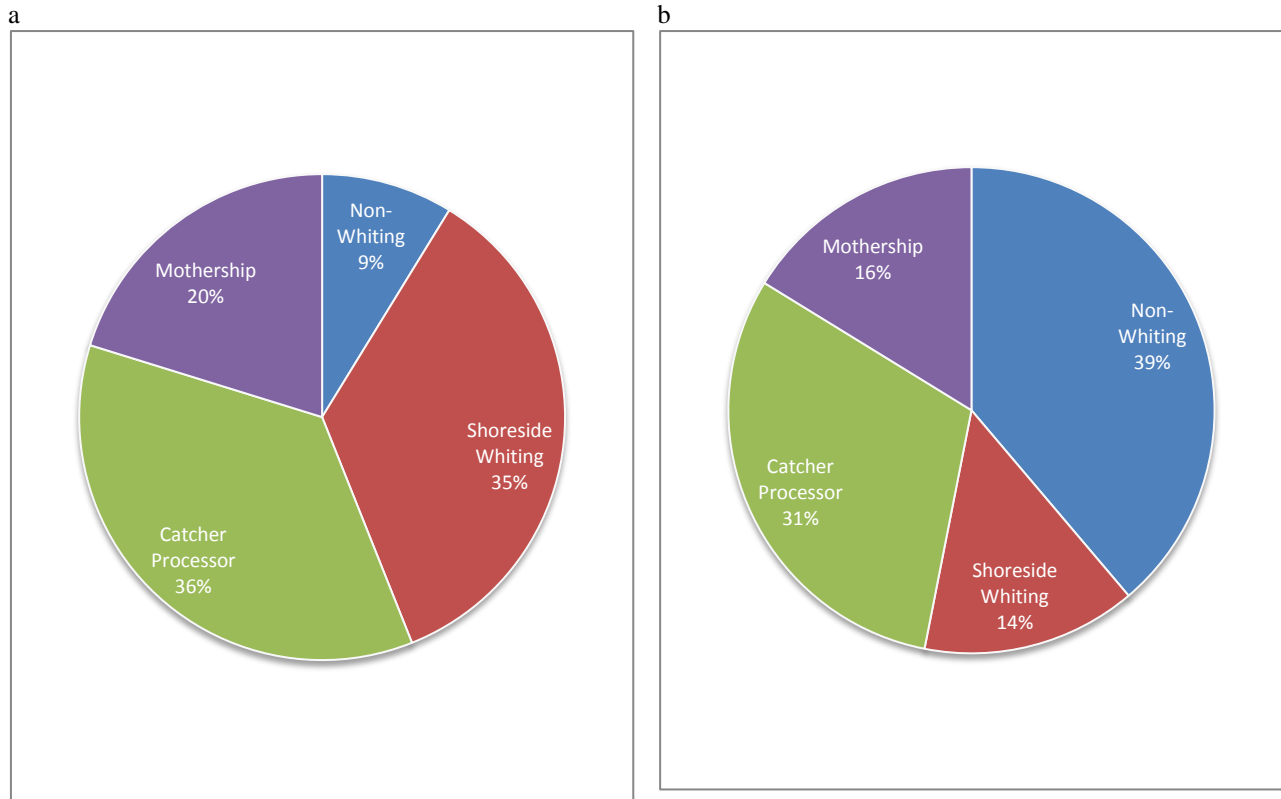
Tables and figures below provide a summary of landings and revenue in the groundfish trawl fishery. Table 3-17 shows landings by the trawl sectors compared to all groundfish sectors and to all west coast landings. The trawl sectors account for 98 percent of all groundfish landings from 1995 to 2008. This is mainly accounted for by the high volume landings of Pacific whiting, a comparatively low value species, which accounted for 84 percent of groundfish landing during this period. Groundfish landings, in turn, accounted for 52 percent of total west coast commercial fishery landings. Table 3-18 shows revenues (in constant dollars) from the groundfish trawl sectors. Figure 3-4 shows average 2004 to 2008 landings and revenue for the trawl sectors graphically based on the tabular data. Nonwhiting accounts for a higher percentage of ex-vessel revenue, 39 percent, because of the higher value of species harvested.

Table 3-17. Annual landings (mt) by groundfish sectors compared to all west coast landings (source: PacFIN).

YEAR	Nonwhiting	Shoreside Whiting	Catcher Processor	Mothership	Trawl	Fixed Gear	Other	Total Groundfish	Total West Coast All Species
1995	49,911.04	75,028.56	61,646.56	40,263.28	226,849.43	929.54	7,087.56	234,866.53	424,327.17
1996	51,277.39	85,082.34	66,577.74	45,818.14	248,755.61	720.67	7,728.84	257,205.13	474,246.88
1997	46,956.80	87,415.21	71,268.09	50,637.08	256,277.17	560.29	7,139.33	263,976.79	484,218.50
1998	36,754.95	87,825.94	71,184.58	50,746.08	246,511.55	448.68	5,134.05	252,094.28	369,246.21
1999	36,052.86	83,469.83	68,831.99	47,979.47	236,334.15	666.13	4,234.87	241,235.15	451,032.40
2000	30,605.37	85,853.64	68,605.35	47,295.64	232,359.99	765.00	3,512.98	236,637.98	485,801.24
2001	24,522.00	73,411.06	59,233.62	35,910.23	193,076.90	592.94	3,073.63	196,743.47	425,607.39
2002	23,967.05	45,723.18	36,619.17	26,640.12	132,949.52	430.27	2,662.36	136,042.15	367,801.22
2003	21,148.52	51,255.19	41,433.12	26,039.99	139,876.81	661.98	2,673.71	143,212.51	333,652.82
2004	19,224.35	89,654.71	74,775.47	24,162.57	207,817.10	774.88	2,691.06	211,283.03	403,750.46
2005	19,698.02	97,629.50	79,332.65	49,294.81	245,954.98	958.20	2,999.11	249,912.29	449,357.26
2006	17,846.41	97,268.52	79,094.93	55,600.19	249,810.05	976.80	2,671.06	253,457.90	466,336.56
2007	20,816.14	73,282.57	73,587.43	47,985.06	215,671.21	659.50	2,357.09	218,687.80	448,363.60
2008	24,271.49	50,787.12	109,062.88	57,685.90	241,807.40	579.57	2,608.78	244,995.75	430,547.16

Table 3-18. Annual ex-vessel revenue for groundfish trawl sectors (source: PacFIN).

YEAR	Nonwhiting	Shoreside Whiting	Catcher Processor	Mothership
1995	\$56,489,165	\$7,868,492	\$6,465,078	\$4,222,542
1996	\$52,922,576	\$5,152,993	\$4,032,266	\$2,774,965
1997	\$46,433,718	\$8,162,572	\$6,654,802	\$4,728,340
1998	\$34,249,365	\$4,760,466	\$3,858,447	\$2,750,611
1999	\$33,023,236	\$6,839,770	\$5,640,301	\$3,931,582
2000	\$33,625,667	\$7,965,430	\$6,365,148	\$4,388,050
2001	\$27,972,381	\$5,741,781	\$4,632,905	\$2,808,687
2002	\$23,207,487	\$4,555,886	\$3,648,757	\$2,654,439
2003	\$23,948,883	\$5,085,241	\$4,110,752	\$2,583,536
2004	\$20,879,203	\$7,030,244	\$5,863,494	\$1,894,700
2005	\$22,096,113	\$10,887,944	\$8,847,423	\$5,497,511
2006	\$22,980,905	\$12,542,650	\$10,199,189	\$7,169,572
2007	\$25,478,925	\$11,328,940	\$11,376,069	\$7,418,134
2008	\$31,472,304	\$11,584,924	\$24,878,063	\$13,158,588

**Figure 3-8.** Share of landings (a) and revenue (b) by groundfish trawl sector, average 2004-08.

3.6.2 Limited Entry Shore-based Trawl Sector

West coast LE trawl vessels use midwater trawl gear and small and large footrope bottom trawl gear (defined at 50 CFR 660.302 and 660.322(b)). Midwater trawl gear is not designed to touch the ocean

bottom and is, therefore, used to target groundfish species, such as Pacific whiting and yellowtail rockfish that ascend above the ocean floor. Small and large footrope trawl gear types are designed to remain in contact with the ocean floor and are used to target species that reside along the ocean bottom such as flatfish on the continental shelf and slope, or DTS species (Dover sole, thornyhead, and sablefish complex) in deep water. Fishermen generally use small footrope trawl gear in areas that have a regular substrate (few rocks or outcroppings) and use it more widely on the continental shelf than on the continental slope, due in large part to regulatory requirements. Fishermen use large footrope trawl gear most commonly in areas that may have an irregular substrate, along the continental slope, and in deeper water.

Shore-based trawl vessels participate in bottom trawl opportunities for species like sole, rockfish, and roundfish. Opportunities are also available for Pacific whiting where most vessels use midwater trawl gear. Bottom trawlers operate in an environment of two-month cumulative trip limits, which allow a vessel to harvest a given amount of groundfish species within a two-month period. It is commonly believed that this two-month limit structure has eliminated the conditions that result in a race for fish, because vessels are able to harvest their two-month cumulative trip limits without fear of another vessel catching that limit.

In addition to cumulative trip limits, trawlers using bottom trawl gear are subject to several different area closures, including trawl RCA closures, which are designed to protect areas where depleted rockfish species are relatively abundant, and EFH area closures, which are intended to protect relatively sensitive habitat from bottom trawling. Trawl RCA boundaries and cumulative limits are routinely adjusted inseason based upon fishery performance. Managers structure catch limit opportunities and closed areas with several objectives in mind, including protecting rebuilding species while simultaneously providing for a year-round fishing opportunity. While many adjustments to catch limits and trawl RCA boundaries are relatively minor, some of these adjustments in recent years have been relatively extreme and have closed fishing opportunity for wide areas of the coast mid-season. For example, in 2004, an unexpected amount of darkblotched rockfish catch occurred in the fishery, leading to a large expansion of the trawl RCA and elimination of several target species opportunities, including petrale sole—one of the most important target species to bottom trawlers. In January and February of 2006, unseasonably favorable weather occurred, making it easy for vessels to target petrale sole during their aggregation period. This led to a catch of petrale sole during the first two-month cumulative trip limit period that was nearly twice the expected amount. This caused managers to eliminate petrale sole opportunities at the end of the year in an attempt at preventing overfishing of the stock in that year. Other events have affected opportunities available to shore-based trawl vessels. For example, other sectors have, in the past, taken more than the expected amount of a rebuilding species, necessitating the inseason restriction of many sectors to eliminate the harvest of that particular species to foster the rebuilding of that stock.

These reactionary inseason adjustments make it somewhat difficult for nonwhiting vessels to develop business plans during the year even though they operate without a race for fish condition. This is because some adjustments can prevent future harvests of several types of groundfish that are an important component of trawl target opportunities. Typically such adjustments have little advance notice.

With a few exceptions, shore-based whiting vessels operate in a different structure than nonwhiting trawlers.⁶⁵ Most shore-based whiting trawl vessels operate under a primary season structure where vessels harvest Pacific whiting until the sector allocation is reached, and the fishery is closed. Trawlers fish under a common quota of whiting and for bycatch limits. The commercial whiting OY is allocated to three different nontribal sectors, with the shore-based sector receiving 42 percent of the commercial OY.

⁶⁵ At times bottom trawl vessels have targeted Pacific whiting. Bottom trawlers that target Pacific whiting are subject to two-month limits for Pacific whiting.

The shore-based sector is closed when the whiting allocation is reached or when a bycatch limit is reached.

To allow the Pacific whiting industry to have the opportunity to harvest the full Pacific whiting OY, the nontribal commercial fishery is managed with bycatch limits for certain overfished species. To date, bycatch limits have been established for darkblotched, canary, and widow rockfish. With bycatch limits, the industry has the opportunity to harvest a larger amount of Pacific whiting, if they can do so while keeping the total catch of specific overfished species within adopted bycatch limits. Regulations provide for the automatic closure of the commercial (nontribal) portion of the Pacific whiting fishery upon attainment of a bycatch limit. This is different from the bottom trawl fishery where harvest availability of target species is often constrained by the projected catch of overfished species. Beginning in 2009, sector-specific bycatch limits for overfished species will be used allow each sector of the whiting fishery to be closed when the bycatch limit is projected to be attained. Bycatch limits are used to reduce the risk of exceeding a specified bycatch limit and possibly an overfished species OY. Because of these conditions, the whiting fishery is characterized by relatively brief periods of concentrated harvest and little opportunity for business planning.

3.6.3 Catcher-processor and Mothership Sectors

3.6.3.1 Mothership Sector Participation Trends

Historically, the primary seasons for the at-sea sectors of the whiting fishery have started on May 15, while the coastwide primary season for the shoreside fishery has started on June 15. The actual number for fishing days in a season varies between years, given changes in participation levels, the annual allocation, market conditions, and the levels of bycatch limit species and Chinook salmon (Table 3-19). Similarly, the number of fishing days per vessels ranges.

Table 3-19. Days fished by Catcher Vessels in Pacific Whiting in the Mothership Sector, 2007-08.

Year	Range of Dates in which Primary Season Fishing Occurred	Average Number of Days Fished per Vessel	Range of Days Fished per Vessel
2007	May 15-November 15	32 days	5-26 days
2008	May 15-July 3	26 days	9-64 days

Since 1994, the number of catcher vessels that participated in the mothership sector has fluctuated from a low of three vessels in 2003 to a high of 21 vessels in 1994, with the average around 11 vessels per year (Table 3-20). Vessel and processor participation in the mothership fishery has varied over time, influenced by a variety of factors, including, but not limited to, Pacific whiting abundance and available Pacific whiting harvest levels, Pacific whiting prices on the worldwide market, and alternative west coast and Alaska fishing opportunities. Many catcher vessels participating in the mothership sector also participate in the Pacific whiting shoreside fishery. Since 2005, between 39 and 70 percent of the mothership sector catcher vessels have also participated in the Pacific whiting shoreside fishery (Table 3-20). In 2008, 4 of the 19 mothership catcher vessels had purchased EMS equipment for their vessels to meet the monitoring requirements of the Pacific whiting shoreside fishery.

Table 3-20. Mothership Sector Participation by year, 1994-2008.

Year	Pacific Whiting OY (mt)	Mothership-Catcher Vessels	Motherships
1994	260,000	43	9 ¹
1995	178,400	36	6
1996	212,000	28	8 ²
1997	232,000	27	6
1998	232,000	24	6
1999	232,000	24	6
2000	232,000	23	6
2001	190,400	20	5
2002	129,600	11	4
2003	148,200	12	4
2004	250,000	10	4
2005	269,069	18	5
2006	269,069	20	6
2007	242,591	20	6
2008	269,545	19	5

¹ In 1994, one vessel participated in both the catcher-processor sector and the mothership sector.

² In 1996, two vessels participated in both the catcher-processor sector and the mothership sector.

Table 3-21. Catcher vessel participation in the mothership and shore-based sectors.

Year	Number of Catcher Vessels	Number of Vessels that also Participated in the Shore-based Sector	Percentage of Vessels that Participate in Both Sectors
2005	18	7	39%
2006	20	12	60%
2007	20	14	70%
2008	19	14 ^a	70%

^a As of February 2009, four vessels had purchased EMS equipment for permanent installation on the vessel.

Figure 3-9 plots the number of catcher vessels that have annually participated in the mothership sector of the Pacific whiting fishery against the ex-vessel Pacific whiting prices from 1997 to 2008. NMFS downloaded these prices from the PacFIN website and used Port of Newport, Oregon, prices because Newport is a larger Pacific whiting receiving port with consistent participation in the fishery over time, several processing plants, and plants that process Pacific whiting both as surimi and as headed-and-gutted product. Prices are likely different between the shore-based and mothership sectors; however, price data are not reported from the at-sea sectors. Therefore, shore-based sector price data are used as a proxy indicator of changing prices over time, rather than as an exact measure of those prices. Prior to 2005, there does not appear to be a close relationship between ex-vessel price and the number of catcher vessels in the mothership fishery. There does, however, appear to be a closer relationship to the number of vessels that have annually participated in the mothership sector of the Pacific whiting fishery and the mothership sector allocation between 1997 and 2008 (Figure 3-10).

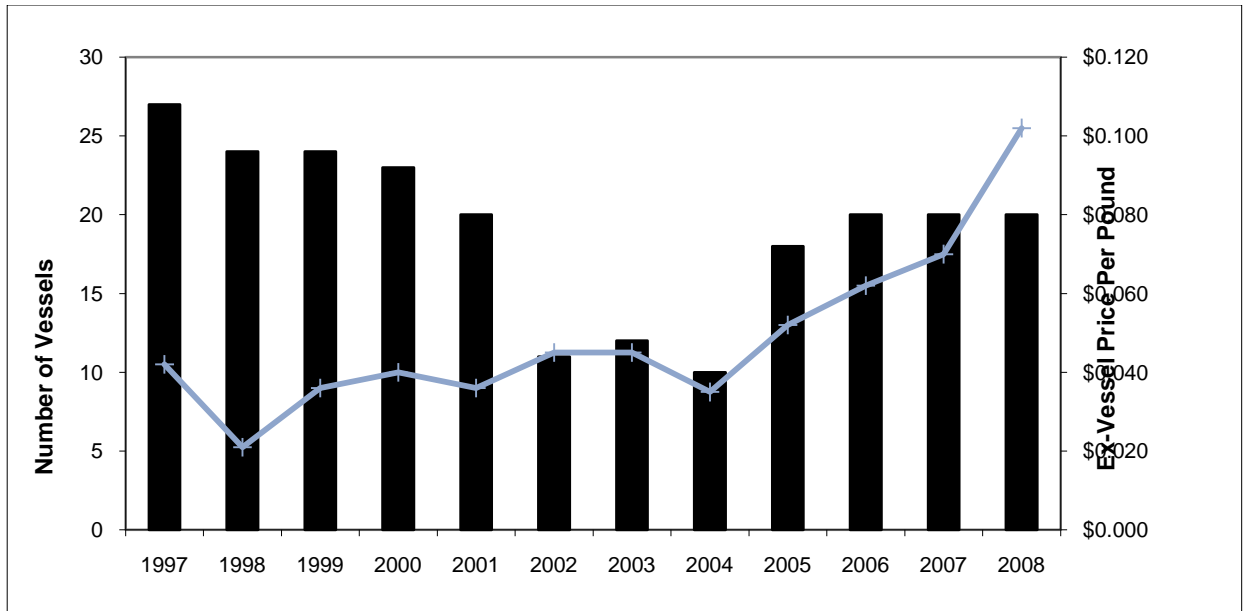


Figure 3-9. Number of catcher vessels in the Pacific whiting mothership fishery weighed against whiting ex-vessel price per pound, 1994-2006. (Port of Newport, OR prices used to provide constant comparison over time. Source: www.psmfc.org/pacfin.)

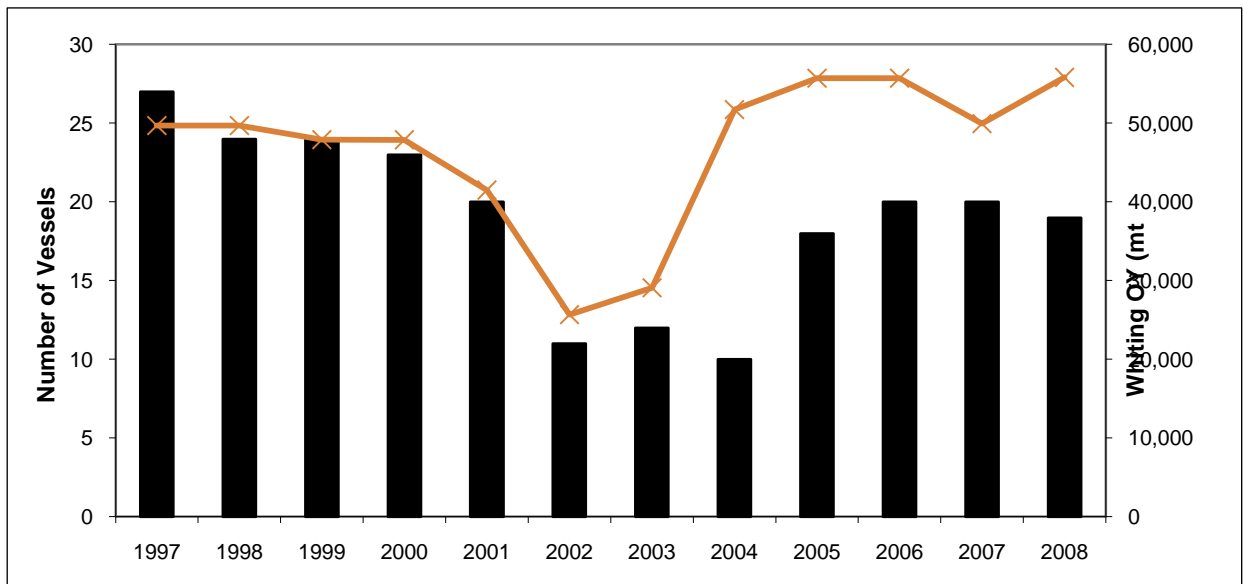


Figure 3-10. Number of catcher vessels in the Pacific whiting mothership fishery weighed against the mothership sector Pacific whiting allocation (mt), 1994-2006.

Catcher vessels that operate in the mothership sector are larger on average than vessels that operate shoreside. Several catcher vessels in the mothership sector exceed 100 feet in length, but most vessels tend to be between 80 and 100 feet in length (Table 3-22).

Table 3-22. Catch and participation of mothership catcher vessels by year and length category.

Year	Data	Length Category (feet)			
		<80	80-90	90-100	>100
1995	No. of Vessels	7	6	6	6
	Retained Weight (mt)	4,846	7,955	7,450	11,179
1996	No. of Vessels	4	10	5	5
	Retained Weight (mt)	6,948	15,677	8,348	9,416
1997	No. of Vessels	7	8	5	5
	Retained Weight (mt)	13,099	15,173	8,854	12,210
1998	No. of Vessels	6	6	6	6
	Retained Weight (mt)	10,919	11,602	12,379	15,845
1999	No. of Vessels	4	6	6	6
	Retained Weight (mt)	6,534	11,466	11,640	16,456
2000	No. of Vessels	3	6	6	6
	Retained Weight (mt)	5,752	12,719	10,359	15,762
2001	No. of Vessels	3	6	5	4
	Retained Weight (mt)	6,110	12,615	8,099	9,037
2002	No. of Vessels	2	5	1	3
	Retained Weight (mt)	C	10,843	C	8,501
2003	No. of Vessels	1	5	3	3
	Retained Weight (mt)	C	10,702	7,014	6,579
2004	No. of Vessels	2	5	1	2
	Retained Weight (mt)	C	10,322	C	C
2005	No. of Vessels	2	6	5	3
	Retained Weight (mt)	C	14,606	10,785	19,547
2006	No. of Vessels	4	6	6	4
	Retained Weight (mt)	9,400	23,334	12,931	9,936
2007	No. of Vessels	4	7	6	3
	Retained Weight (mt)	6,526	15,774	15,476	10,210

Source: PacFIN NPAC4900 table. July 2008

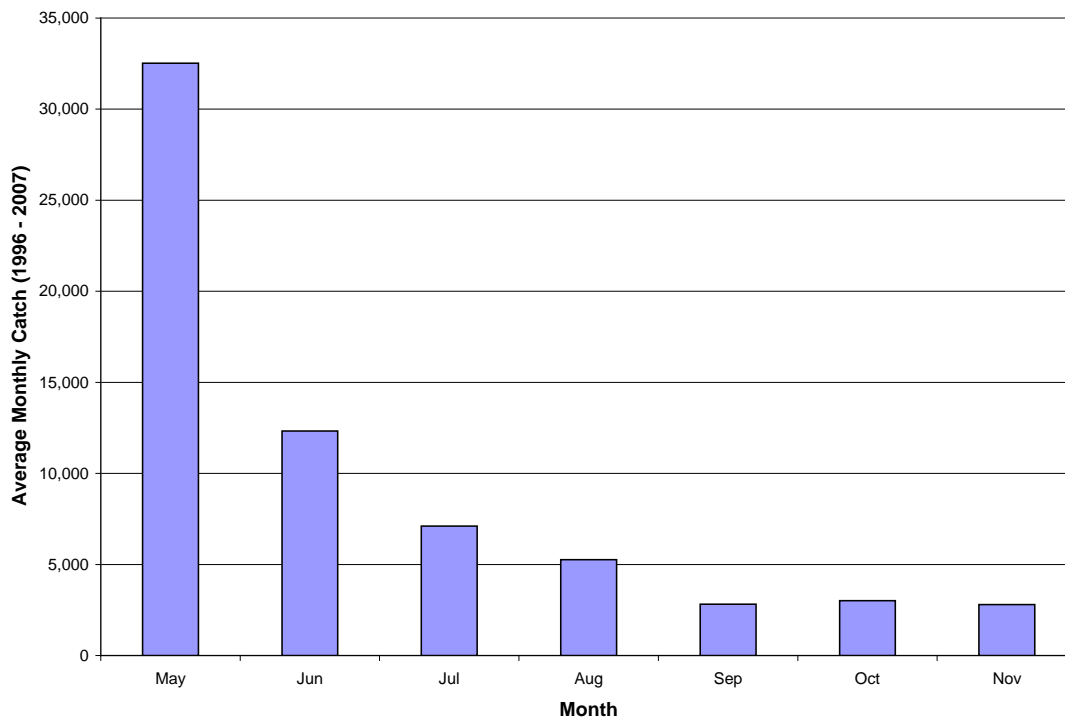
Note: "C" means data are confidential.

Participants in the mothership sector operate over several months of the year with much of the participation occurring in May and June. Many mothership catcher vessels leave the mothership fishery to participate in the shoreside whiting fishery, which begins June 15, or head to the Bering Sea to participate in the Alaska pollock "B" season. As with effort, catch is heavily concentrated toward the May and June time period (Table 3-23, Figure 3-11).

Table 3-23. Monthly distribution of mothership sector catcher vessel participation (count of vessels).

Year	Month							
	April	May	June	July	August	September	October	November
1995	35	31						
1996		28	23					
1997		26	25					
1998		24						
1999		23	23					
2000		23	23					
2001		18	6	4				
2002		11	8					
2003		12	6					
2004		10	2					
2005		16	14				3	2
2006		18	15		2	4		
2007		20	17	2				

Source: PacFIN NPAC4900 table. July 2008

**Figure 3-11.** Average monthly distribution of mothership sector catch, pounds (1996-2007).

3.6.3.2 Participation and Harvest Trends in the Catcher-processor Sector

Catcher-processor effort in the fishery has varied over time. With the voluntary creation of the Pacific Whiting Conservation Cooperative in 1997, the sector took on the characteristics of a rationalized fishery. The amount of capital in the fishery generally declined as the season became longer. Companies with multiple vessels were able to consolidate to fewer vessels.

Table 3-24. Catcher-processor Sector Participation by year, 1994-2008.

Year	Pacific Whiting OY (mt)	Catcher-processors
1994	260,000	9 ¹
1995	178,400	9
1996	212,000	10 ²
1997	232,000	10
1998	232,000	7
1999	232,000	6
2000	232,000	8
2001	190,400	7
2002	129,600	5
2003	148,200	6
2004	250,000	6
2005	269,069	6
2006	269,069	9
2007	242,591	XX
2008	269,545	XX

While the actual number of catcher-processor vessels participating in any given year has not varied tremendously, many vessels spend less time in the fishery and leave the fishery after June (Table 3-63). Beginning in July, only a handful of catcher-processor vessels remain, often into November, to finish off the quota remaining in the fishery. The distribution of catch has become much less concentrated in time following the formation of the voluntary co-op. Prior to the formation of the voluntary co-op, catcher-processors operated over a much shorter time period with harvest concentrated in May and June (Figure 3-28). Although most vessels participate in the Alaska pollock fishery B season, leave the fishery by spring, and return for fall fishing if allocation remains, a single AFA qualified vessel has consistently remained in the whiting fishery during the pollock B season. Consolidation of pollock effort as a result of the AFA has reduced the need for some vessels in the Alaska fishery. Under the existing AFA, a vessel may be designated as a replacement vessel for an AFA vessel in the event of actual total loss or constructive total loss. The flexibility of the catcher-processor co-op allows such AFA qualified vessels to remain operational in the whiting fishery and available to replace an AFA vessel in Alaska should it be necessary without the loss of catch opportunity in either fishery.

Table 3-25. Count of catcher-processors operating by month and year.

Year	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1995	9	9							
1996		10	10						
1997		10	7						
1998		5	7	1	1				
1999		5	6	2					
2000		4	5	5	1	1	1	1	
2001		4	6	1	1	2	2	2	
2002		4		1	1	1	1		
2003		3	1	1	1	2	2		
2004		5	4	1	1	4	2	1	
2005		6	4	1	2	4	4		
2006		6	8	3		3	3		
2007		9	9				3	4	1

Source: PacFIN NPAC4900 table. July 2008

Note: not unique records and should not be summed

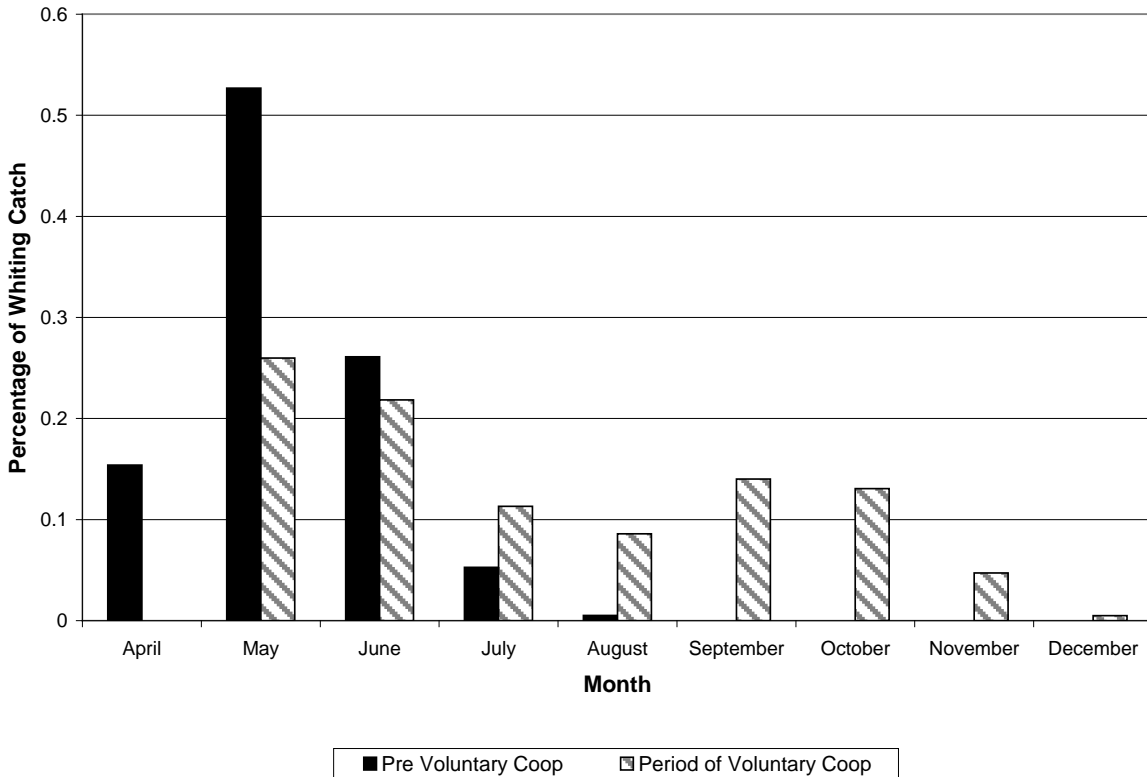


Figure 3-12. Seasonality of whiting harvest in the catcher-processor sector (before and after formation of voluntary cooperative).

Because of the catch sharing agreements created through the voluntary co-op, participants in the catcher-processor sector do not race for fish. Prior to 2009, however, participants expressed concern over the fact that another sector could preempt the catcher-processor sector through attainment of a bycatch limit and did not afford the opportunity for a pre-planned fall fishery.

3.6.3.3 At-sea Harvest and Revenue

Depending on the OY, at-sea harvests by nontribal motherships and catcher-processors ranged from 63,000 mt in 1998 to 128,000 mt in 2005. In 2007, the at-sea sector catch generated an estimated \$20.3 million in ex-vessel revenue. The amount of revenue generated in the fishery has been increasing since 2001, both because of a larger OY than in 2001 and improved market conditions and higher prices received as a result. The amount of nonwhiting groundfish harvested by this fleet is quite small, often in the range of less than half of one percent of total catch.

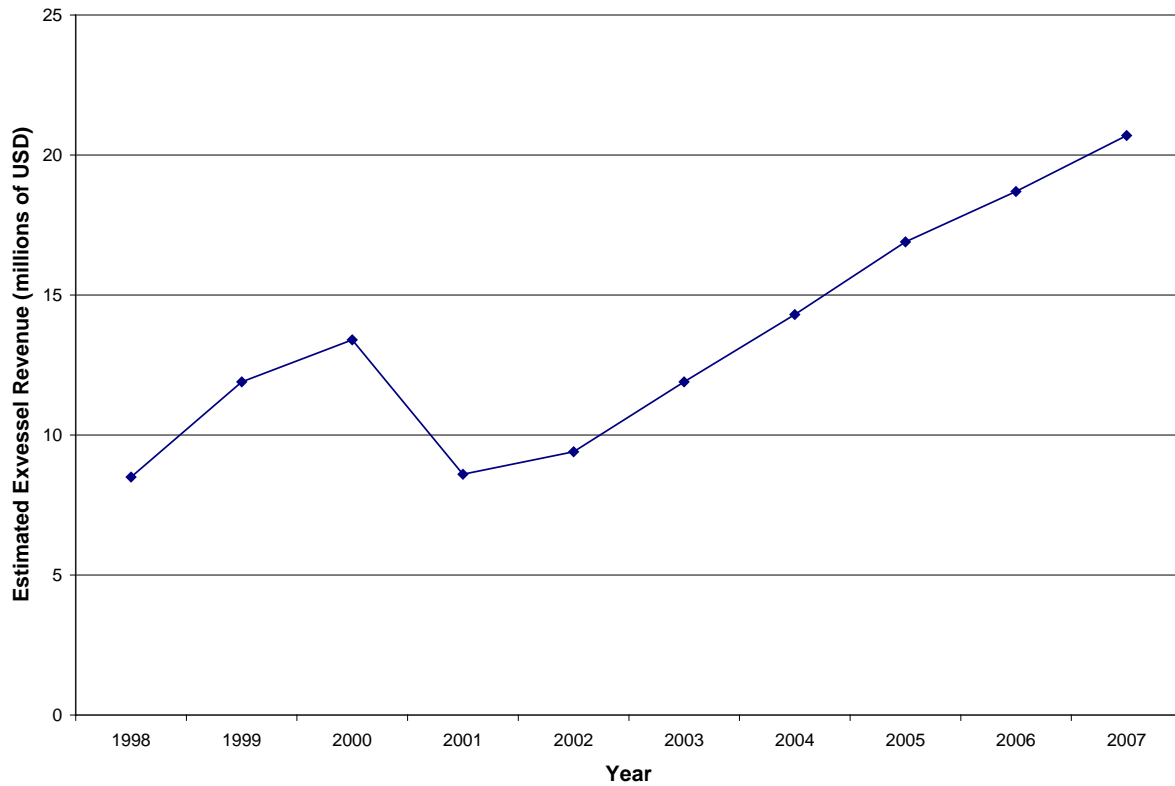


Figure 3-13. Estimated at-sea ex-vessel revenue by year. (Source: PacFIN PFMC Port Group Report, July 2008.)

At-sea whiting vessels incidentally catch a variety of species in addition to whiting. By weight, yellowtail rockfish, widow rockfish, dogfish, squid, and mackerel are the species encountered most frequently in the at-sea sectors outside of whiting. However, when measured as a percentage of the amount of whiting taken, the relative amount is small. In many years, the bycatch rate is less than 1 percent, while in other years it is between 1 and 2 percent (Table 3-26).

Table 3-26. Nontribal at-sea Pacific whiting catch (mt) by year and species.

Year	Pacific Whiting	Yellowtail Rockfish	Widow Rockfish	Dogfish	Squid	Chub Mackerel	Other	Bycatch %
1995	100,383	780	218	186	25	0	318	1.5%
1996	110,931	618	256	87	16	239	248	1.3%
1997	120,964	300	198	208	9	51	175	0.8%
1998	120,039	398	295	220	70	452	457	1.6%
1999	115,046	693	161	272	23	1	614	1.5%
2000	114,460	537	226	79	95	16	488	1.3%
2001	94,250	123	167	77	80	47	400	0.9%
2002	62,935	14	135	37	35	0	103	0.5%
2003	67,236	2	12	11	101	0	110	0.4%
2004	97,277	18	20	341	1,123	0	159	1.7%
2005	127,421	73	79	70	745	0	240	0.9%
2006	134,219	63	139	23	92	4	156	0.4%
2007	121,075	68	145	86	66	0	131	0.4%

3.6.4 Landings, Revenue, and Participation

The number of shore-based trawl vessels landing groundfish (including whiting) on the west coast has declined over time. During the 1980s, approximately 500 trawl vessels landed groundfish in any given year. With the introduction of LE, the number of vessels declined and remained between 300 and 400 vessels per year for several years. In the mid-1990s, the number of trawl vessels declined further as a result of requirements necessary to meet a specific length endorsement regulation. Catcher-processors and other large vessels desiring to participate in the fishery found it necessary to purchase multiple permits and combine them in order to acquire a large enough length endorsement to operate their relatively large vessels in the fishery. Because of the purchasing of permits by catcher-processor entities and other large vessels, the number of shoreside trawl vessels declined further. In late 2003, a Federal buyback was implemented which reduced the number of trawl vessels further yet. In 2003, for example, 241 trawl vessels recorded landings of groundfish, while in 2004, only 155 trawl vessels recorded landings of groundfish. The number has remained relatively stable since 2004.

Table 3-27. Trawl participation and landings by year (includes both LE and open access).

Year	No. of Vessels	Landed weight (mt)	Exvessel Revenue	Avg. mt per Vessel	Avg. Revenue per Vessel
1981	495	106,527	\$41,651,311	215	\$ 84,144
1982	560	122,056	\$53,213,681	218	\$ 95,024
1983	541	103,499	\$48,274,450	191	\$ 89,232
1984	543	104,214	\$50,157,152	192	\$ 92,370
1985	504	99,534	\$48,827,118	197	\$ 96,879
1986	502	88,226	\$48,419,329	176	\$ 96,453
1987	517	98,954	\$61,019,114	191	\$ 118,025
1988	493	91,984	\$56,494,540	187	\$ 114,593
1989	517	101,829	\$58,782,647	197	\$ 113,700
1990	502	92,341	\$55,025,490	184	\$ 109,613
1991	472	105,006	\$59,823,428	222	\$ 126,745
1992	453	140,017	\$63,569,954	309	\$ 140,331
1993	477	120,203	\$56,703,785	252	\$ 118,876
1994	460	135,739	\$57,721,652	295	\$ 125,482
1995	417	133,662	\$69,370,347	321	\$ 166,356
1996	396	147,791	\$62,938,122	373	\$ 158,935
1997	373	143,899	\$59,305,894	386	\$ 158,997
1998	345	133,450	\$43,765,358	387	\$ 126,856
1999	347	125,414	\$43,502,581	361	\$ 125,368
2000	275	119,664	\$43,722,944	435	\$ 158,993
2001	268	100,598	\$35,377,633	375	\$ 132,006
2002	261	71,274	\$28,896,283	273	\$ 110,714
2003	241	74,456	\$30,440,612	309	\$ 126,310
2004	155	111,907	\$29,902,433	722	\$ 192,919
2005	154	119,965	\$33,503,576	779	\$ 217,556
2006	151	115,406	\$36,139,160	764	\$ 239,332
2007	159	94,160	\$37,191,912	592	\$ 233,911

Source: PacFIN fil and fit table. July 2008.

Note: Open access trawl vessels include California halibut and sea cucumber trawl vessels that incidentally land groundfish.

Over time, landings in the trawl fishery have fluctuated, especially on a species-specific basis (Figure 3-14). Pacific whiting has grown in importance, especially in recent years. Through the 1990s, the

volume of Pacific whiting landed in the fishery increased. In 2002 and 2003, landings of Pacific whiting declined due to information showing the stock was depleted and the subsequent regulations that restricted harvest to rebuild the species. Following rebuilding and the removal of the Pacific whiting stock from overfished status, catches rebounded. In addition, markets for the stock improved leading to higher ex-vessel prices than seen previously. Historically, shoreside Pacific whiting activities generated their greatest revenue in 2006.

While the Pacific whiting fishery has grown in importance in recent years, harvests in the nonwhiting component of the fishery have declined steadily since the 1980s. Ex-vessel revenues in the fishery peaked in the mid 1990s at over \$60 million. Following the passage of the SFA (1996) and the listing of several species as overfished, harvests became increasingly restricted, and landings and revenues declined steadily until 2002. Since 2002, ex-vessel revenues have stabilized at around \$23 million to \$27 million per year.

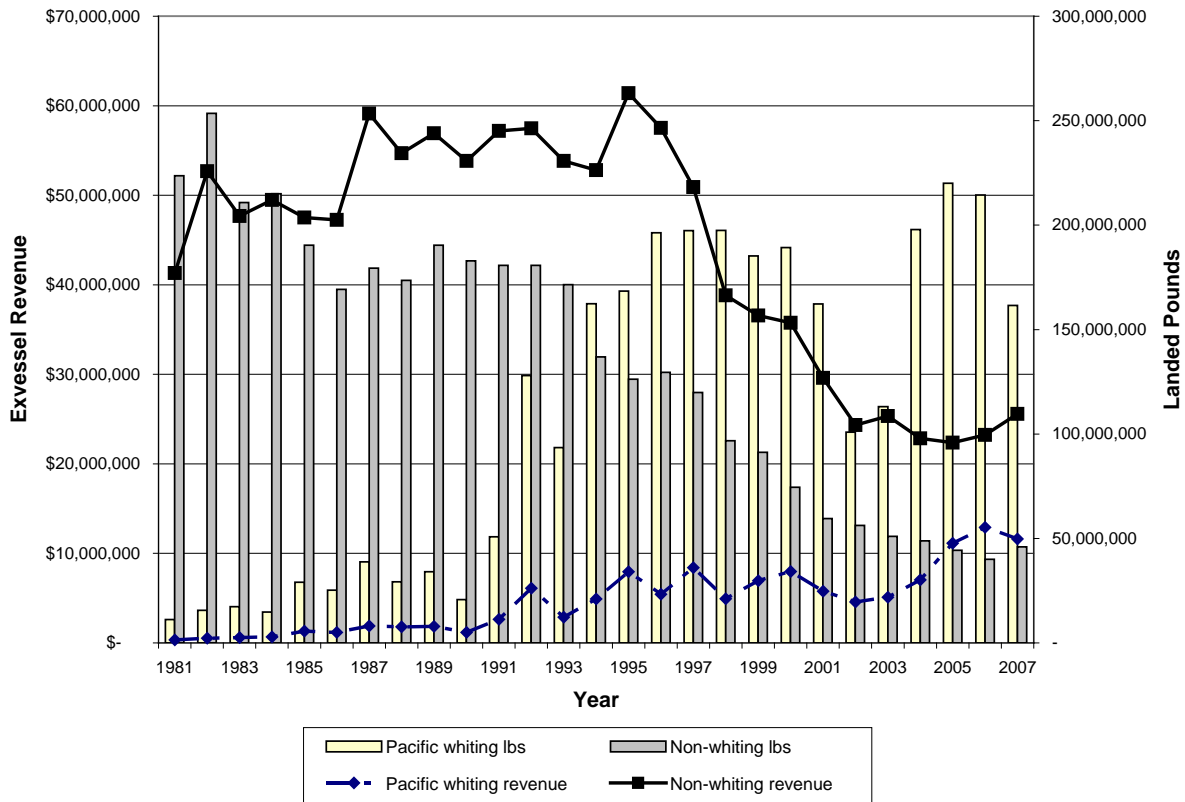


Figure 3-14. Shoreside landed pounds and ex-vessel revenue from whiting and nonwhiting groundfish caught using trawl gear.

The type of species landed shoreside in the trawl fishery has changed over the years. Rockfish were historically an important component of trawl fishery harvests, but have declined due to decreasing abundance of several rockfish species and regulations put in place to protect depleted rockfish stocks. While rockfish landings were declining, whiting harvests increased. Whiting comprises the single largest species harvested in the fishery by volume. Flatfish harvests have not fluctuated as widely as rockfish landings, but have increased in importance as their share of total fishery harvests have grown. Roundfish landings have declined over time as species like lingcod were subject to restrictive management measures to foster their rebuilding and to protect depressed rockfish stocks that are caught in conjunction with lingcod. Sablefish remains the single most important roundfish species to the trawl fishery, outside of Pacific whiting.

Table 3-28. Shoreside landings of nontribal trawl-caught groundfish by species aggregation and year.

Year	Landed weight (mt)				
	Flatfish	Rockfish	Roundfish (nonwhiting)	Shark	Pacific whiting
1981	25,742	53,790	9,333	248	827
1982	32,525	54,856	14,120	117	1,022
1983	29,637	41,536	11,200	51	1,035
1984	27,578	34,029	12,079	254	2,719
1985	30,537	30,422	10,495	214	3,890
1986	26,456	27,936	8,155	97	3,420
1987	28,485	31,749	10,499	105	4,788
1988	26,749	34,277	10,583	141	6,865
1989	29,699	38,130	10,297	90	7,353
1990	27,596	36,112	8,269	355	8,112
1991	30,410	28,606	9,343	699	20,597
1992	24,757	29,145	8,419	930	56,125
1993	22,032	31,250	7,596	859	42,112
1994	17,396	26,729	5,707	1,059	73,615
1995	18,314	25,298	5,082	363	75,034
1996	20,504	24,371	5,457	203	85,082
1997	20,410	20,360	5,271	346	87,409
1998	16,475	16,559	2,634	467	87,826
1999	20,108	11,691	3,463	475	83,418
2000	17,265	9,961	2,818	329	85,854
2001	14,729	6,202	2,746	348	73,411
2002	13,161	4,216	2,226	467	45,723
2003	14,610	2,790	3,198	201	51,255
2004	13,234	2,345	3,378	156	89,655
2005	14,266	1,919	3,011	223	97,630
2006	12,890	1,978	2,773	122	97,269
2007	15,631	2,471	2,524	109	73,283

Source: PacFIN fil table. July 2008.

Trawlers catch a wide range of species. By weight, the following species account for the bulk of nonwhiting landings: Dover sole, sablefish arrowtooth flounder, petrale sole, English sole, longspine thornyhead, skates, Pacific cod, rex sole, and shortspine thornyhead. Management measures intended to reduce the directed and incidental catch of overfished rockfish and other depleted species have significantly reduced rockfish catches in recent years substantially below historical levels.

Table 3-29. Landings of Nonwhiting Groundfish by 10 Largest Species and Year

Species	2001	2002	2003	2004	2005	2006	2007	Total
Dover sole	6,678	5,937	6,930	6,414	6,742	5,729	8,958	47,388
Sablefish	2,369	1,433	2,105	2,226	2,202	2,318	2,356	15,010
Arrowtooth	2,470	2,081	2,302	2,246	2,081	1,723	2,042	14,944
Petrals	1,784	1,729	1,877	1,829	2,668	2,564	2,194	14,645
English sole	1,370	1,427	1,050	1,118	1,033	1,010	629	7,636
Longspine thornyhead	1,155	1,819	1,449	716	638	748	801	7,326
Skate	1,222	654	1,215	621	823	923	946	6,404
Pacific cod	422	826	1,099	1,158	765	376	54	4,701
Rex sole	551	581	582	492	566	522	541	3,834
Shortspine thornyhead	405	554	557	497	473	499	775	3,762

Both nonwhiting and whiting landings and revenues in Oregon are significantly larger than the other two states (Table 3-30). Washington is the home of a large portion of the at-sea whiting fleet, making Washington's participation in trawl fisheries substantial; however, at-sea fisheries are discussed later.

Table 3-30. Landed weight (mt) and ex-vessel revenue (\$1,000s) by state and fishery sector, 2001-07.

	2001	2002	2003	2004	2005	2006	2007
California							
Non-Whiting							
Landed wt	7,473	7,187	6,380	5,499	5,594	5,003	6,130
Exvessel Rev	8,960	8,996	7,467	6,356	6,730	6,907	8,499
Pacific Whiting							
Landed wt	2,306	2,789	1,740	4,742	3,875	5,429	2,967
Exvessel Rev	171	275	170	641	427	632	385
Oregon							
Non-Whiting							
Landed wt	12,148	8,405	10,499	10,245	10,786	10,952	12,848
Exvessel Rev	14,679	10,065	12,863	11,371	12,168	13,830	15,105
Pacific Whiting							
Landed wt	53,376	32,305	36,581	59,075	61,463	61,319	42,801
Exvessel Rev	4,132	3,219	3,642	4,396	6,637	7,974	6,501
Washington							
Non-Whiting							
Landed wt	4,635	4,656	4,129	3,458	3,120	1,891	1,826
Exvessel Rev	4,232	3,723	3,569	3,127	3,173	2,273	1,888
Pacific Whiting							
Landed wt	17,730	10,630	12,934	25,838	32,238	30,520	27,514
Exvessel Rev	1,439	1,061	1,273	1,994	3,818	4,306	4,740

Source: PacFIN ftl data. July 2008

Limited entry trawlers take the vast majority of the groundfish harvest if measured by weight, but somewhat less if measured by value. In 2003, groundfish trawlers landed more than 95 percent of total groundfish harvest by weight but only 64 percent by value (Table 3-30). The difference between the weight and revenue shares is mostly due to the catch of Pacific whiting. Since whiting fetch a relatively low price and are caught almost exclusively by LE trawl vessels, they skew the overall value per unit weight for this sector.

Table 7-12. Shoreside nontribal trawl groundfish landings (mt) and ex-vessel revenue (\$1,000s) by trawl type, state, and year.

	2001	2002	2003	2004	2005	2006	2007
Bottom Trawl							
California							
Landed wt	6,996	7,089	6,370	5,459	5,558	4,967	6,108
Exvessel Rev	8,457	8,888	7,460	6,321	6,700	6,876	8,483
Oregon							
Landed wt	10,012	7,942	10,459	10,077	10,613	10,857	12,735
Exvessel Rev	12,540	9,657	12,805	11,274	12,003	13,744	15,002
Washington							
Landed wt	3,777	4,330	4,121	3,338	2,919	1,725	1,571
Exvessel Rev	3,402	3,421	3,559	3,044	3,053	2,149	1,742
Midwater Trawl							
California							
Landed wt	2,782	2,886	1,750	4,781	3,911	5,464	2,990
Exvessel Rev	674	383	177	676	457	663	401
Oregon							
Landed wt	55,516	32,772	36,621	59,243	61,636	61,414	42,914
Exvessel Rev	6,276	3,633	3,701	4,493	6,801	8,060	6,604
Washington							
Landed wt	18,848	14,670	13,071	25,972	32,633	30,687	27,769
Exvessel Rev	2,355	1,770	1,311	2,079	3,954	4,429	4,886

Source: PacFIN FTL table. July 2008

Table 3-31. Shoreside groundfish landings (mt) and revenue (\$1,000s) by trawl and nontrawl vessels, 2001-07. Trawl portion of total landings and revenue shown in parenthesis.

	2001	2002	2003	2004	2005	2006	2007
Non-Trawl							
Landed wt	4,614	3,806	4,192	4,231	4,658	4,324	3,698
Exvessel rev	18,355	14,613	17,952	17,239	19,780	20,775	18,286
Trawl							
Landed wt	100,723 (96%)	71,776 (95%)	79,436 (95%)	119,899 (97%)	133,106 (97%)	145,716 (97%)	104,887 (97%)
Exvessel rev	35,497 (66%)	29,437 (67%)	31,938 (64%)	31,525 (65%)	36,051 (65%)	40,598 (66%)	39,688 (68%)

Source: PacFIN ftl data. July 2008

Shore-based trawl vessels deliver their catch to processors and buyers located along the coasts of Washington, Oregon, and California and tend to have their homeports located in towns within the same general area where they make deliveries, though there are several cases of vessels delivering to multiple ports during a year. Larger vessels in the shore-based LE trawl sector focus more heavily on the DTS complex in deep water and on Pacific whiting, while smaller trawl vessels focus more heavily on the shelf, in part due to technical constraints (smaller vessels are not able to trawl at deeper depths). Large trawl vessels also tend to participate in the trawl fishery for more months of the year than small trawl vessels, presumably due to a greater ability to fish during more hazardous winter months. Shore-based vessels range in size from less than 40 feet to over 90 feet in length (Table 3-32). Figure 3-15 shows the average number of vessels by state and length category, 2004 to 2007, which is the period after the vessel buyback program. It can be seen that the trawl vessels making landings are smaller overall in California than those in Oregon. Washington has fewer trawl vessels on average and a more even distribution in terms of length.

Table 3-32. Count of trawl vessels making landings by state, year, and vessel length (feet), 2001-07.

	2001	2002	2003	2004	2005	2006	2007
Washington							
<41	1	1	1	1	1		
41-50	8	7	6	5	5	4	5
51-60	8	8	7	5	5	5	7
61-70	9	10	9	5	5	6	1
71-80	12	8	8	3	4	6	8
81-90	1	2	1	3	5	6	6
>90	1	1	2	2	2	3	3
Oregon							
<41	4	3	3	3	3	2	2
41-50	11	9	9	9	9	10	11
51-60	20	18	17	10	10	14	13
61-70	40	38	39	25	26	26	28
71-80	26	26	25	19	19	20	21
81-90	8	7	9	8	7	6	6
>90	2	1	1	1	1	3	3
California							
<41	21	19	14	11	13	10	12
41-50	37	39	34	14	14	17	17
51-60	32	37	35	20	19	17	17
61-70	27	27	21	13	13	10	9
71-80	13	11	9	9	7	11	11
81-90	2	2	2	1	1	1	1
>90	1				1	1	

Source: PacFIN ftl, ft, and cg tables. July 2008.

Note: Not unique records and should not be summed.

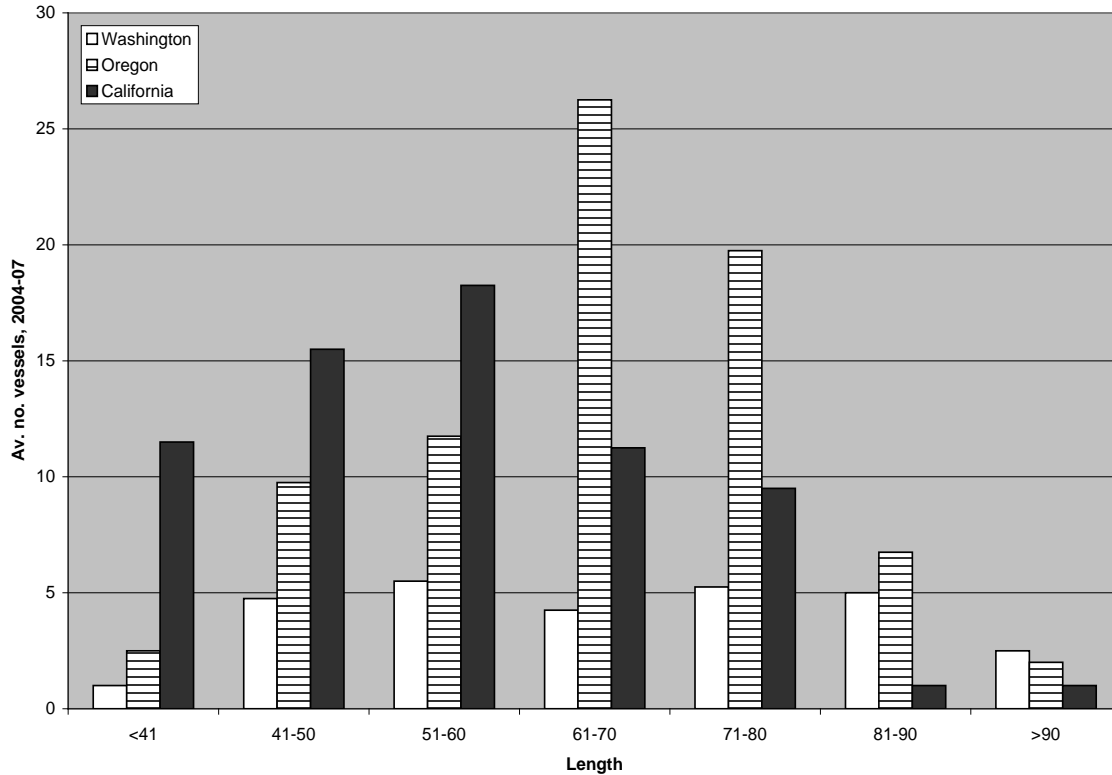


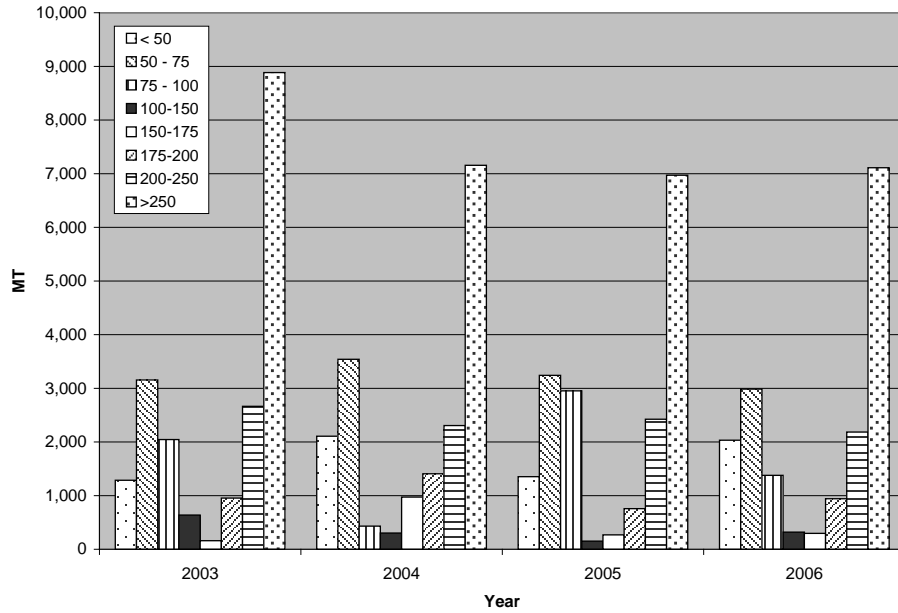
Figure 3-15. Average number of vessels 2004-07, by state and length category.

Trawl vessels fish a wide range of depths. In recent years, the trawl RCA has consistently restricted access to depths between 100 and 150 fathoms, and has, at times, restricted areas deeper and shallower depending on various factors. Nonwhiting groundfish vessels fish in depths as shallow as 10 fathoms and as deep as 600 fathoms. In recent years, the largest volume of retained catch has come from deeper than 250 fathoms (Table 3-33, Figure 3-16). Shoreside Pacific whiting vessels fish in a relatively more concentrated area, but still fish a wide range of depths. The majority of Pacific whiting is harvested in areas between 50 and 150 fathoms.

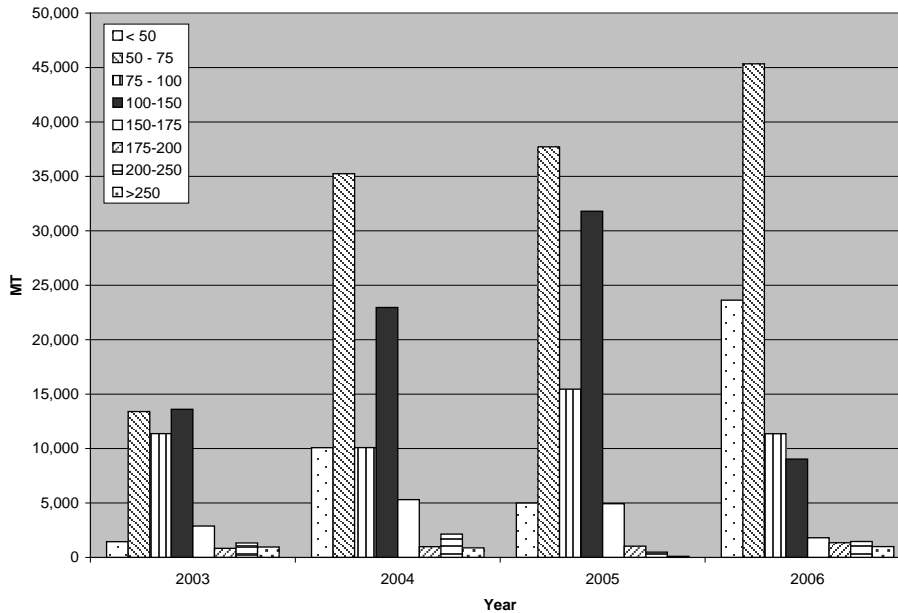
Table 3-33. Retained catch of groundfish by species type, depth, and year.

Species	Depth range	Landed MT by Year			
		2003	2004	2005	2006
Non-Whiting Groundfish	< 50	1,285.7	2,106.7	1,353.4	2,032.1
	50 - 75	3,155.8	3,540.2	3,241.3	2,985.0
	75 - 100	2,045.1	431.3	2,953.3	1,377.1
	100-150	637.5	302.8	152.6	319.2
	150-175	160.3	972.7	268.5	295.9
	175-200	954.9	1,407.0	757.2	941.4
	200-250	2,664.7	2,306.3	2,423.1	2,184.6
	>250	8,885.0	7,156.6	6,971.5	7,110.8
Pacific Whiting	< 50	1,447.3	10,076.1	4,995.3	23,630.7
	50 - 75	13,402.0	35,248.8	37,718.8	45,339.4
	75 - 100	11,369.6	10,083.8	15,459.0	11,360.8
	100-150	13,602.4	22,959.3	31,797.9	9,028.9
	150-175	2,880.2	5,305.4	4,930.4	1,807.4
	175-200	836.9	989.9	1,031.8	1,344.5
	200-250	1,333.4	2,142.5	483.9	1,461.7
	>250	959.5	881.7	100.5	997.0

Source: PacFIN logbook data. November 2007.



a. Nonwhiting landings



b. Whiting landings

Figure 3-16. (a) Nonwhiting and (b) whiting landings, mt, by depth (feet), 2003-06.

Trawl vessels harvest groundfish species across a wide array of latitudinal areas. In general, the LE trawl fleet operates north of Point Conception to the U.S./Canada border. Midwater trawl vessels concentrate in a relatively smaller area, because of the geographic distribution of Pacific whiting, which are more abundant off Oregon and Washington. Historically midwater trawlers targeted other species, such as yellowtail and widow rockfish, but opportunities for those species were eliminated to foster the rebuilding of widow and canary rockfish (a species often caught in conjunction with yellowtail).

Table 3-34. Latitudinal distribution of retained trawl catch (mt), 2003-06.

Gear	Latitude Area	Year			
		2003	2004	2005	2006
Bottom Trawl	34° 27' to 36°	716	628	388	126
	36° to 38°	1,312	1,589	1,111	840
	38° to 40° 10'	1,594	1,497	1,329	1,185
	40° 10' to 42°	3,113	1,758	2,548	2,744
	42° to 44°	2,975	2,480	2,637	3,051
	44° to 46°	2,660	2,233	2,438	2,820
	46° to 48°	3,927	4,915	4,914	4,783
	48° to US/CAN	3,737	3,029	2,539	1,549
Midwater Trawl	34° 27' to 36°				
	36° to 38°				
	38° to 40° 10'	C	C		C
	40° 10' to 42°	1,038	4,695	3,870	5,228
	42° to 44°	1,888	3,977	4,848	20,294
	44° to 46°	26,025	51,129	47,471	25,646
	46° to 48°	17,432	21,528	24,902	43,008
	48° to US/CAN	133	7,299	16,134	2,062

Source: PacFIN logbook data. November 2007

The trawl fishery harvests a variety of species at various times of the year. In recent years, petrale sole has made up the bulk of the January and February trawl fishery with Dover sole and sablefish also playing a large role during those months. From March through May, the strategy referred to as the “DTS strategy” (Dover sole, thornyheads, and sablefish) is the focus of trawl effort. Beginning in May and June, target species typically begin transitioning from deeper depths along the continental slope and deep portions of the shelf to shallower portions of the shelf, and effort in the fishery follows suit. In addition, weather becomes more favorable and smaller trawl vessels begin operating more frequently. From May through October, the fishery targets species such as “other flatfish,” Dover sole, and petrale sole along the continental shelf, while other vessels choose to prosecute pink shrimp during those months. On June 15, the primary season for the shoreside whiting fishery opens, and many trawlers focus on that species in June, July, and often into August, depending on the length of the fishery. In November and December, many trawl vessels transition over to the Dungeness crab fishery, but several trawlers remain in the fishery and target petrale sole and some DTS species (Figure 3-17).

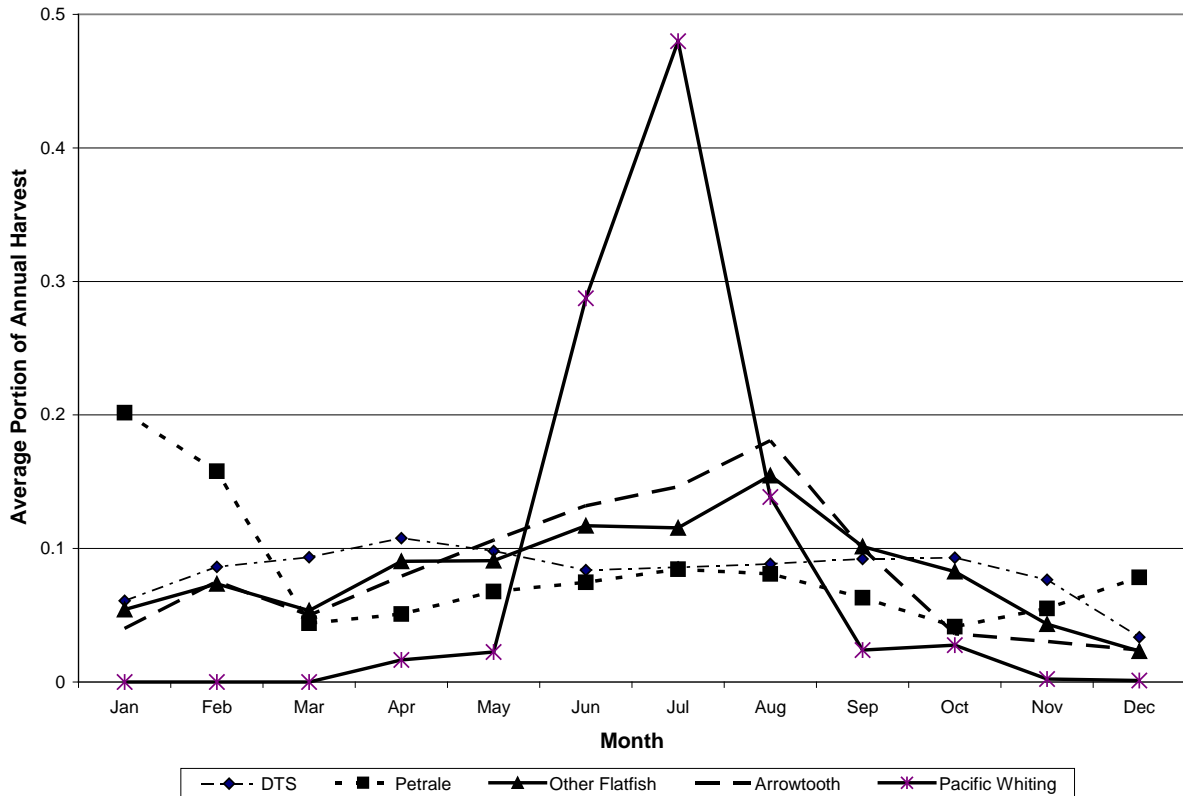


Figure 3-17. Seasonal distribution of shoreside target species landings (average 2001-07).

In 2003, a fishing capacity reduction program (buyback) was implemented off the west coast, which retired 91 vessels from the LE trawl sector. These 91 vessels represented less than 40 percent of the number of boats actively engaged in the LE trawl sector, but approximately 50 percent of historic catch. The purpose of the program was to reduce the number of vessels and permits endorsed for the operation of groundfish trawl gear to increase and stabilize economic revenues for vessels remaining in the groundfish fishery and to conserve and manage depleted groundfish species. Vessels that participated in the buyback program were sold, scrapped, or converted to nonfishing purposes, and those vessels cannot be used for fishing again.

The impact of the trawl vessel buyback appears to have been positive in terms of ex-vessel revenue per vessel, specifically for nonwhiting trawl vessels. Average trawl ex-vessel revenues generated by nonPacific whiting groundfish increased from approximately \$108,000 to \$151,000 between 2003 and 2004, even though total ex-vessel revenues for the fleet decreased from approximately \$25,000,000 to \$22,000,000 during the same period (Figure 3-18). Average bottom trawl revenues per vessel appear to have consistently remained higher than the amount of revenue generated prior to the buyback. Based on the difference between pre- and post-average revenues per vessel, the buyback appears to have increased average revenue per vessel by somewhere on the order of \$50,000 per year.

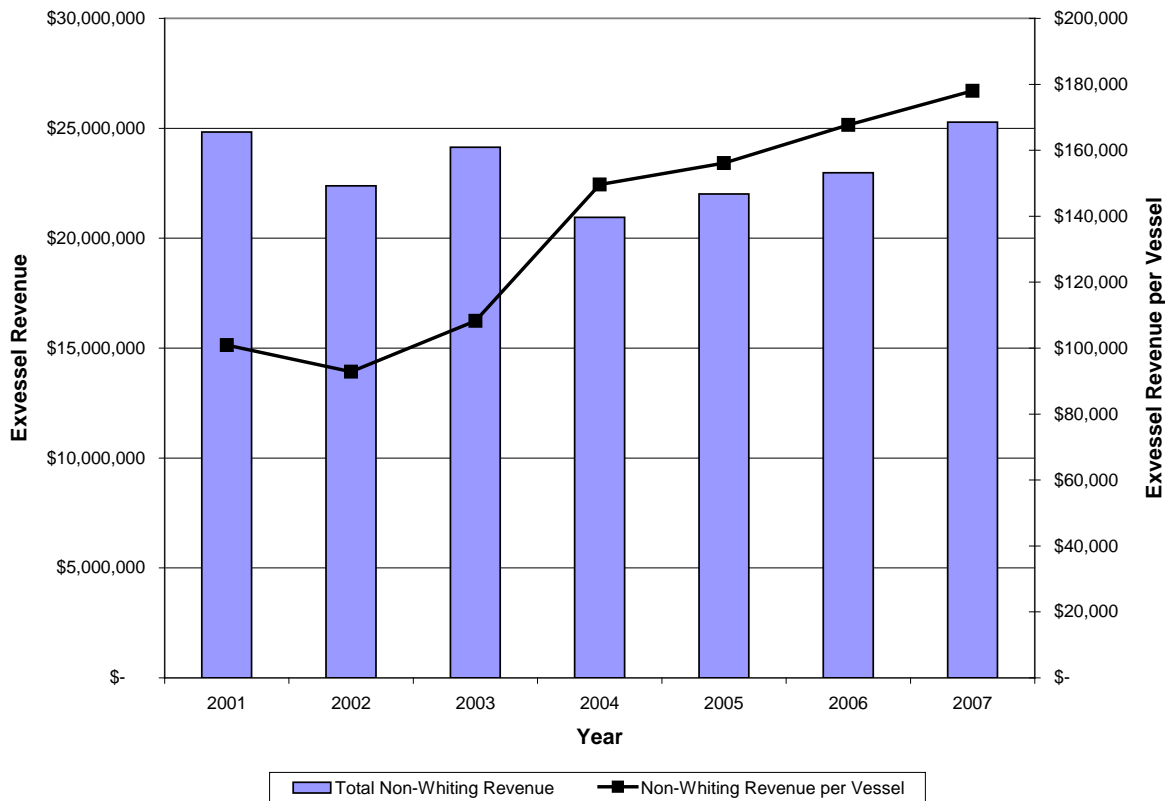


Figure 3-18. Average annual LE trawl ex-vessel revenues per year (excluding catch of Pacific whiting).

Net revenues for nonwhiting trawl vessels were estimated by Lian, Singh, and Weninger in 2008 (Lian, *et al.* 2008). Estimates of net revenues were generated using a cost earnings survey conducted by the NWFSC, which collected cost data from trawlers operating in 2004. These cost earnings data were matched with PacFIN fish ticket data to derive estimates of net revenue generated by vessels active in the fishery during 2004. These estimates indicate that the average nonwhiting trawl vessel makes zero economic profit. Simply put, zero economic profit means that there are no profits being generated in the fishery above what would be considered a normal wage plus the costs of operating and maintaining a vessel. While the average vessel makes close to zero economic profit, some vessels do make profits, while others may actually lose money and would be better off (financially speaking) leaving the fishery.

3.6.5 Fishing Vessel Safety

The National Institute for Occupational Safety and Health provided descriptive statistics on fishing vessel injury and loss from 2000 to 2008. Figure 3-19 shows nonfatal vessel losses and fishing-vessel-related deaths during this period. Five of the deaths were due to vessel loss in two incidents, two resulted from onboard injury and one from a fall overboard. Contributing factors to vessel loss were flooding, weather conditions, the vessel capsizing, vessel instability, and being struck by a large wave. The most common contributing factor, flooding (five instances), was due to capsizing, water entering over gunnels, hull breach, and unsealed hatch. Hauling back a heavy net was cited as a cause of one of the three instability instances. This suggests that weather and vessel condition were important factors in vessel loss, with vessel operation (e.g., instability due to overloading) also contributing. Of the nonfatal vessel losses, four were steel hulled, and the other was wood. They ranged in age from 22 to 103 years old.

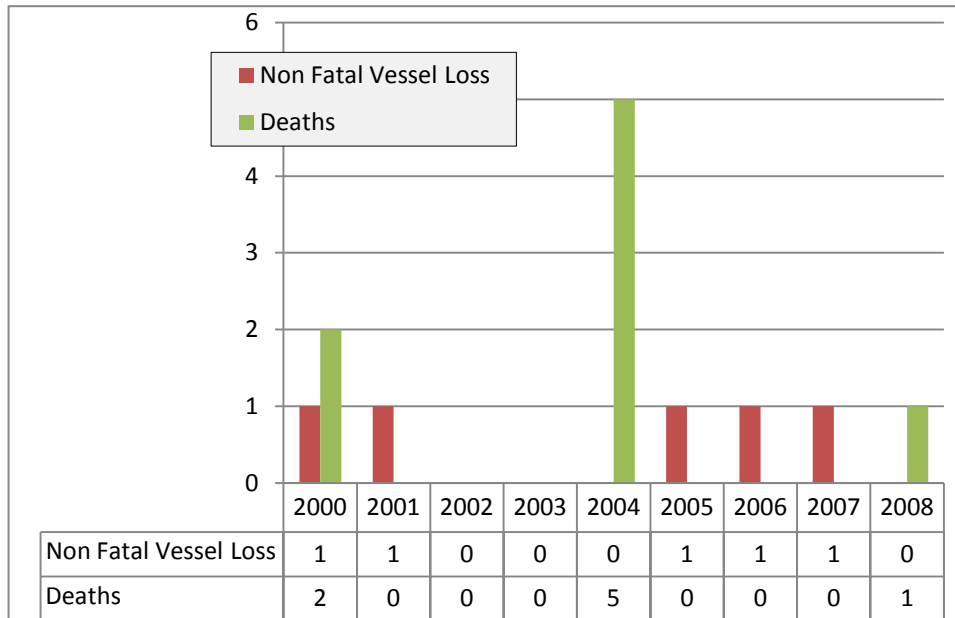


Figure 3-19. Nonfatal vessel loss and deaths in the west coast groundfish trawl fishery, 2000-08 (source: NIOSH).

3.7 Captain and Crew

Limited entry trawlers often use several crew members, and sometimes a hired captain, to assist in trawl operations. Although data are not captured on west coast crew members, anecdotal information and industry input are available to describe crew conditions and the number of jobs that exist on the west coast.

The Fishermen's Marketing Association (FMA) (P. Leipzig, pers. comm., Executive Director, FMA, August 2008) reports that west coast trawlers in the 1980s may have operated with two to three crewmembers and a captain. Larger-than-average vessels (vessels exceeding 80 feet) would often operate with a captain and three to four crewmembers. Over time, revenues generated by trawl vessels declined and crew wages and employment followed suit. Immediately prior to the 2003 buyback, many small boat owners operated their vessel independently without crew, presumably because they could not afford to pay crewmembers a share. Other vessel owners would work together by crewing for one another with one captain operating as a crewmember on another's vessel and vice versa. Following the buyback, average vessel revenues improved, and many nonwhiting operations currently operate with one captain and two crewmembers.

Captain and crew wages typically are issued based on a share of vessel productivity with adjustments for certain cost items. Captain and crew shares are based on the skill and experience of specific captain and crew. Those with greater skill and experience receive a larger percentage, and those with less skill and experience receive a smaller percentage.

Based on information from industry representatives, the type of crew compensation system varies somewhat across vessels. Many vessels compensate crew after calculating an adjusted gross revenue value which takes into account the cost of fees (to the Oregon Trawl Commission [OTC] and FMA), the cost of fuel, and the cost of groceries. The share paid to crew can vary from 8 percent of adjusted gross to 12 percent of adjusted gross, with exceptional crew fetching up to 15 percent of adjusted gross. Hired captains are also paid according to the adjusted gross revenue scale, but fetch higher shares. Captains may receive 17 to 25 percent (P. Leipzig, pers. comm., Executive Director, FMA, August 2008). The

following table illustrates information received from industry representatives, which can be used to generate order of magnitude estimates regarding crew wages under status quo conditions and under rationalized fishery conditions. This information shows that the cost of fuel under current conditions may range from 30 to 40 percent of gross, the cost of FMA fees is 1.3 percent of gross, and the cost of OTC fees is 0.5 percent of gross, meaning adjusted gross revenues may be 68.2 to 58.2 percent of actual gross (before subtracting groceries, for which no information was readily available). Crew shares range from 8 to 15 percent of adjusted gross, and hired captain shares may range from 17 to 25 percent of gross.

Table 3-35. Select itemized costs incurred by trawl vessel owners.

	Low	High
Fuel	30%	40%
FMA	1.30%	1.30%
OTC	0.50%	0.50%
100% minus subtotal	68.2%	58.2%
Crew	8%	15%
Captain	17%	25%

Source: P. Leipzig, pers. comm., Fishermen's Marketing Association, 2008.

By assuming two crewmembers and one captain, the information shown above indicates that the total share of unadjusted gross revenue received by captain and crew may range from approximately 20 to almost 40 percent. Captain and crew may receive 20 percent of unadjusted gross if the vessel incurs high fuel costs, but pays relatively low shares. Captain and crew may receive almost 40 percent of gross if the vessel incurs low fuel costs, but pays relatively high shares. Using this information enables estimating the wages made by captain and crew under status quo conditions by fishery (Table 3-35).

Table 3-36. Estimated compensation to hired captain and crew by fishery.

Fishery	Total Captain and Crew Wages (sum of all captain and crew per vessel)
Shoreside Whiting	\$69,000-\$161,000
Mothership Whiting	\$64,500-\$150,000
Nonwhiting	\$39,300-\$78,600

3.8 Nontrawl Commercial Groundfish Harvesters

3.8.1 Limited Entry Fixed-gear

Limited entry fixed-gear vessels use pot and hook and line gear to target species such as sablefish, nearshore rockfish, and thornyheads. Limited entry fixed-gear vessels comprise an important component of the groundfish fishery, though landings and revenues from this sector are generally smaller than in the trawl sector (Table 3-37). Since 1996, revenues in the fishery have ranged from a high of more than \$22 million to a low of more than \$10 million. Landings have ranged from nearly 12 million pounds to nearly 7 million pounds. Vessels using hook-and-line gear take the majority of the catch in the LE fixed-gear sector.

Table 3-37. Landings (mt) and revenue (\$) by year for LE groundfish longline and pot gear.

Gear Group	Year	Landed weight (mt)	Exvessel revenue
Hook and Line	1996	4,408	14,141,815
	1997	4,482	18,655,655
	1998	3,096	8,050,076
	1999	3,577	11,841,126
	2000	3,266	12,519,786
	2001	2,662	10,488,604
	2002	2,449	8,169,857
	2003	2,445	10,726,402
	2004	2,612	11,022,205
	2005	2,923	12,736,843
	2006	2,558	12,995,531
2007	2,350	11,546,844	
Pot	1996	906	4,332,043
	1997	663	3,632,514
	1998	640	2,192,048
	1999	1,076	4,251,561
	2000	1,084	5,452,868
	2001	800	3,852,837
	2002	544	2,717,393
	2003	831	4,816,160
	2004	1,057	4,082,840
	2005	1,134	4,815,701
	2006	1,052	5,268,140
2007	752	3,909,372	

Source: PacFIN vfcmrfd table. July 2008

By weight, sablefish, dogfish, northern slope rockfish, shortspine thornyhead, and blackgill rockfish comprised the largest species landed by LE fixed-gear vessels from 2003 through 2007 (Table 3-38). Prior to 2003, the harvest of many types of rockfish species was much larger, as was harvest of species like grenadiers and lingcod.

Table 3-38. Landings (mt) and revenue (\$) by species in the LE groundfish fixed-gear sector.

2003 thru 2007			1996 thru 2002		
Species	Avg annual landed weight (mt)	Avg Annual exvessel revenue	Species	Avg annual landed weight (mt)	Avg Annual exvessel revenue
Sablefish	1,970.6	10,351,700	Sablefish	2,748.1	13,259,250
Spiny Dogfish	251.4	123,100	Spiny Dogfish	282.1	121,774
Shortspine Thornyhead	109.0	753,066	Unsp. Rockfish	253.2	322,537
North. Unsp. Slope Rockfish	42.7	41,009	Grenadiers	174.0	55,358
Blackgill Rockfish	26.6	76,696	Canary Rockfish	84.9	165,443
Grenadiers	18.0	8,280	Blackgill Rockfish	50.1	98,956
Skate	14.7	7,401	Shortspine Thornyhead	79.9	350,460
Black Rockfish	12.8	46,099	Roughey Rockfish	47.6	63,382
Lingcod	12.8	29,068	Longspine Thornyhead	40.5	151,103
Roughey Rockfish	7.4	8,853	Yellowtail Rockfish	32.5	41,649
Longspine Thornyhead	7.1	39,384	Black Rockfish	31.3	53,058
North. Unsp. Shelf Rockfish	4.6	4,224	Shortspine Thornyhead	31.2	158,630
Thornyheads (Mixed)	4.5	27,074	Lingcod	30.4	62,996

Source: PacFIN vfcmrfd table. July 2008

Limited entry fixed-gear vessels target different species along the coast (Table 3-39). Historically, much of the sablefish had been caught off the coast of California. With the implementation of the LE fixed-gear sablefish tier program, however, much of the sablefish catch migrated north out of California and into Washington and Oregon (Figure 3-20). Inversely, species such as shortspine thornyhead became targeted more heavily off California in the years following the sablefish tier program. As shown in the table below, LE fixed-gear vessels off California tend to target a more diverse set of species, while vessels off Oregon and Washington tend to focus heavily on sablefish and, in Washington, spiny dogfish.

Table 3-39. Landings of select groundfish species in the LE fixed-gear sector by year and state (mt).

State	Species	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
CA	Blackgill Rockfish	111	66	85	18	18	9	44	71	8	23	35
	Lingcod	44	38	12	11	4	3	5	2	4	4	4
	Longspine Thornyhead	97	61	15	29	55	35	12	18	8	15	14
	Shortspine Thornyhead	67	37	46	94	49	43	100	153	128	137	144
	Sablefish	920	1,032	418	581	554	442	351	412	385	397	447
OR	Blackgill Rockfish	C	-	-	C	C	-	-	C	-	C	C
	Lingcod	22	50	27	29	15	17	10	8	9	10	13
	Longspine Thornyhead	C	C	C	C	C	1	C	C	C	C	-
	Shortspine Thornyhead	2	5	4	3	3	2	3	1	1	1	C
	Nor. Unsp. Slope Rockfish	-	-	-	-	18	11	10	6	6	5	6
	Sablefish	1,676	1,605	1,065	1,964	1,970	1,411	870	1,173	1,697	1,728	1,498
WA	Lingcod	C	5	1	13	8	10	5	4	6	9	10
	Longspine Thornyhead	C	1	C	C	C	-	C	C	C	-	-
	Shortspine Thornyhead	14	18	18	17	14	12	7	10	9	11	14
	Nor. Unsp. Slope Rockfish	-	-	-	-	62	25	50	26	52	74	70
	Spiny Dogfish	27	2	1	76	628	431	804	386	262	459	261
	Sablefish	554	750	562	721	658	632	501	840	903	1,045	968

Source: PacFIN vfcmrfd table. July 2008

Note: C indicates data are restricted due to confidentiality

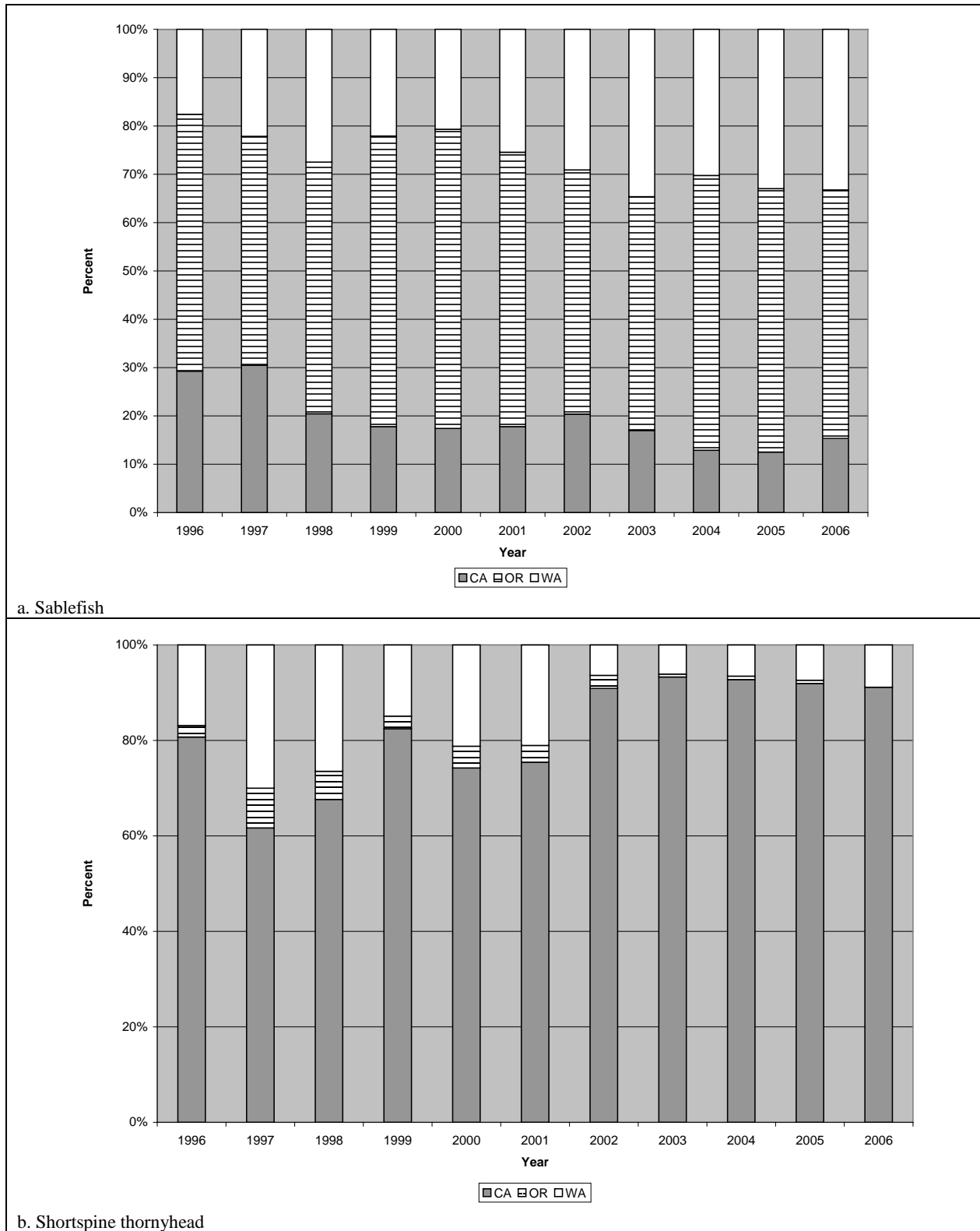


Figure 3-20. (a.) Sablefish and (b.) shortspine thornyhead landings by state, percent of total.

The number of vessels participating in the LE fixed-gear sector has generally declined, especially in recent years. Much of this decline can be attributed to the permit stacking provisions in the sablefish tier program that allow vessels to stack multiple sablefish endorsed fixed-gear permits on a single vessel.

This led to consolidation in the number of vessels participating in the fishery, but an increase in the revenue generated by the average vessel (Table 3-40).

Table 3-40. Groundfish LE fixed-gear landings (lb) and revenue (\$) per vessel, by gear group and year.

Gear Group	Year	No. of Vessels	Landed weight per vessel (lbs)	Ex-vessel revenue per vessel
Hook and Line	1996	225	43,194	62,853
	1997	212	46,608	87,998
	1998	186	36,694	43,280
	1999	187	42,171	63,322
	2000	181	39,775	69,170
	2001	154	38,101	68,108
	2002	139	38,839	58,776
	2003	141	38,223	76,074
	2004	130	44,292	84,786
	2005	121	53,264	105,263
	2006	126	44,761	103,139
Pot	2007	130	39,853	88,822
	1996	60	33,279	72,201
	1997	65	22,479	55,885
	1998	58	24,309	37,794
	1999	52	45,604	81,761
	2000	59	40,491	92,421
	2001	43	41,013	89,601
	2002	37	32,425	73,443
	2003	29	63,198	166,074
	2004	26	89,601	157,032
	2005	23	108,724	209,378
2006	24	96,673	219,506	
	2007	20	82,919	195,469

Source: PacFIN vfcmrfd table. July 2008

Limited entry fixed-gear vessels range in size from less than 25 feet in length to more than 90 feet in length. The most common size category is between 30 and 60 feet (Table 3-41).

Table 3-41. Limited entry fixed-gear vessels making deliveries by length category (percent), gear type, and year.

Gear type	Length range	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Hook and Line	< 31	4%	5%	6%	5%	5%	5%	3%	7%	5%	1%
31 to 40	36%		39%	39%	38%	37%	37%	37%	36%	37%	41%	37%	38%
41 to 50	35%		32%	37%	33%	34%	37%	34%	33%	34%	32%	38%	30%
51 to 60	16%		14%	11%	15%	19%	14%	18%	15%	17%	18%	11%	16%
61 to 70	6%		8%	7%	10%	5%	6%	6%	7%	6%	7%	9%	8%
71 to 80	2%		1%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%
81 to 90	0%		1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	2%
Pot	< 31	2%	0%	9%	8%	7%	6%	4%	13%	0%	0%	0%	0%
	31 to 40	33%	37%	25%	32%	41%	32%	19%	13%	28%	19%	21%	26%
	41 to 50	41%	33%	34%	32%	32%	35%	44%	35%	39%	50%	37%	37%
	51 to 60	14%	18%	20%	18%	15%	10%	19%	26%	11%	6%	21%	11%
	61 to 70	8%	8%	7%	11%	2%	13%	11%	4%	17%	13%	11%	16%
	71 to 80	2%	4%	2%	0%	0%	3%	4%	4%	0%	6%	5%	5%
	81 to 90	0%	0%	2%	0%	0%	0%	0%	4%	6%	6%	5%	5%
	> 90	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%

Source: PacFIN vfcmrfd table. July 2008

3.8.2 Open Access

Open access vessels can be categorized into two types: vessels without Federal LE permits that (a) actively target groundfish or (b) are engaged in nongroundfish activities, but catch groundfish incidentally. While not technically “open access” fisheries, Oregon and California nearshore rockfish fisheries are included in this section.

Table 3-42 illustrates the weight and ex-vessel revenue of open access groundfish caught by gear type and year. This information shows that the open access sector landed much more groundfish prior to the year 2000, and that much of this catch occurred onboard vessels using trawl gear. Open access vessels using trawl gear include California halibut and sea cucumber trawl. The catch of many other gear types has also declined, including groundfish caught by shrimp trawl vessels, troll vessels, and vessels using net gear. The decline in shrimp trawl groundfish catch can largely be attributed to the introduction of excluder devices, which reduce the unintended bycatch of groundfish in that fishery. The catch of groundfish in net gear fisheries was reduced in large part due to regulations off the state of California, which restricted gillnet operations in particular. Two gear types that still have relatively sizeable take of groundfish in the open access sector include hook-and-line and pot gears—the two gear types used by directed open access participants.

Table 3-42. Landed weight (mt) and ex-vessel revenue (\$) of open access groundfish landings by year and gear type.

		Hook and Line	Net	Pot	Troll	Trawl	Shrimp Trawl	Grand Total
1996	Landings (mt)	3,227.6	298.7	213.4	205.2	8,137.3	1,272.7	13,356.4
	Revenue (\$)	7,070,621	399,430	829,989	241,279	5,208,590	1,170,689	14,923,554
1997	Landings (mt)	3,253.8	274.6	157.1	448.1	7,089.2	478.4	11,701.4
	Revenue (\$)	7,660,022	353,084	732,851	494,458	4,775,819	492,575	14,509,117
1998	Landings (mt)	2,379.9	347.5	95.4	284.4	8,697.6	439.8	12,248.3
	Revenue (\$)	5,781,414	390,125	506,424	308,968	5,485,113	474,019	12,949,323
1999	Landings (mt)	1,554.9	101.6	80.5	84.0	7,719.0	457.2	9,997.5
	Revenue (\$)	5,479,393	163,323	442,295	118,239	5,029,896	504,516	11,739,060
2000	Landings (mt)	1,033.1	53.7	175.4	37.1	72.7	312.0	1,684.4
	Revenue (\$)	4,792,748	93,883	902,780	73,732	113,534	472,111	6,450,000
2001	Landings (mt)	1,085.6	62.2	163.2	28.3	168.1	195.3	1,702.7
	Revenue (\$)	4,936,922	111,447	803,523	52,042	190,214	298,672	6,393,303
2002	Landings (mt)	1,211.6	51.4	147.2	16.4	14.6	99.3	1,543.1
	Revenue (\$)	5,671,205	97,175	751,377	37,689	30,710	147,112	6,760,496
2003	Landings (mt)	1,272.8	61.5	226.7	16.1	6.8	14.1	1,598.7
	Revenue (\$)	5,264,571	113,848	1,001,541	34,665	11,443	40,470	6,474,754
2004	Landings (mt)	1,316.8	54.4	209.0	27.0	33.7	16.1	1,658.6
	Revenue (\$)	5,275,884	122,297	793,269	56,275	85,345	46,683	6,382,683
2005	Landings (mt)	1,480.4	44.5	438.3	25.5	72.3	15.9	2,079.3
	Revenue (\$)	6,845,249	83,099	1,588,790	59,256	50,540	59,639	8,692,616
2006	Landings (mt)	1,292.6	51.8	521.6	14.3	7.9	19.3	1,907.6
	Revenue (\$)	6,124,879	115,329	2,230,218	43,212	20,717	53,558	8,588,637
2007	Landings (mt)	974.3	41.2	268.7	19.3	54.8	24.2	1,383.1
	Revenue (\$)	5,567,788	99,159	1,069,820	76,002	68,336	44,831	6,934,527

Source: PacFIN vfcmrfd table. July 2008

The number of vessels landing open access groundfish has generally declined since the mid-1990s. For some gear groups, the decline has been fairly substantial, while the decline has been apparent for others, but less substantial. The number of shrimp trawl vessels, troll vessels, trawl vessels, and pot vessels has declined fairly substantially, while the number of hook-and-line and pot vessels has been noticeable, but to a lesser degree.

Table 3-43. Count of vessels making open access landings of groundfish by year and gear group.

	Hook and Line	Net	Pot	Troll	Trawl	Shrimp Trawl
1996	1,274	97	275	496	87	140
1997	1,327	104	291	495	71	135
1998	1,081	87	201	400	84	126
1999	1,010	104	169	358	92	118
2000	888	100	184	336	42	113
2001	778	78	160	288	43	91
2002	768	70	176	235	41	78
2003	720	57	154	225	26	34
2004	646	55	110	276	17	33
2005	642	46	158	254	16	31
2006	673	52	245	155	13	23
2007	644	57	180	151	19	13

Source: PacFIN vfcmrfd table. July 2008

Open access vessels that make a directed effort at groundfish widely use hook-and-line and pot gear (Table 3-44). In past years, vessels made directed efforts on many types of rockfish species, lingcod, and sablefish, among others. In more recent years, however, directed effort has been largely focused on nearshore rockfish species (the state managed nearshore fisheries) and sablefish (Figure 3-21).

Table 3-44. Weight (mt) of select groundfish species landed by open access vessels using hook-and-line or pot gear.

	Slope Rockfish	Nearshore Groundfish	Shelf Rockfish	Lingcod	Sablefish	Spiny Dogfish	Grenadiers
1996	221.6	848.8	927.9	308.6	637.6	54.8	241.8
1997	127.4	923.3	981.1	351.4	536.2	163.2	85.4
1998	128.5	853.1	1,011.1	111.6	164.7	0.2	16.7
1999	21.6	772.2	381.8	102.9	253.4	9.6	30.0
2000	20.3	557.9	88.4	46.4	428.4	3.1	41.7
2001	17.8	622.1	56.1	74.9	427.5	2.2	16.1
2002	45.4	701.6	20.5	99.7	423.0	8.4	35.1
2003	56.6	493.0	13.0	97.0	703.6	88.0	33.3
2004	33.0	545.3	24.0	108.7	570.2	172.6	50.3
2005	38.9	496.7	22.5	100.4	1,194.6	6.6	31.3
2006	36.3	438.8	32.3	102.9	1,053.6	119.8	7.3
2007	19.6	470.5	37.4	109.3	571.5	2.1	7.5

Source: PacFIN vfcmrfd table. July 2008

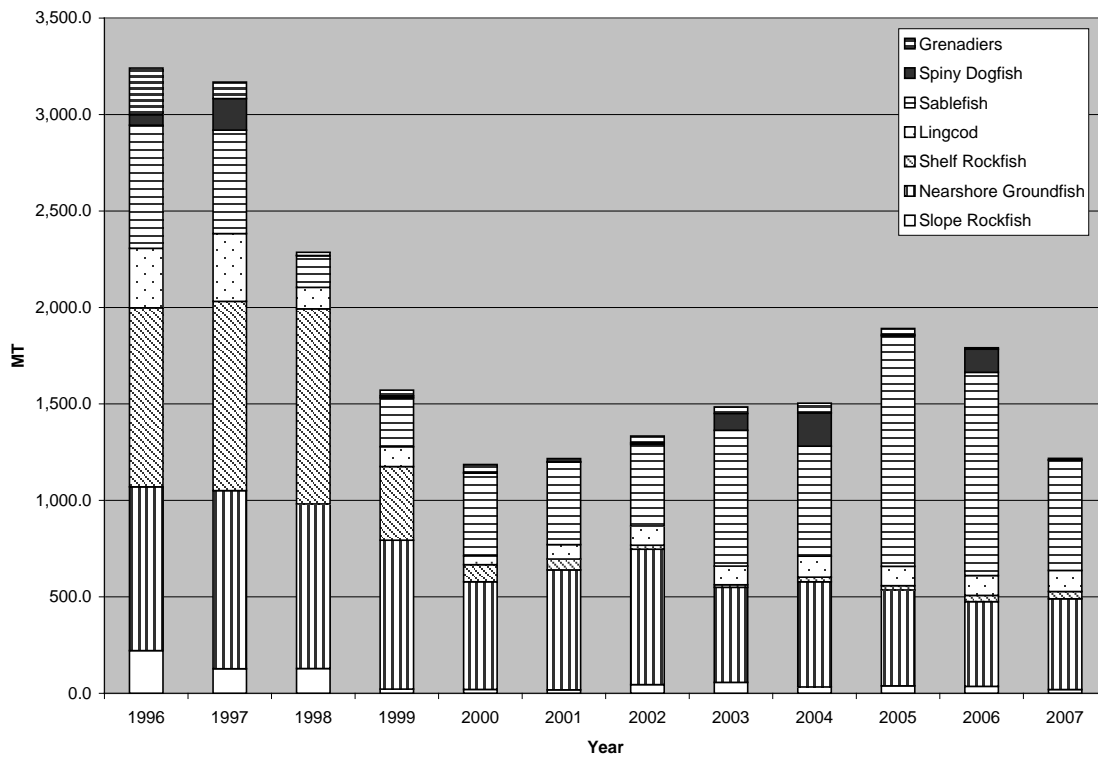


Figure 3-21. Weight (mt) of select groundfish species landed by open access vessels using hook-and-line or pot gear.

3.8.3 Nongroundfish Harvesters

Harvesters target many other types of species in addition to groundfish (Table 3-45). Other types of species include coastal pelagic species (CPS), crab, HMS, salmon, shellfish, shrimp, and other species that do not necessarily fall under these categories. Such other species include many groundfish-like species such as Pacific halibut, California halibut, croaker, and California sheephead. Of these nongroundfish groupings, crab is typically the largest grouping by value, while CPS are typically the largest group by volume.

Table 3-45. Landings (mt) and ex-vessel revenue (\$) of nongroundfish species groups, 1995-2007.

		Coastal Pelagic	Crab	Highly Migratory	Other	Salmon	Shellfish	Shrimp
1995	Landings	128,739	19,802	18,613	16,809	15,711	21,201	12,946
	Revenue	38,072,518	72,479,070	28,133,079	46,132,360	26,814,810	99,756,235	23,718,023
1996	Landings	136,617	27,421	29,052	15,768	9,946	45,740	15,571
	Revenue	43,409,706	83,639,398	45,863,486	42,297,793	18,310,425	213,499,470	25,369,113
1997	Landings	151,482	15,986	25,905	14,582	13,828	50,722	19,430
	Revenue	44,768,437	67,299,467	40,793,457	42,126,056	24,145,280	252,829,260	24,270,038
1998	Landings	74,819	15,012	28,603	10,696	8,890	45,418	6,282
	Revenue	10,194,529	59,513,944	39,990,490	28,316,943	16,146,278	232,675,766	15,079,765
1999	Landings	171,140	18,918	16,865	11,452	5,932	19,769	14,868
	Revenue	43,243,651	82,638,200	33,107,613	34,009,381	14,922,845	107,600,680	21,317,512
2000	Landings	226,076	16,922	13,549	11,829	9,785	58,797	16,756
	Revenue	42,246,749	78,665,557	32,981,595	36,037,729	25,010,479	286,033,739	21,850,511
2001	Landings	196,198	15,501	13,943	10,949	17,022	59,476	19,051
	Revenue	32,750,464	68,785,464	31,426,641	31,311,277	24,422,398	303,660,136	17,903,743
2002	Landings	183,394	20,007	12,279	11,663	20,476	51,526	26,696
	Revenue	33,258,508	76,128,768	22,206,223	31,663,828	28,334,342	271,367,784	22,510,006
2003	Landings	125,851	37,793	19,277	9,719	19,014	62,371	14,985
	Revenue	35,731,546	133,659,223	33,927,174	27,662,492	33,054,083	334,892,527	12,612,881
2004	Landings	143,752	31,996	16,288	9,895	19,151	70,937	10,168
	Revenue	32,649,834	117,846,638	33,420,587	30,075,672	49,769,111	418,049,305	12,374,831
2005	Landings	158,239	28,484	10,419	9,745	12,207	82,436	11,855
	Revenue	43,468,320	98,475,750	24,010,310	29,388,293	38,139,748	479,187,288	15,756,906
2006	Landings	160,172	38,834	13,418	9,031	13,583	144,103	9,249
	Revenue	40,807,666	144,293,399	27,327,312	31,101,599	35,750,966	878,194,904	12,497,733
2007	Landings	195,423	24,200	12,297	9,862	10,916	65,870	12,097
	Revenue	45,290,724	124,887,804	25,449,549	30,898,623	34,838,544	437,020,959	17,380,309

Source: PacFIN fil table. July 2008

Brief descriptions of west coast nongroundfish fisheries follow. Table 3-46 shows recent participation, landings, and ex-vessel revenue information for these fisheries. Figure 3-22 shows the landing information graphically. CPS landings are not shown in the figure because the amounts are so much larger compared to the other fisheries. Shrimp trawl and Dungeness crab pot vessels may also participate in the groundfish LE trawl fishery. Salmon and albacore troll, and coastal pelagic purse seine vessels are not configured so that they could participate in the trawl fishery. However, vessel owners and captain crew in the groundfish LE trawl fishery may participate in the other fisheries from time to time.

Shrimp Trawl Harvesters: Shrimp trawlers target Pacific pink shrimp, ridgeback prawn, and spot prawns with shrimp trawl gear, and many also participate in the west coast groundfish LE trawl fishery. These fisheries are principally managed by the three west coast states; state LE programs limit participation, although many licenses are unused or latent. Although the fishery expanded in the 1970s and 1980s, participation in the shrimp trawl fishery has declined since 1996, especially during the years following the 2004 trawl vessel buyback. The decline in participation is reflected post-2004 landings and revenues. Revenues appear to have rebounded recently, likely due in part to the Pacific pink shrimp

fishery certification as sustainable by the Marine Stewardship Council, and higher prices that may be fetched as a result. Pink shrimp currently makes up the bulk of the shrimp trawl catch and effort because spot prawn trawling, once much more common, is now heavily restricted across the west coast. Most spot prawns are caught incidentally when targeting shrimp. This fishery generally occurs during the late spring and summer months.

Regulations are in place to restrict mesh size, count per pound, and incidental harvest of other species. The 2000 declaration that canary rockfish was overfished led to the states' commitment to reduce their incidental take in these fisheries. In response, finfish excluders are now required on shrimp nets, limiting catches of overfished rockfish. Initially, their use was voluntary to encourage fishermen to experiment with the different types and designs, make modifications, and advise managers on appropriate regulations. Through this program, finfish excluders were made mandatory mid-season in 2001 and 2002 and permanent beginning in 2003. Before their use, rockfish and other species represented approximately 5 percent of the total value of the shrimp fishery, but finfish landings (including canary rockfish) now comprise less than 0.01 percent of the total value (Washington Department of Fish and Wildlife 2008).

Dungeness Crab Pot Harvesters: The Dungeness crab fishery is subject to a LE system, and vessels may range from a small wooden troller with its two-man crew to large steel combination vessels with a four-man crew capable of fishing around the clock for extended periods of time (Oregon Dungeness Crab Commission 2008). Many groundfish LE trawl harvesters also participate in the Dungeness crab fishery. The bulk of the Dungeness crab fishery takes place in December and January. Participation in the crab fishery has been relatively stable over time. Between 1996 and 2007, approximately 1,200 to 1,500 nontribal vessels have landed crab using pot gear along the west coast. Revenues have fluctuated fairly substantially. From 1996 to 2002, revenues fluctuated between approximately \$78 million and \$51 million, but the fishery has generated substantially more since 2002 with 2005 being the only year the fishery generated less than \$100 million in ex-vessel revenue.

Salmon Troll Harvesters: Salmon are caught by nontribal harvesters using troll gear along the west coast. The most frequently harvested salmon are Chinook and coho. The number of participants in the salmon troll fishery has declined since the 1970s. In the 70s and 80s, for example, more than 3,000 vessels reported deliveries of salmon with troll gear off Oregon alone. That number has dwindled to less than 1,000; since 1991, frequently less than 500 vessels participate in a given year. Much of the decline in participation has been due to a decline in the abundance of west coast salmon stocks. The states of Washington, Oregon, and California have effort controls in place to restrict the number of vessels participating in the fishery. Each state has a different set of regulations in place for restricting effort, with Oregon and California being fairly similar.

Albacore Troll Harvesters: Albacore are targeted by troll vessels along the west coast during the summer and early fall months. Albacore landings are made by U.S. trollers originating along the three coastal states and also by trollers from British Columbia who fish albacore in U.S. waters pursuant to international agreements. The revenue attributed to albacore trolling activity has grown in recent years with revenues exceeding \$20 million annually since 2003. Throughout the late 1990s, revenues were somewhat lower and varied between \$10 million and \$19 million depending on the year. The number of vessels in the fishery has varied over time, though, with the exception of 1997, participation has been less than 900 vessels since 1995.

Coastal Pelagic Purse Seine Harvesters target species such as sardines with purse seine gear off the coasts of Washington, Oregon, and California. Traditionally, these fisheries occurred off central and southern California. In recent years, a fishery has developed off the mouth of the Columbia River during the summer and early fall. The volume of landings is much greater than other species, but sardines have a comparatively low price per pound. Nonetheless, only Dungeness crab, the highest value fishery, consistently exceeds the sardine fishery in terms of ex-vessel revenue.

Table 3-46. Participation, landings (mt), and revenue (\$) in west coast nongroundfish fisheries, 1995 or 1996 to 2007: (a) shrimp and prawn species from vessels using shrimp trawl gear, (b) crab species by vessels using pot gear, (c) salmon by vessels using troll gear, (d) HMS by vessels using troll gear, (e) CPS by vessels using purse seine.

	No. of Vessels	Landed weight (mt)	Exvessel revenue (\$)
1996	277	13,900	20,312,622
1997	265	17,681	18,772,053
1998	229	4,829	10,109,025
1999	219	13,110	17,164,377
2000	209	15,463	17,667,630
2001	171	17,762	13,644,064
2002	174	25,641	18,663,500
2003	112	14,111	8,588,404
2004	88	9,004	7,829,722
2005	85	10,890	10,531,508
2006	71	8,474	6,921,427
2007	75	11,064	11,784,014

a. Shrimp and prawn

	No. of Vessels	Landed weight (mt)	Exvessel revenue (\$)
1995	1,725	3,994	15,111,176
1996	1,507	2,779	9,067,121
1997	1,301	3,139	9,925,972
1998	1,086	1,510	5,473,374
1999	1,032	2,166	9,173,930
2000	1,153	3,084	13,510,446
2001	1,136	2,582	9,908,692
2002	1,183	4,138	13,742,176
2003	1,113	4,963	20,378,519
2004	1,297	4,411	29,173,552
2005	1,232	3,408	22,723,664
2006	891	799	8,977,506
2007	1,034	1,034	11,496,952

c. Salmon troll

	No. of Vessels	Landed weight (mt)	Exvessel revenue (\$)
1995	373	127,817	37,765,617
1996	396	135,940	42,472,965
1997	397	148,938	42,384,886
1998	281	73,166	9,930,619
1999	318	170,001	42,951,788
2000	339	225,228	42,042,196
2001	284	195,367	32,188,806
2002	273	183,319	32,601,312
2003	248	125,685	35,223,664
2004	227	143,478	32,570,164
2005	205	158,097	43,423,938
2006	206	159,932	40,737,352
2007	168	195,331	45,211,912

e. CPS purse seine

Source for all tables: PacFIN fil table. July 2008

	No. of Vessels	Landed weight (mt)	Exvessel revenue (\$)
1996	1,515	25,676	77,792,466
1997	1,486	13,984	57,933,282
1998	1,501	13,082	51,165,124
1999	1,469	16,992	72,757,968
2000	1,460	14,717	68,261,323
2001	1,352	13,097	57,969,328
2002	1,432	17,312	64,688,873
2003	1,417	35,234	122,815,510
2004	1,368	28,935	104,200,392
2005	1,251	24,289	81,878,930
2006	1,223	36,042	132,548,794
2007	1,266	20,501	104,015,143

b. Dungeness crab

	No. of Vessels	Landed weight (mt)	Exvessel revenue (\$)
1995	479	5,986	10,534,691
1996	689	9,887	18,177,773
1997	1,148	10,641	18,784,648
1998	784	12,410	16,875,124
1999	693	5,335	9,669,277
2000	683	8,094	15,273,095
2001	896	10,045	18,666,901
2002	638	7,799	11,210,676
2003	811	15,540	22,859,098
2004	728	13,757	26,085,393
2005	569	8,761	20,270,534
2006	615	12,623	23,475,441
2007	627	11,164	20,859,448

d. Highly migratory species

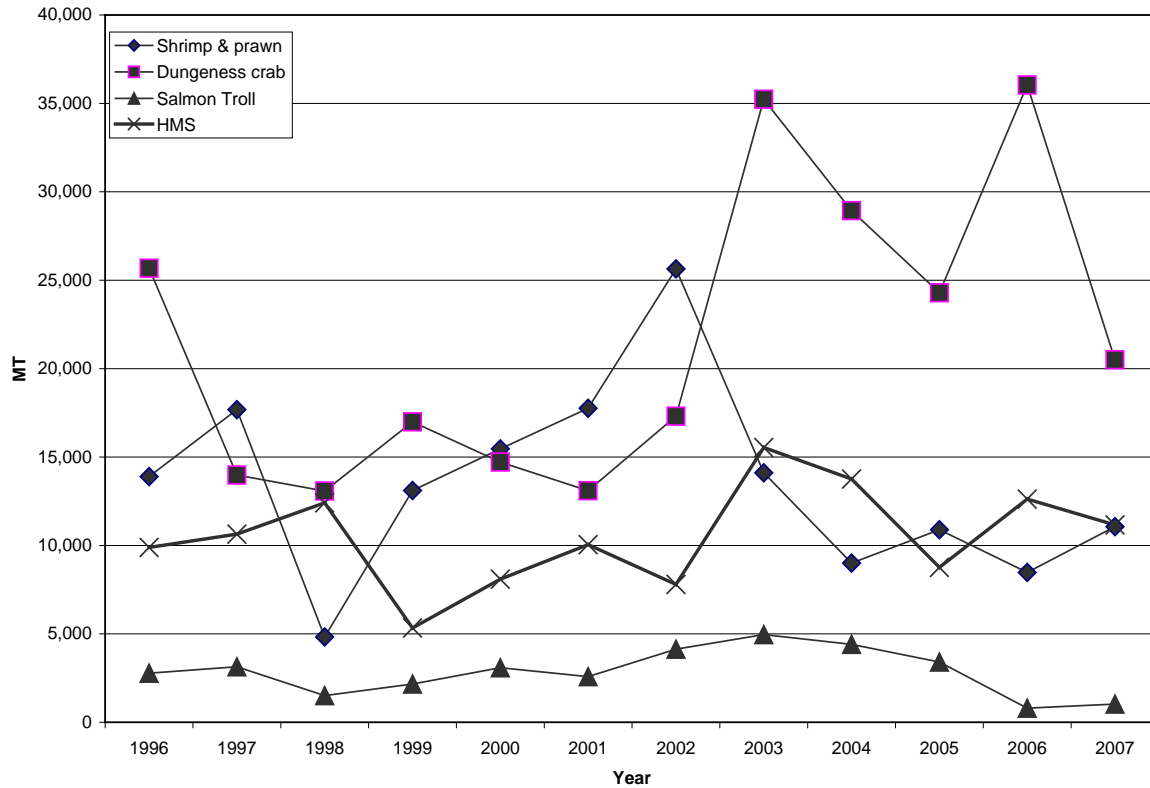


Figure 3-22. Landings (mt) in nongroundfish fisheries, 1996-2007.

3.9 Shoreside Processors of Trawl Groundfish

West coast harvesters are supported by businesses that process and distribute finfish and shellfish products. Some smaller firms are involved with a single species or species group, but most of the industry is diversified. Several of the larger processing companies have multiple plants and/or buying stations. In addition, just as with harvesters, anecdotal evidence, such as company websites, suggests that businesses that process west coast harvests are also involved in Alaska and foreign fisheries as well.⁶⁶

Trawl rationalization will affect the operations of west coast shoreside processing enterprises. This section provides an overview profile of existing shoreside processing companies. The discussion below addresses whiting and nonwhiting processors separately.

3.9.1 Whiting

In 2008, catcher vessels in the whiting shore-based sector primary season whiting landed whiting at 16 Pacific whiting first receivers (see Table 3-48) located in ports in all three states. Between 8 and 16 of these received whiting in any one year from 1997 to 2008.

⁶⁶ See, for example, <http://www.pacseafood.com/default.aspx?page=30> and <http://www.tridentseafoods.com/>.

Table 3-47. Pacific Whiting in the Shore-based Sector 1997-2008.

Year	Number of First Receivers	Number of Catcher Vessels	Average Annual Ex-Vessel Price per Pound ¹ (\$)	Total Catch of Pacific Whiting (mt)
1997	12	41	0.042	87,499
1998	12	36	0.021	87,627
1999	14	39	0.036	83,388
2000	14	36	0.040	85,653
2001	13	29	0.036	73,326
2002	8	30	0.045	45,276
2003	9	33	0.045	51,061
2004	9	26	0.035	89,251
2005	10	29	0.052	97,378
2006	14	37	0.062	97,296
2007	14	39	0.070	87,398
2008	16	37	0.102	50,423

Table 3-48. Whiting processing plant locations in 2008.

City	Buyer or Processing Plant Owner
Astoria/Warrenton	Bay Fresh Seafoods
	Bornstein Seafoods Of Oregon
	Da Yang Seafoods Inc
	Delmar Seafoods
Charleston / Coos Bay	Bandon Pacific Inc
	Hallmark Fisheries
	Oregon Brand Seafood Llc
	Pacific Choice Seafood Company
Ilwaco	Jessies Ilwaco Fish Co Inc
Newport	Ocean Beauty Seafoods Inc
	Pacific Shrimp Company
	Trident Seafoods Corp
San Francisco	W F Alber, Inc
Watsonville	Bay Fresh Seafoods
	Del Mar Seafoods Inc
Westport	Ocean Gold Seafoods Inc

Table 3-49 provides details on the quantities (in metric tons [mt] and raw product costs [RPC]) for each year, including totals for all buyers and averages (and cost) received by a buyer in the year. Raw product costs are in nominal form; they have not been adjusted for inflation. An average of 95,901 mt per year of whiting was received from harvesters. The RPC was \$13.7 million in 2006, the highest of any year to that point.

Table 3-49. Shoreside whiting receiving characteristics,

	2004	2005	2006	2004-06
Total Received (mt)	92,879.2	97,557.9	97,266.1	95,901.1
Buyers	7	8	11	13
Average Per Buyer (mt)	13,268.5	12,194.7	8,842.4	11,065.5
Raw Product Cost (RPC)	\$7,522,999	\$11,350,167	\$13,718,807	N/A
Average RPC per Buyer	\$1,074,714	\$1,418,771	\$1,247,164	N/A

N/A = Not applicable

The companies that receive whiting vary widely in terms of the volume received. Table 3-50 indicates the quantity of whiting received by buyers. Five firms received more than 10,000 mt each during the period, including three with more than 30,000 mt. At the other end of the scale, 4 of the 13 firms received less than 1,000 mt during the period.

Table 3-50. Counts of companies by total mt of whiting received.

MT Range	2004-06
>0 and <=100	2
>100 and <=200	0
>200 and <=1,000	2
>1,000 and <=5,000	4
>5,000 and <=10,000	0
>10,000 and <=20,000	1
>20,000 and <=30,000	1
>30,000	3

Considering the 26 companies that received whiting during 1994 through 2006, the share of historic receipts that is accounted for by currently active companies is noteworthy. The historic period (1994 to 2003) corresponds with the participation period in the analytical scenarios used in Chapter 4. The count of companies and relative share of historic receipts are shown in Table 3-51; these are presented in terms of the number of years active. For example, within the column headed “Any (>0 mt),” the first row indicates that 13 companies (of 26) had no recent participation, and collectively they represent 13.0 percent of past historic receipts. The column further indicates that five had one year of participation, three had two years, and five had three years. Each column sums to 26 in order to account for all receivers of whiting.

Table 3-51. Count of companies and percentage of 1994-2003 history (mt) by number of years of activity during 2004-06.

No Years	Any (>0 mt)		>1 mt		>100 mt		>1,000 mt		>5,000 mt	
	No. companies	% history	No. companies	% history	No. companies	% history	No. companies	% history	No. companies	% history
0	13	13.00%	13	13.00%	15	25.80%	17	25.80%	22	30.30%
1	5	<0.1%	5	<0.1%	5	<0.1%	3	<0.1%	0	0.00%
2	3	12.80%	3	12.80%	1	0.00%	1	0.00%	0	0.00%
3	5	74.20%	5	74.20%	5	74.20%	5	74.20%	4	69.70%

Shoreside whiting receivers are characterized by several firms with long participation in the industry, along with some recent entrants. This is demonstrated in Table 3-52, which shows the first and last years of participation for companies that received whiting from vessels in the directed fishery. The table indicates that nine companies started participation in 1994 or prior, and that five of those nine also had whiting receipts in 2006 (i.e., remain in the fishery). The column for 2006 also shows four firms entered in each year from 2003 through 2006.

Table 3-52. Entry and exit years for companies receiving whiting from targeted whiting trips.

First Year of Participation	Last Year of Participation			TOTAL
	2004	2005	2006	
1994*	0	0	5	9
1995	0	0	1	1
1996	0	0	0	1
1997	0	0	1	2
1998	0	0	0	1
1999	0	0	0	2
2000	0	0	0	1
2001	0	0	0	1
2002	0	0	0	0
2003	0	0	1	3
2004	0	0	1	1
2005		2	1	3
2006			1	1
Total	0	2	11	26

*May have also received whiting prior to 1994.

Whiting is processed in processing plants within each state. Since whiting requires specialized equipment, most of the facilities process whiting only and are not also used for nonwhiting. The plant locations and plant owners are presented in Table 3-53. Several companies listed in Table 3-48 operate more than one processing plant, and the plant listed in Table 3-53 may have a different name than its parent company.

3.9.2 Nonwhiting

From 2004 to 2006, trawl harvesters delivered nonwhiting from targeted trips to 63 shoreside processing companies (Table 3-53) located in all three states. Thirty-six to forty-six of these companies received nonwhiting in any one year from 2004 to 2006. This contrasts with the total of 208 companies that received nonwhiting from 1994 to 2006. The geographic distribution of the companies that received whiting indicates that they operate in each of the three states, with 38 in California, 20 in Oregon, and 10 in Washington. Included in these totals are four companies that received nonwhiting in more than one state; these are displayed in Table 3-54.

Table 3-53. Shoreside companies that received nonwhiting, 2004-06.

Anchor Bay Inc	Fitz	Ocean Gold Seafoods Inc
Arrowhac Fisheries Inc	Fti Produce	Olde Port Fisheries Inc
Bay Fresh Seafoods	Genochio, Thomas	Oregon Gourmet Crab
Bay Ocean Seafood	Giovannis	Oregon Ocean Seafoods
Bayshores Fish Co	Goudeau, Helen M	P & T Flannery Seafoods Inc
Bornstein Seafoods	Greendale Fish Company	Pacific Seafood Group
Boundary Fish Co Inc	Gruhlkey, Milton	Pemberton Fish
Caito Fisheries Inc	High Tide Seafoods	Pennisi, Giuseppe
California Shellfish Co	J M J International Inc	Pham, Sang
Cape Flattery Fishermens Coop	Jessies Ilwaco Fish Co Inc	Princeton Seafood Co
Carvalho Fisheries	K Lyn Fisheries	Royal Seafoods
Caught In Oregon	Ken S Sio Inc	Sea Harvest
Central Coast Seafood Inc	Local Ocean Seafoods Inc	Sea K Fish Co Inc
Chetco Seafood Co	Lucys Fresh Seafood	Solomon
Chucks	Miller, Ken	Stagnaro Bros
Codys Sea To You Seafoods	Monterey Fish Company Inc	Starvin Marvin's
Del Mar Seafoods	Morgan Fish	The Tides
Diamond Meats	Morning Star Fisheries	Three Captains Sea Products
Diller	Next Seafood Co Inc	Tognazzinis Dockside Restaurant
Exclusive Freshness	North Coast	W F Alber
Fishhawk Fisheries	Ocean Fresh Seafood Products, Jv	Waldport Seafood Company Llc

Table 3-54. Shoreside nonwhiting receiving companies operating in multiple states, 2004-06.

	California	Oregon	Washington
Bornstein Seafoods		X	X
California Shellfish Co	X	X	
North Coast	X	X	
Pacific Seafood Group	X	X	X

Table 3-55 provides details on the quantities (mt) and RPC for each year, including the total for all buyers and averages (and cost) received by a buyer in the year. Raw product costs are in nominal form; they have not been adjusted for inflation. An average of 18,807 mt per year of nonwhiting was received from harvesters. The RPC was \$23.7 million in 2006, higher than the two previous years, but less than half (in nominal, unadjusted dollars) than the value during the mid-1990s. The average RPC per buyer was \$658,653 in 2006.

Table 3-55. Shoreside nonwhiting receiving characteristics, 2004-06.

	2004	2005	2006	2004-06
Total Received (mt)	20,015.7	18,859.8	17,544.8	18,806.8
Buyers	46	44	36	63
Average Per Buyer (mt)	435.1	428.6	487.4	447.8
Raw Product Cost	\$22,563,138	\$22,275,975	\$23,711,514	N/A
Average RPC per Buyer	\$490,503	\$506,272	\$658,653	N/A

N/A = Not applicable

The companies that receive nonwhiting vary widely in terms of the volume received. Table 3-56 indicates the quantity of nonwhiting received by buyers. Nearly 70 percent, or 44 companies, received fewer than 50 mt during the three-year period. A large proportion of these companies receives but does not process nonwhiting; they include restaurants, wholesalers and retailers, or distributors. Of the

remaining 19 companies that received more than 50 mt, only seven received more than 1,000 mt. One received more than 5,000 mt, and one received more than 20,000 mt.

Considering the 208 companies that have received nonwhiting during 1994 through 2006, it is noteworthy to address the share of historic receipts that are accounted for by the currently active companies. The historic period (1994 to 2003) corresponds with the participation period in the scenarios. The count of companies and relative share of historic receipts are shown in Table 3-57; these are presented in terms of the number of years active. For example, within the columns headed “Any (>0 mt),” the first row indicates that 145 companies (of 208) had no recent participation. Collectively, these companies represent 20.0 percent of past historic receipts. The column further indicates that 24 had one year of participation, 15 had two years, and 24 had three years. Each column sums to 208 to account for all receivers of whiting.

Table 3-56. Counts of companies by total of nonwhiting received (mt), 2004-06.

MT Range	2004-06
>0 and <=50	44
>50 and <=100	2
>100 and <=200	6
>200 and <=1,000	4
>1,000 and <=5,000	5
>5,000 and <=10,000	1
>10,000 and <=20,000	0
>20,000	1

Table 3-57. Count of companies and percentage of 1994-2003 history (mt) by number of years of activity during the period, 2004-06.

Number of Years	Any (>0 MT)		>1 MT		>100 MT		>200 MT	
	No. companies	% history	No. companies	% history	No. companies	% history	No. companies	% history
0	145	20.00%	167	20.10%	197	25.70%	199	27.80%
1	24	2.60%	14	2.60%	2	1.50%	2	1.50%
2	15	1.90%	9	1.90%	2	2.10%	0	0.00%
3	24	75.50%	18	75.40%	7	70.70%	7	70.70%
Number of Years	>300 MT		>500 MT		>1,000 MT		>5,000 MT	
	No. companies	% history	No. companies	% history	No. companies	% history	No. companies	% history
0	201	29.30%	201	29.30%	203	31.10%	207	57.30%
1	0	0.00%	1	0.60%	1	3.70%	0	0.00%
2	2	5.00%	2	5.00%	0	0.00%	0	0.00%
3	5	65.70%	4	65.10%	4	65.10%	1	42.70%

Shoreside nonwhiting receivers are characterized by several firms with long participation in the industry and many companies with just one or two years of participation since 1994. This is demonstrated in Table 3-58, which shows the first and last years of participation for companies that received nonwhiting from vessels in the directed fishery. The table indicates that nine companies started participation in 1994 or earlier, and five of those nine companies also had whiting receipts in 2006 (i.e., remain in the fishery). The column for 2006 also shows that four firms entered each year from 2003 through 2006.

Table 3-58. Entry and exit years for companies receiving nonwhiting from targeted nonwhiting trips.

First Year of Participation	Last Year of Participation			Total
	2004	2005	2006	
1994*	2	3	19	80
1995	1	2	3	15
1996	1	0	0	15
1997	0	1	0	17
1998	0	0	2	15
1999	0	2	0	9
2000	0	1	1	12
2001	0	1	2	9
2002	1	0	2	16
2003	0	0	1	2
2004	7	1	2	10
2005		4	3	7
2006			1	1
Total	12	15	36	208

*May have also received nonwhiting prior to 1994.

Nonwhiting is processed in processing plants within each state. The plant locations and plant owners are presented in Table 3-59.

Table 3-59. Nonwhiting processing plant locations in 2008. Note: Those processing companies in shaded cells have not been verified to be processing plants.

City	Processing Company
Astoria/Warrenton	Bornstein Seafoods Of Oregon
	Pacific Coast Seafoods Company
Atascadero	Central Coast Seafood
Bellingham	Arrowhac Fisheries Inc
	Bornstein Seafoods Inc
Bodega Bay	The Tides
Charleston / Coos Bay	Bandon Pacificinc
	Hallmark Fisheries
	Oregon Brand Seafood Llc
	K Lyn Fisheries
	Starvin Marvin's Seafood
Crescent City	Carvalho Fisheries Inc
El Granada	Pemberton Fish
Eureka	Pacific Choice Seafood Company
Fort Bragg	Caito Fisheries Inc
Half Moon Bay	Fitz
	Morning Star Fisheries
	Three Captains Sea Products
Hawaiian Gardens	M A Seafood
Monterey	Royal Seafoods Inc
Newport	Pacific Shrimp Company
Port Angeles	High Tide Seafoods
	Bugatto Ent Inc
San Francisco	Next Seafood Co Inc
	Morgan Fish
	Pacific Fresh Sea Food Company
	W F Alber, Inc
	West Bay Seafood Company Inc
Santa Rosa	North Coast Fisheries Inc
Watsonville	Del Mar Seafoods Inc
Westport	Ocean Gold Seafoods Inc

3.9.3 West Coast Processing Centers and Product Flow

Data on where landings of nonwhiting groundfish were processed from 2004 to 2007 was compiled to illustrate the spatial relationships between processing centers and buying locations. Table 3-60 shows the cities where processing occurred, the ports where the fish came from, the distance in road miles between the port of origin and processing city (determined using Google Earth), and the percent of coastwide landings processed in that city. A processing city can also be a port of origin for that city, meaning the fish was processed locally. In such cases, the road distance is zero. There are a few major processing centers on the west coast. Only seven cities processed more than 1 percent of coastwide landings, and the largest processing center, Astoria, Oregon, accounted for more than two-thirds of processing activity by weight of landed fish.⁶⁷ The other processing cities above 1 percent are Newport (15 percent), Eureka (15 percent), Bellingham (12 percent), Coos Bay (9 percent), Fort Bragg (7 percent), and Watsonville (2 percent). These seven processing centers accounted for 96 percent of the coastwide total. These ports also tend to import fish from a larger number of ports.

Table 3-61 shows the characteristics of processing centers and related ports. The ports are shown in geographic order, from north to south along the coast. Horizontal lines in the table indicate the three state boundaries. For confidentiality reasons, the numerical value of volumes of processed fish are not given; instead, these data are classified in quartile categories labeled none, low, medium, and high. Fish is either locally processed, meaning that the port of landing and processing location are the same city; “imported,” meaning the fish is trucked in from other ports; or “exported,” meaning the fish is sent from that port to another location. Ports with no local nonwhiting groundfish processing, such as Blaine, Washington, or Crescent City, California, show no local processing or imports of fish. Processing cities away from the coast, such as Watsonville or Santa Rosa, California, show only imported fish, since they receive fish from coastal ports and, not being a landing site, do not export fish.

Befitting its number one rank, Astoria has the second-highest number of local processors of nonwhiting groundfish (Coos Bay has six) and receiving ports. It processes a high volume of locally landed fish and also imports a high volume, but exports fish. The high volume of imported fish suggests that local processors are trying to optimize plant capacity, which would seem to exceed (at least periodically) the capacity of local nonwhiting landings. Plant capacity may be structured for variable whiting landings and shifted to processing other fish during off-peak periods. It also indicates Astoria’s importance as a regional processing center. The other top-ranked processing centers also show high volumes of locally processed and imported fish, but also export fish to other locations.

Figure 3-23 through Figure 3-26 visually represent the processing networks. The road routes (derived from Google Earth) are classified in quartiles by the volume of fish trucked over those distances.⁶⁸ Pie charts indicate the proportion of locally processed, imported, and exported fish for each processing city.

Figure 3-23 shows the regional dominance of Astoria in northern Oregon and Washington’s Olympic Peninsula. Nearby Ilwaco/Chinook could be considered part of a regional agglomeration that can draw on sources of supply using the Columbia River estuary and a common labor pool. Bellingham is a regional center for the eastern shore of Puget Sound.

⁶⁷ The Astoria figures also include those for the adjacent town of Warrenton. In a few other cases, some processing in adjacent or nearby cities has not been aggregated, which is an oversight. For example, South Beach is adjacent to Newport, so its volume should be added to that of Newport, and Harbor is adjacent to Brookings.

⁶⁸ Routes between each port and processing city are separately mapped. Because many of these routes overlap, and due to the way the line segments are mapped, in some cases, narrower lines (lower volume routes) may be hidden behind heavier lines (higher volume routes).

As seen in Figure 3-24, Newport is an important processing center on the central Oregon coast. Local landings account for more than half its total processing; it also imports and exports smaller volumes. Newport, South Beach, and Waldport could be considered part of a regional agglomeration. Waldport imports its small volume of fish from Newport. South Beach, adjacent to Newport, imports fish from Florence. Newport exports 12 percent of its landings to Coos Bay, while close to half of the fish landed in Coos Bay is exported to Newport, suggesting a further link between these two processing cities. Coos Bay also exports a very small proportion of its landings to Santa Rosa, approximately 436 road miles away. After Newport, the next-highest volume of Coos Bay imports come from Brookings; no fish is imported from California.

Eureka is a regional center for northern California; imports account for slightly less than half of the fish processed there and are derived from five other locations: Brookings and Crescent City on the Oregon/California border to as far south as San Francisco (although the volume is small). Fort Bragg imports about a third of the fish processed there from Eureka and much smaller amounts of fish from the central California ports of San Francisco and Half Moon Bay. In fact, one-fifth of the fish landed in Eureka is exported to Fort Bragg.

As seen in Figure 3-25 and Figure 3-26, there are many more processing locations south of Fort Bragg, but the amounts of nonwhiting groundfish processed in these cities is generally small. In this region, only the inland city of Watsonville falls within the top seven processing locations listed above. Santa Rosa and San Francisco are important regional processing centers, but they handle much smaller volumes of nonwhiting groundfish. The number, dispersed locations, and small volumes handled in processing locations in central California suggest that groundfish represents a small proportion of the overall activity of these processors. All the processing locations south of San Francisco, including Watsonville, account for a little less than 4 percent of the coastwide total.

Table 3-60. Relationship between processing cities and ports.

Processing City	Port	Distance
Aberdeen	Westport	21
	Aberdeen	78
Astoria	Astoria	0
	Neah Bay	234
	Port Angeles	239
	Tillamook/Garibaldi	66
	Westport	86
Atascadero	Morro Bay	17
Avila	Avila	0
Bellingham Bay	Bellingham Bay	0
	Blaine	21
Bodega Bay	Bodega Bay	0
	Crescent City	224
Charleston (Coos Bay)	Brookings	104
	Charleston (Coos Bay)	0
	Newport	105
	Winchester Bay	28
El Granada	Marshall	4
	Princeton / Half Moon Bay	71
	Rodeo	50
	Vallejo	60

Processing City	Port	Distance
Eureka	Bodega Bay	239
	Brookings	112
	Crescent City	85
	Eureka	0
	Fort Bragg	134
	San Francisco	272
Fort Bragg	Eureka	134
	Fort Bragg	0
	Princeton / Half Moon Bay	199
	San Francisco	172
Harbor	Brookings	3
Hawaiian Gardens	Avila	216
	Moss Landing	412
	Princeton / Half Moon Bay	359
Ilwaco/Chinook	Ilwaco/Chinook	0
Los Osos	Avila	5
Monterey	Monterey	0
	San Francisco	118
Morro Bay	Morro Bay	0
	Moss Landing	143
Moss Landing	Monterey	18
	Moss Landing	0
	Santa Cruz	25
Newport	Charleston (Coos Bay)	99
	Newport	0
	Tillamook/Garibaldi	68
Nipomo	Avila	27
Oxnard	Moss Landing	286
	San Francisco	391
Princeton / Half Moon Bay	Princeton / Half Moon Bay	0
Sacramento	San Francisco	88
San Francisco	Bodega Bay	70
	Crescent City	357
	Dillon Beach	59
	Morro Bay	232
	San Francisco	0
San Jose	Moss Landing	59
	Santa Cruz	34
San Leandro	Moss Landing	34
	Princeton / Half Moon Bay	92
Sand City	Moss Landing	15
Santa Barbara	Santa Barbara	0
Santa Cruz	Santa Cruz	0
Santa Rosa	Brookings	328
	Charleston (Coos Bay)	436
	Moss Landing	158
Scotts Valley	Princeton / Half Moon Bay	54
	Santa Cruz	7
South Beach	Florence	47
Tillamook/Garibaldi	Tillamook/Garibaldi	0
Waldport	Newport	17
Watsonville	Avila	157
	Morro Bay	147
	Moss Landing	9
	San Francisco	91

Table 3-61. Characteristics of processing centers and ports.

Processing City	No. of Processors	No. of Receiving Ports*	No. Processing Cities Exported to	Local Processing	Imported Fish	Exported Fish
Blaine	0	0	1	None	None	High
Bellingham Bay	3	2	0	High	High	None
Neah Bay	0	0	1	None	None	High
Port Angeles	0	0	1	None	None	Medium
Aberdeen	1	1	0	None	Medium	None
Westport	0	0	2	None	None	High
Ilwaco/Chinook	1	1	0	High	None	None
Astoria	5	6	2	High	High	None
Tillamook/Garibaldi	2	1	2	Low	None	Medium
Newport	4	3	2	High	High	High
South Beach	1	1	0	None	Medium	None
Waldport	1	1	0	None	Low	None
Florence	0	0	1	None	None	Medium
Winchester Bay	0	0	1	None	None	Medium
Charleston (Coos Bay)	6	4	2	High	High	High
Brookings	0	0	4	None	None	High
Harbor	1	1	0	None	Low	None
Crescent City	0	0	3	None	None	High
Eureka	1	6	1	High	High	High
Fort Bragg	2	4	1	High	High	High
Santa Rosa	1	3	0	None	High	None
Bodega Bay	2	2	2	Low	Medium	Medium
Dillon Beach	0	0	1	None	None	Low
Marshall	0	0	1	None	None	Medium
Sacramento	1	1	0	None	Medium	None
Vallejo	0	0	1	None	None	Low
Rodeo	0	0	1	None	None	Medium
San Francisco	4	5	6	High	High	High
San Leandro	1	2	0	None	Low	None
Princeton / Half Moon Bay	3	1	5	High	None	Medium
El Granada	6	4	0	None	High	None
San Jose	1	2	0	None	Medium	None
Scotts Valley	1	2	0	None	Medium	None
Santa Cruz	1	1	3	Low	None	Medium
Watsonville	2	4	0	None	High	None
Moss Landing	3	3	8	High	Low	High
Sand City	1	1	0	None	Medium	None
Monterey	1	2	1	High	Medium	Medium
Atascadero	2	1	0	None	High	None
Morro Bay	3	2	3	High	Medium	High
Avila	1	1	4	Low	None	Medium
Los Osos	1	1	0	None	Low	None
Nipomo	1	1	0	None	Low	None
Santa Barbara	3	1	0	Low	None	None
Oxnard	1	2	0	None	Medium	None
Hawaiian Gardens	1	3	0	None	Medium	None

*Including the processing city.

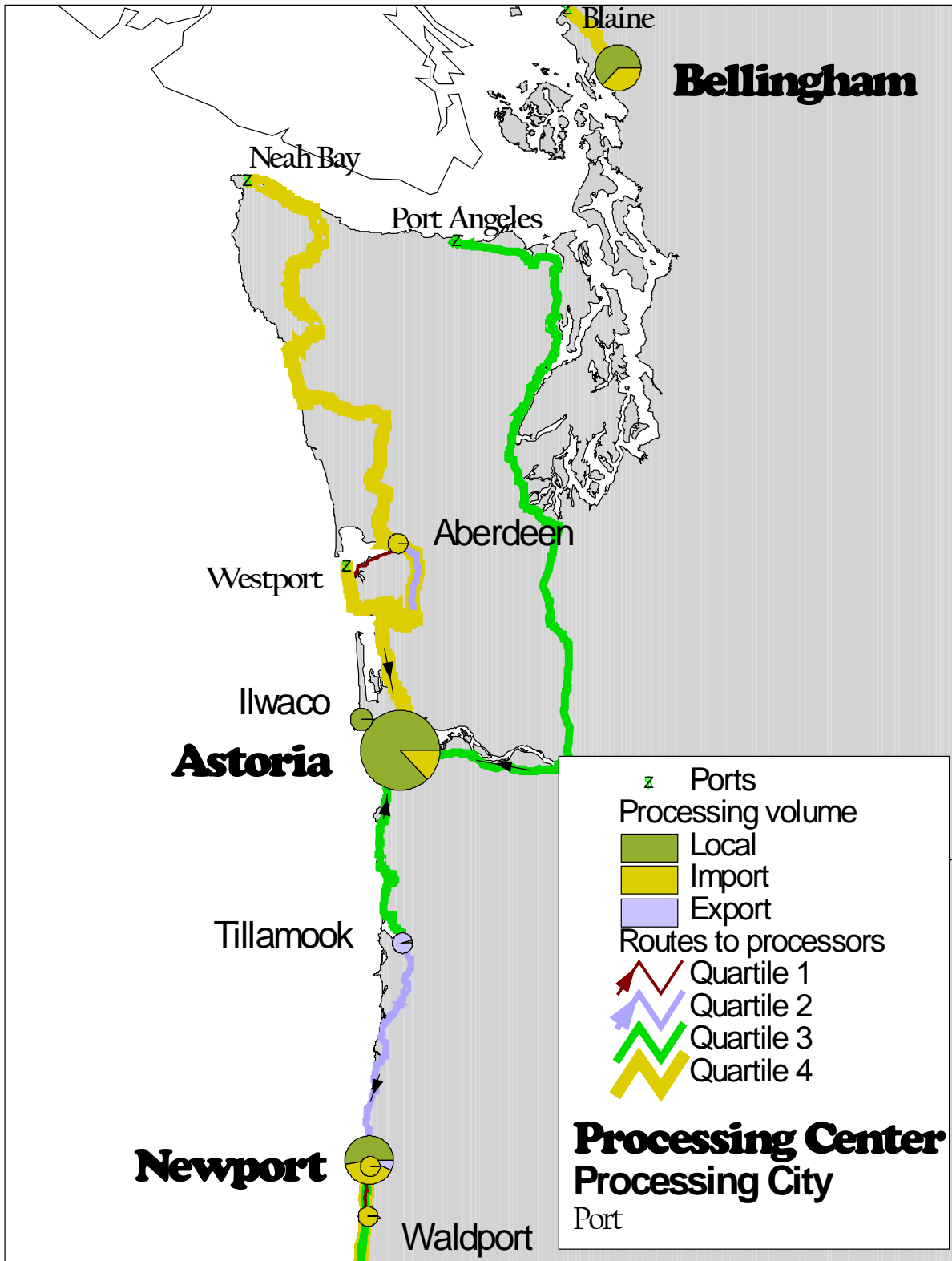


Figure 3-23. Processing relationships in Washington and northern Oregon.

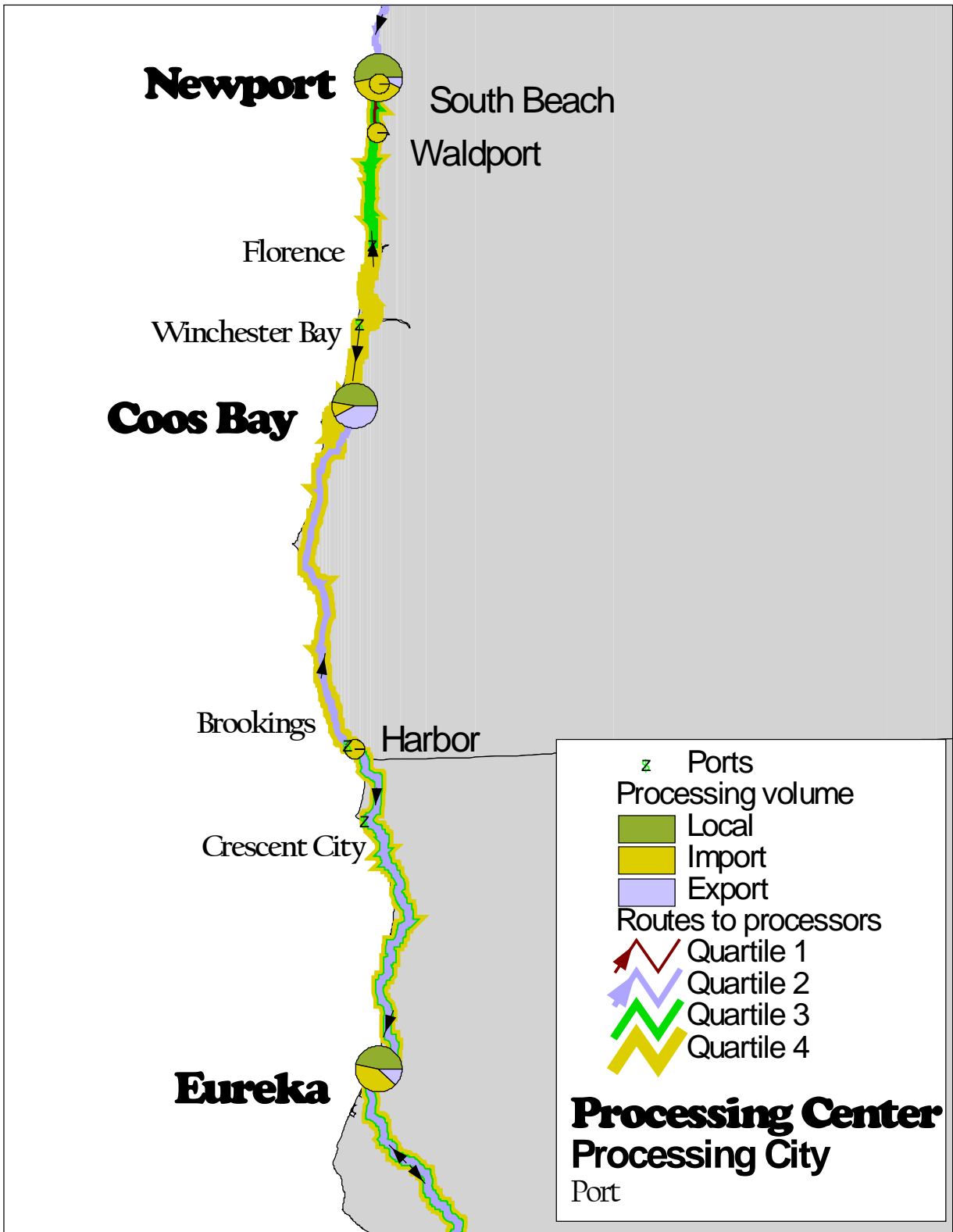


Figure 3-24. Processing relationships in Oregon and northern California.



Figure 3-25. Processing relationships in northern California.



Figure 3-26. Processing relationships in central California.

3.10 Mothership Processors of Trawl Groundfish

Section 3.6.3 describes the Pacific whiting mothership sector focusing on catcher vessels that deliver to the processing vessels. Unlike catcher-processors, which directly harvest and then process on board, mothership vessels receive vessels from catcher vessels for processing, but do not directly harvest the fish. Motherships are relatively large vessels with crews of 65 to 200 people, who mostly work in shifts to keep the factories operating day and night. Some of the processing vessels operate in the Alaska pollock fisheries, but move south to the Washington, Oregon, California area to fish for whiting between pollock seasons. Table 3-20 shows mothership participation since 1994. Although participation has varied from four to nine processing vessels, six or fewer have participated in the recent past. It is expected that these six vessels would qualify for the processor permit proposed under the mothership co-ops that are part of the alternatives presented in Chapter 2.

The AFA, which rationalized the Alaska pollock fishery, eventually led to Council action; the current trawl rationalization proposal supersedes past stopgap measures. It was thought that the AFA management system, by giving participants in the pollock fishery greater flexibility, could result in new entry into the whiting fishery (to participate vessels, only had to be registered to a groundfish LE permit with the appropriate gear and length endorsement). New entry could exacerbate race-for-fish conditions in the fishery that stem from quota-based management. In 1999, the Council began work on Groundfish FMP Amendment 15 to address possible spillover effects, a task mandated by the AFA. When no immediate influx of new participants materialized, however, and other issues became more pressing, further work was deferred. In 2006, the entry into the fishery of additional catcher vessels that had not previously participated, and shifts in participation between the sectors, again raised concerns. The Council adopted Amendment 15 in March 2008 and created qualification criteria for participation in each of the whiting sectors, including criteria for motherships. The amendment was explicitly framed as a temporary measure that would sunset with a more comprehensive set of measures under trawl rationalization.

Since 1995, several different companies have participated as a mothership. Some companies have participated in only one or two years, while others have participated on a consistent basis. The following table illustrates mothership vessel and company participation by year.

Table 3-62. Mothership company and vessel participation by year.

Company	Vessel Name	Year												
		95	96	97	98	99	00	01	02	03	04	05	06	07
All Alaskan	Heather Sea	X												
	Saga Sea	X												
American Seafoods	American Dynasty		X											
	American Triumph		X											
	Ocean Rover	X	X	X	X	X	X	X	X	X	X	X	X	X
Arctic Storm	Arctic Fjord	X	X	X	X	X	X	X	X	X	X	X	X	X
	Arctic Storm	X	X	X	X	X	X	X	X	X	X	X	X	X
Peter Pan/Nichiro	Golden Alaska	X	X	X	X	X	X							X
Premier Pacific	Ocean Phoenix	X	X	X	X	X	X	X				X	X	X
MV Savage Inc/Cascade Fishing/Suisan	Sea Fisher												X	
Supreme Alaska	Excellence	X	X	X	X	X	X	X	X	X	X	X	X	X

The variation in participation by mothership companies can be explained by prevailing market conditions and stock abundance. Throughout much of the early 2000s, conditions were generally unfavorable for Pacific whiting fishery participation. The stock was listed as overfished early in this period, resulting in a decline in available harvest. Shortly thereafter mad cow disease impacted Pacific whiting surimi markets due to the use of beef plasma in the production of whiting surimi. Producers have switched increasingly to H&G product forms and also switched from using beef plasma to using egg yolk in the production process. Furthermore, the Pacific whiting stock was taken off the overfished list quickly, leading to a rebound in harvest levels. The lack of participation by two companies in the early and mid 2000s can be explained by these conditions.

The mothership sector in general is relatively vertically integrated. Based on data available in November 2008, 10 catcher vessel permits can be identified as being wholly or partially owned by companies that also own motherships. On a company level, two companies received most of their catch between 2003 and 2006 from catcher vessels that are described as being wholly or partially vertically integrated, while two other companies received a clear minority of their deliveries from wholly or partially owned catcher vessels over that time.

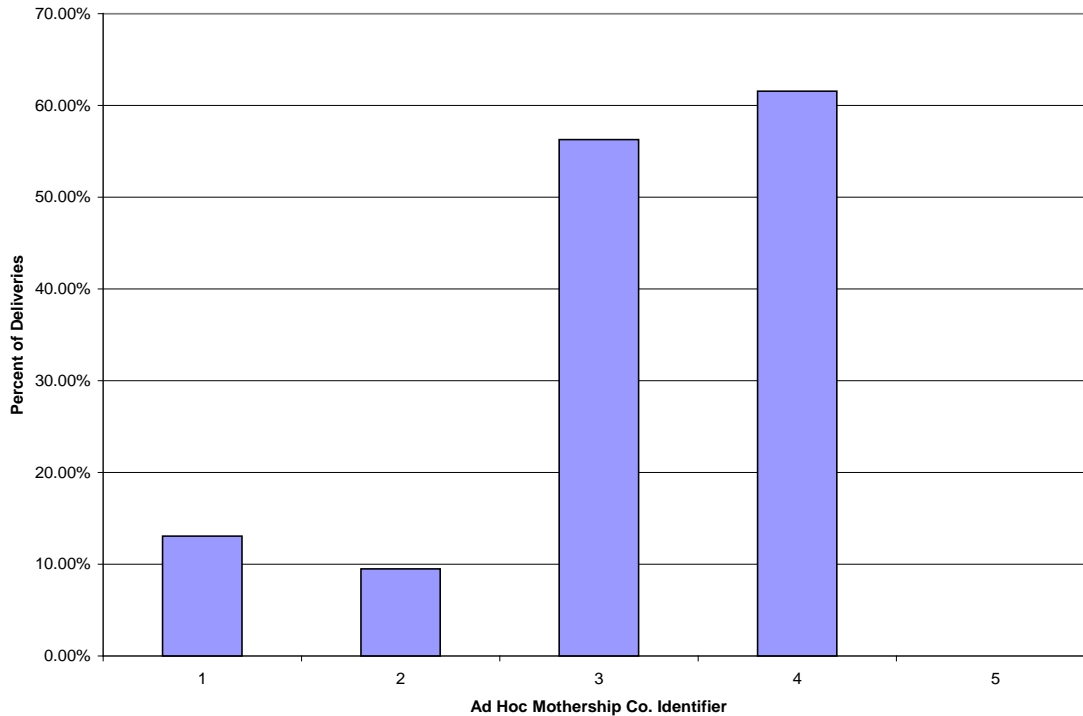


Figure 3-27. Portion of Deliveries Received by Wholly Owned or Affiliated Catcher Vessel Permits by Mothership Company (2003 - 2006).

3.11 Trawl Catcher Processors

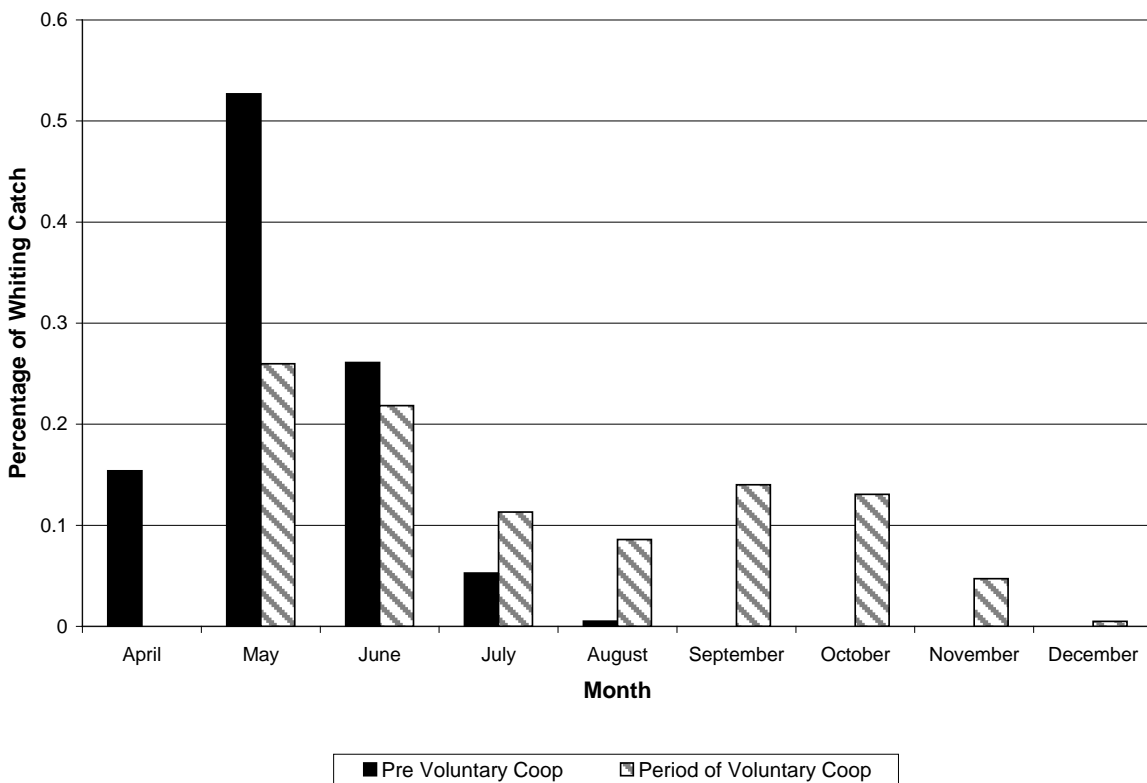
Catcher-processor effort in the fishery has varied over time. With the voluntary creation of the Pacific Whiting Conservation Cooperative in 1997, the sector took on the characteristics of a rationalized fishery. The amount of capital in the fishery generally declined as the season became longer, and vessels no longer found it necessary to compete. While the actual number of catcher-processor vessels participating in any given year has not varied tremendously, many vessels spend less time in the fishery and leave the fishery after June (Table 3-63). Beginning in July, only a handful of catcher-processor vessels remain, often into November, to finish off the quota remaining in the fishery. The distribution of catch has become much less concentrated in time following the formation of the voluntary cooperative. Prior to the formation of the voluntary cooperative, catcher-processors operated over a much shorter time period with harvest concentrated in the May and June timeframe (Figure 3-28).

Table 3-63. Count of catcher-processors operating by month and year.

Year	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1995	9	9							
1996		10	10						
1997		10	7						
1998		5	7	1	1				
1999		5	6	2					
2000		4	5	5	1	1	1	1	
2001		4	6	1	1	2	2	2	
2002		4		1	1	1	1		
2003		3	1	1	1	2	2		
2004		5	4	1	1	4	2	1	
2005		6	4	1	2	4	4		
2006		6	8	3		3	3		
2007		9	9				3	4	1

Source: PacFIN NPAC4900 table. July 2008

Note: not unique records and should not be summed

**Figure 3-28.** Seasonality of whiting harvest in the catcher-processor sector (before and after formation of voluntary cooperative).

Because of the catch sharing agreements created through the voluntary cooperative, participants in the catcher-processor sector do not race for fish, though participants have expressed increasing concern over the fact that another sector could preempt the catcher-processor sector through attainment of a bycatch cap. In other words, because of the common bycatch cap, conditions exist for catcher-processor participants to engage in race-for-fish behavior, although they do not engage in such behavior currently.

3.12 Processors and Labor

Harvesting and processing labor is expected to be affected by changes to these sectors caused by rationalization. Processing requires skilled and semi-skilled labor ranging from general labor (for example, unloading vessels) to more skilled labor (for example, filleting fish, or operating and maintaining processing equipment).

Those employed in managerial positions (as opposed to owner-managers) fall in the labor category. Processing labor also includes people aboard catcher-processor and motherships who are exclusively involved in processing activities. Others aboard these vessels fall in the category of captain and crew. Other labor is undertaken by input suppliers (for example, shop clerks or warehouse workers).

The size of processing facilities, and the degree to which they can switch production to different product forms, will determine how labor is affected by rationalization. Shore-based whiting processors currently must handle large volumes of fish in a relatively short time because the whiting fishery tends to function like a derby, with harvesters competing to catch the available quota. When there is no whiting fishery, processors must diversify into processing other products in order to maximize returns. By the same token, their labor demand varies throughout the year. For example, if a plant cannot be put to another use outside of the whiting season, such as processing nonwhiting groundfish or Dungeness crab, most of the jobs in the facility will be seasonal. This is less of a problem in the at-sea sector because motherships and catcher-processors are mobile and can be deployed to the Alaska pollock fishery. Processors specializing in nonwhiting groundfish deal with lower volumes and a steadier supply because of cumulative trip limits. They may also require different types of labor than whiting processors if their operation is less mechanized, and they deal with a greater variety of species and product forms.

3.13 Input Suppliers

Businesses that support groundfish trawlers may be indirectly affected by a trawl rationalization if the program, depending on the business type, size, and location. Various businesses supply inputs to the trawl sector. For many, however, the trawl sector accounts for a small proportion of sales, either because they sell to firms and individuals across the economy (e.g., grocery wholesalers/retailers), or they sell to harvesters in many other fisheries (e.g., marine electronics retailers). Smaller, specialized retailers located in ports where groundfish trawlers are an important component of the local fleet (in terms of purchases, not necessarily number of vessels) would be more affected by changes in demand for inputs. Those most affected depend on the trawl sector for a large proportion of their sales. The types of suppliers most affected by trawl rationalization would be the following:

- Small retailers of specialized equipment and materials (e.g., ship chandlers, hardware stores)
- Dockside fuel suppliers
- Suppliers of specialized services (e.g., welders, riggers, equipment installers)
- Equipment manufacturers for whom groundfish trawl vessels account for a large proportion of sales (e.g., boat builders, net manufacturers)
- Firms that contract observers to the groundfish trawl sector
- Brokerage firms that handle the sale/transfer of IFQs

The number of input suppliers varies greatly by community. A NMFS NWFSC study (K. Norman, pers. comm., NMFS NWFSC, July 2008) looked at the presence of 61 different types of groundfish businesses in 11 Washington and Oregon communities (Table 3-64). The businesses included suppliers of anchors, bait, cold storage, tackle, ice, nets, and refrigeration, as well as service providers such as boat builders, boat yards, haul-out facilities, permit brokers, and marine surveyors. The study came up with the following numbers of businesses in each community (from north to south):

Table 3-64. Input suppliers in Washington and Oregon.

Community	Number of Fishery-related Suppliers
Washington	
Bellingham	51
Anacortes	36
Neah Bay	1
Seattle	362
Westport	17
Ilwaco	5
Oregon	
Astoria/Warranton/Hammond	36
Newport	25
Coos Bay/Charleston	23
Brookings	2

3.14 Communities and Socioeconomic Groups

3.14.1 General Introduction

This section summarizes the community profiles presented in Appendix H and places relevant fishery activity in a community setting. First, it describes how fishing communities were identified for this document. Next, it discusses general characteristics of west coast fishing communities, including geography, demography, input suppliers, processors and labor, captains and crew, social structure, and the built environment. Section 3.14.4 summarizes a study of dependence, engagement, and vulnerability in fishing communities. Next, it discusses trends that affect fishing communities; summarizes relevant data about fishing communities; and addresses environmental justice concerns.

The information and organization of this discussion of the socioeconomic environment draws upon the community profiles developed by the NMFS NWFSC (Norman, *et al.* 2006), as well as the 2007-2008 groundfish annual specifications EIS (PFMC 2006) and other documents.

3.14.2 Identifying Fishing Communities

Communities can be identified in several ways. They can be defined geographically (i.e., Neah Bay or San Francisco); they can refer to a community of interest (for example, everyone involved in the groundfish trawl fishery), or an occupational community (such as groundfish trawl crew). In accordance with the MSA's National Standard 8, this analysis defines communities geographically. A methodology developed by the NMFS NWFSC was used to identify trawl communities and communities that might be affected by changes in the trawl sector. Particularly vulnerable communities were identified in a vulnerability study conducted by the NMFS NWFSC (PFMC 2006, Appendix A).

Fishing communities, as defined in the MSA, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing, this may include boatyards, fish handlers, processors, and ice suppliers. Similarly, entities that depend on recreational fishing may include tackle shops, small marinas, lodging facilities catering to out-of-town anglers, and tourism bureaus advertising charter fishing opportunities. People employed in fishery management and enforcement comprise another component of fishing communities.

3.14.3 General Characteristics of West Coast Fishing Communities

3.14.3.1 West Coast Geography and Demography

For the purpose of analysis, west coast fishing communities are organized around regions comprising port groups and ports consistent with the organization of fish landings data in the PacFIN database. There are four port groups in Washington covering 21 named ports; in Oregon there are five port groups covering 20 ports; 10 port groups cover 35 named ports in California. Figure 3-29 shows the location of these ports and port groups. Table 3-65 shows port group and county relationships in Washington and Oregon; Table 3-66 shows the same for California. Communities in Southern California are not discussed in this EIS, because there is no groundfish trawl fishery presence in that area.

Section 5.4.2 in the 2008 groundfish SAFE document (PFMC 2008c) includes updated population data for coastal counties based on the U.S. Census Bureau's 2006 American Community Survey, which supplements the 2000 census data referenced in Section 3.14.7 of this EIS document. Coastal counties tend to be rural in Washington, Oregon, and northern California. These data are incorporated by reference. The only major urban center in a coastal county in this region is in Puget Sound where Seattle, Tacoma, and their satellite communities comprise a large population and commercial agglomeration. According to 2000 census data, the rural population for Washington State as a whole is 18 percent of the total. Excluding Puget Sound, coastal counties range from 48 to 100 percent rural population. In Oregon, the statewide rural population is 21 percent of the population, while coastal counties, excluding Lane County, which encompasses the inland population center of Eugene, range from 37 to 100 percent rural. The northern California counties of Del Norte, Humboldt, and Mendocino are similarly rural. Coastal areas in central and Southern California are much more urbanized, with 80 to 100 percent of the population in these counties considered urban. Similar to the pattern of urban versus rural population, coastal counties in Washington, Oregon, and California tend to be less racially diverse than the states as a whole. Household median income also tends to be lower and the poverty rate higher in this region compared to statewide averages. Section 8.0 in Appendix A to the 2005-06 groundfish harvest specifications EIS (PFMC 2004a) contains detailed population data for west coast fishing communities based on the 2000 census.

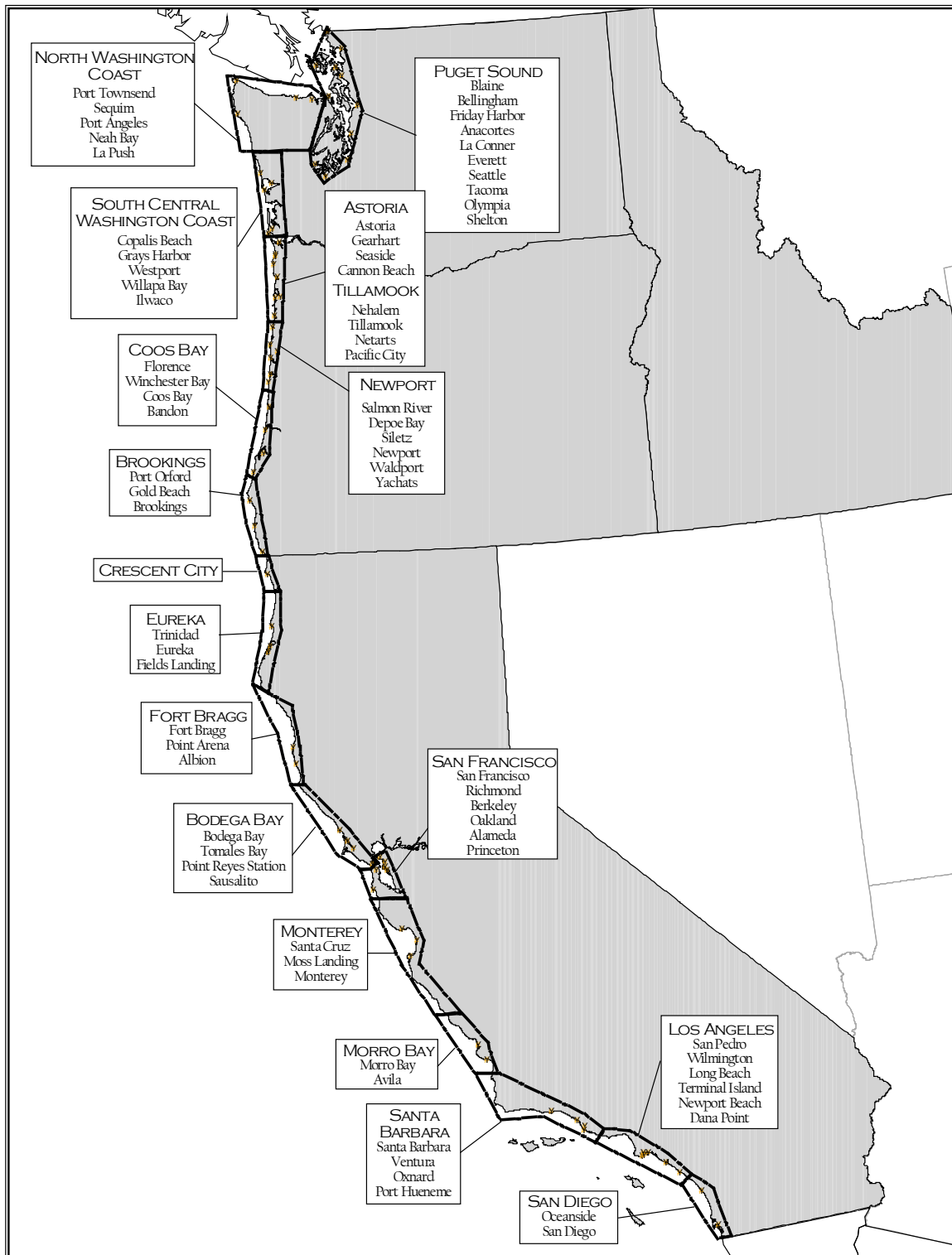


Figure 3-29. West coast ports and port groups.

Table 3-65. Port group, county, and community relationships in Washington and Oregon.

Port Group Area	County	Name	Port Group Area	County	Name	
Washington			Oregon			
N. Puget Sound	Whatcom	Blaine	Astoria	Multnomah	Pseudo Port Code for Columbia R.	
		Bellingham Bay				Astoria
	San Juan	Friday Harbor		Clatsop		Gearhart - Seaside
	Skagit	Anacortes			Unknown	Cannon Beach
		La Conner				Landed in WA; Transp. to OR
S. Puget Sound	Snohomish	Other North Puget Sound Ports	Tillamook	Tillamook	Nehalem Bay	
	Snohomish	Everett				Tillamook / Garibaldi
	King	Seattle				Netarts Bay
	Pierce	Tacoma			Pacific City	
	Thurston	Olympia	Newport	Lincoln	Salmon River	
	Mason	Shelton				
Unknown	Other South Puget Sound Ports					Depoe Bay
North Washington Coast	Jefferson	Port Townsend			Newport	
		Sequim			Waldport	
	Clallam	Port Angeles			Yachats	
		Neah Bay				
		La Push				
South & Central WA Coast	Grays Harbor	Copalis Beach	Coos Bay	Lane	Florence	
		Grays Harbor		Douglas	Winchester Bay	
		Westport	Coos		Coos Bay	
	Pacific	Willapa Bay	Brookings	Curry	Port Orford	
		Ilwaco/Chinook				
Unidentified WA	Klickitat	Other Columbia River Ports			Brookings	
	Pacific	Other Washington Coastal Ports				
	Unknown	Unknown WA Ports				

Table 3-66. Port group, county, and community relationships in California.

Port Group Area	County	Name	Port Group Area	County	Name	
California Recreational Groupings			California			
North Coast: Humboldt and Del Norte Counties			Monterey	Santa Cruz	Santa Cruz	
North-Central: Mendocino County				Monterey		Moss Landing
North-Central: San Mateo County to Sonoma County						
South-Central Coast: San Luis Obispo to Santa Cruz			Morro Bay	San Luis Obispo	Other S.C. and Mon. Co. Ports	
South Coast: Ventura to Santa Barbara Counties						
South Coast: Los Angeles to San Diego Counties					Avila	
California					Other S.L., O. Co. Ports	
Crescent City	Del Norte	Crescent City	Santa Barbara	Santa Barbara	Santa Barbara	
		Other Del Norte County Ports				
Eureka	Humboldt	Eureka (Includes Fields Landing)		Santa Barbara	Ventura	Port Hueneme
		Fields Landing				
		Trinidad			Ventura	
		Other Humboldt County Ports			Other S.B. and Ven. Co. Ports	
Fort Bragg	Mendocino	Fort Bragg	Los Angeles	Los Angeles	Terminal Island	
		Albion				
		Arena				San Pedro
		Other Mendocino County Ports				Willmington
Bodega Bay	Sonoma	Bodega Bay	Los Angeles	Orange	Longbeach	
		Tomaes Bay				
	Marin	Point Reyes			Dana Point	
		Other Son. & Mar. Co. Outer Coast Ports			Other LA and Orange Co. Ports	
		Sausalito			San Diego	
San Francisco	Alameda	Oakland	San Diego	San Diego	Oceanside	
		Alameda				
	Contra Costa	Berkely	San Diego	San Diego	San Diego	Other S.D. Co. Ports
		Richmond				
		San Francisco				
	San Francisco		San Francisco Area			
			Other S.F. Bay & S.M. Co. Ports			
	San Mateo	Princeton				

3.14.3.2 Groundfish Fishery-related Income

In 2007, economic activities of the LE trawl fleet were estimated to have provided about \$81 million in personal income compared with \$662 million from all west coast fishing activities (Table 3-67). The port areas for which the trawl fishery generated the most personal income were along the south central Washington coast (i.e., Westport and Ilwaco), Astoria, Newport, Coos Bay, and Eureka. The ports with fishing communities that had the greatest dependence on the LE shoreside trawl fishery were Newport, Eureka, Fort Bragg, and Astoria, all of which relied on the shoreside trawl sector for at least 25 percent (rounded) of their personal income from fishing (Table 3-68). Estimates of personal income were developed using the Fishery Economic Assessment Model (FEAM), which is based on the U.S. Forest Service Impact Analysis for Planning (IMPLAN) model.

Table 3-67. Community income impact (\$1,000) baseline (2007) activity by fisheries sectors by port area (local personal income impacts).

Port Area	Fishery Sector							
	Limited Entry Shoreside Trawl	Limited Entry Fixed Gear	Open Access	Non-Groundfish	Treaty Groundfish	Treaty Non-Groundfish	At-Sea Whiting	TOTAL
Northern Puget Sound	2,199.8	2,656.2	66.1	8,137.4	23.2	129.6		13,212.4
Southern Puget Sound		81.0	5.5	2,588.0				2,674.5
North Washington Coast	346.0	1,068.2	187.5	4,476.9	3,801.7	4,448.8		14,329.2
South and Central Washington Coast	18,128.9	1,088.3	218.3	84,278.1	7,313.6	649.5		111,676.7
Unidentified Washington				13.7	706.1	7,886.2		8,606.0
Astoria	21,216.5	697.2	98.4	63,344.7				85,356.8
Tillamook	13.4	0.3	194.5	2,781.2				2,989.5
Newport	13,592.2	2,070.4	129.1	15,247.2				31,038.9
Coos Bay	8,257.2	1,286.1	251.8	27,351.0				37,146.1
Brookings	1,549.8	827.3	1,142.9	3,539.7				7,059.7
Crescent City	2,007.0	322.8	633.9	18,386.7				21,350.4
Eureka	7,177.2	574.3	256.3	12,575.5				20,583.2
Fort Bragg	2,885.5	603.6	697.7	7,262.0				11,448.7
Bodega Bay	80.4	30.0	66.5	10,432.2				10,609.1
San Francisco	2,280.8	236.0	395.9	14,248.3				17,161.0
Monterey	880.7	787.0	513.8	37,817.7				39,999.2
Morro Bay	58.4	64.6	1,844.2	2,186.7				4,153.9
Santa Barbara		398.1	364.7	82,751.8				83,514.7
Los Angeles		1,237.9	184.4	84,285.7				85,708.1
San Diego		513.3	97.6	8,313.0				8,923.9
Unidentified California				298.8				298.8
Catcher Vessel							16,866.3	16,866.3
Catcher-Processor							25,827.9	25,827.9
Tribal CV							1,817.3	1,817.3
TOTAL	80,674.0	14,542.4	7,349.2	490,316.5	11,844.6	13,114.1	44,511.4	662,352.1

Table 3-68. Baseline on local fishing community dependence (% dependence, 2007), percent of fishery related income impacts by fisheries sector and port area.

Port Area	2007 Income Impacts (%)							TOTAL
	Limited Entry Shoreside Entry Trawl	Limited Entry Fixed Gear	Open Access	Non-Groundfish	Treaty Groundfish	Treaty Non-Groundfish	At-Sea Whiting	
Northern Puget Sound	16.6%	20.1%	0.5%	61.6%	0.2%	1.0%		100%
Southern Puget Sound		3.0%	0.2%	96.8%				100%
North Washington Coast	2.4%	7.5%	1.3%	31.2%	26.5%	31.0%		100%
South and Central Washington Coast	16.2%	1.0%	0.2%	75.5%	6.5%	0.6%		100%
Unidentified Washington				0.2%	8.2%	91.6%		100%
Astoria	24.9%	0.8%	0.1%	74.2%				100%
Tillamook	0.4%	0.0%	6.5%	93.0%				100%
Newport	43.8%	6.7%	0.4%	49.1%				100%
Coos Bay	22.2%	3.5%	0.7%	73.6%				100%
Brookings	22.0%	11.7%	16.2%	50.1%				100%
Crescent City	9.4%	1.5%	3.0%	86.1%				100%
Eureka	34.9%	2.8%	1.2%	61.1%				100%
Fort Bragg	25.2%	5.3%	6.1%	63.4%				100%
Bodega Bay	0.8%	0.3%	0.6%	98.3%				100%
San Francisco	13.3%	1.4%	2.3%	83.0%				100%
Monterey	2.2%	2.0%	1.3%	94.5%				100%
Morro Bay	1.4%	1.6%	44.4%	52.6%				100%
Santa Barbara		0.5%	0.4%	99.1%				100%
Los Angeles		1.4%	0.2%	98.3%				100%
San Diego		5.8%	1.1%	93.2%				100%
Unidentified California				100.0%				100%
Catcher Vessel							100%	100%
Catcher-Processor							100%	100%
Tribal CV							100%	100%

3.14.3.3 Social Structure: Networks, Values, Identity

The fishing community on the west coast is composed of many separate communities based on fishery, gear type, targeted species, geography, and, to some degree, cultural background and ethnicity. For example, Astoria, Oregon, has Finnish roots that are celebrated in community festivals, and Native American communities have ties to the fishery that date back thousands of years.

Commercial fishing enterprises in Washington, Oregon, and California are socially and culturally diverse. However, most tend to be family-run businesses. While most fishermen are male, women are often involved in the shoreside aspects of the fishing business and provide an important support and communications network for the fishing community. Few fishing families own multiple boats, and few boats are owned by large corporations. In many communities, families can trace several generations of involvement in the fishing industry.

Recreational fishing is also an important part of many communities' identities. The recreational fishing industry includes charter boats, guides, marinas, gear, bait, and other suppliers. Many of these businesses are also family-owned and operated. In addition to their direct impact on the local community, the recreational fishing industry supports a broad-based community of thousands of individual boat owners and shore fishermen participating in ocean and inland recreational fisheries.

The commercial fishing industry generally places a high value on independence. Fishing necessarily occurs at sea, and frequently attracts people who enjoy solitude and self-direction. This sense of independence and self-reliance contrasts sharply with the increasingly stringent controls being placed on the industry.

Fishing is also known for its high level of danger; it is consistently rated among the most dangerous professions in the U.S. Despite this danger, there are few safety nets for people in the industry. Crew members are not technically employees and are not eligible for unemployment insurance, Workers' Compensation, and other benefits normally associated with workers in other demanding and dangerous occupations. Vagaries of weather, market conditions and regulations demand high levels of flexibility. Many crew members are itinerant, moving from port to port and job to job (Gilden 1999).

The challenges of pursuing and maintaining fishing-based livelihoods have caused fishermen to form organizations to represent common interests. Examples include the Coos Bay Trawlers Association, the Newport Fishermen's Wives Association, the Pacific City Dorymen's Association, the Fishermen's Marketing Association, the Pacific Marine Conservation Council, the West Coast Fishermen's Alliance, the Western Fishboat Owner's Association, and the Women's Coalition for Pacific Fisheries (Gilden 1999). These organizations help the multiple facets of the fishing community represent their interests to policy makers and the general public.

3.14.3.4 The Built Environment

Few coastal communities depend exclusively on commercial fishing. Harvesting, processing, and related support industries (fuel, docks, ice, gear repair, etc.) are part of a complex web of interaction with other economic activities such as sport fishing, whale watching, tourism, and other recreational activities. Commercial and recreational fishermen coexist, and both contribute financially to the businesses and infrastructure that serve and support them. Communities such as Newport, Oregon, celebrate their fishing industry, having turned the port waterfront into a major tourist attraction. This is also true for many other historic ports in Washington, Oregon, and California. Maintenance of port facilities for the fishing fleet provides access for other user groups, such as recreational fishermen and boaters, and draws tourists who are attracted to the sights and smells of a working fishing port.

The presence of a viable commercial fleet helps provide the funding and incentive to dredge harbor entrances and to maintain jetties and port facilities. These activities, in turn, assist the recreational industry and private users to operate safely and efficiently from coastal ports. Seafood processors and shoreside support businesses pay property taxes and license fees to the port cities and surrounding jurisdictions, thereby contributing to the maintenance of the local infrastructure for all area residents.

The following are examples of fishery-related effects on port infrastructure. In ports such as Brookings and Garibaldi in Oregon, reduction in fishing fleets has coincided with the silting of harbor entrances due to reduced dredging. This has restricted access for larger vessels, including trawlers, and made it more difficult for a fleet to become established in the future (Gilden 1999). In another example, the Port of Astoria recently added a new breakwater to provide additional moorage for larger vessels involved in the new sardine fishery (Oregon Coastal Zone Management Association 2002).

3.14.4 Dependence, Engagement, and Vulnerability in Fishing and Fishing-Related Activities

There have been many efforts to determine levels of dependence, engagement, vulnerability, and resilience in natural resource-based communities. Understanding these factors helps managers focus on impacts to specific communities, and determine which communities are least able to adapt to a decrease in harvest as a result of regulatory change.

Most studies use the term “dependence” to mean a community’s use of a particular resource (for example, whiting or flatfish). “Engagement” is used to describe a community’s use of a more general resource (for example, fisheries). “Resilience” is used to describe a community’s ability to adapt to change. “Vulnerable” areas are communities that are highly engaged, highly dependent, or have relatively low resilience.

Appendix A to the 2007-08 groundfish harvest specifications EIS (PFMC 2006) describes an analysis of community vulnerability and resilience (hereafter referred to as the 2006 socioeconomic analysis). This analysis is incorporated by reference. The analysis estimates dependence of west coast fishing communities on fishing activity and the relative resilience those communities have to dealing with change. This information is useful for considering impacts to communities in cases where changes in fishing activity have a different degree of impact to a community. In such cases, a moderate change in fishing activity occurring in a vulnerable community may be considered a substantial impact, while a moderate change in fishing activity in a less vulnerable community may be considered relatively inconsequential. The 2006 socioeconomic analysis includes a detailed description of the methodology (PFMC 2006)

3.14.5 Most and Least Vulnerable Communities

The 2006 socioeconomic analysis identifies 32 communities as vulnerable in terms of commercial groundfish fisheries. Of these, 13 are considered trawl communities (Aberdeen, Bandon, Bodega Bay, Chinook, Everett, Garibaldi, Gold Beach, LaPush, Oakland, Oceanside, Oxnard, Pacific City, Port Angeles, Port Arena, Point Orford, San Pedro, Santa Cruz, Seaside, and Siletz are designated as vulnerable, but are not considered trawl communities). The remaining 13 groundfish trawl communities, plus six groundfish trawl communities not listed as being vulnerable in the 2006 analysis, are shown below in Table 3-69 in order of relative vulnerability. Within categories, they are listed north to south. (Communities designated vulnerable by Quigley are bolded).

Table 3-69. Vulnerable communities.

	Dependence on Groundfish¹	Lack of Resilience²
Most vulnerable communities (medium dependence, least resilience)		
Neah Bay	2	5
Moss Landing	2	4
Relatively lower dependence, but low resilience		
Iiwaco	1	3
Relatively higher dependence, medium resilience		
Bellingham	3	2
Astoria	3	2
Coos Bay	3	2
Crescent City	3	2
Eureka	3	2
Fort Bragg	3	2
Relatively higher dependence, higher resilience		
Newport	3	1
Morro Bay	3	1
Medium dependence but higher resilience		
Westport	2	1
Relatively lower dependence and relatively higher resilience		
Warrenton	1	1
Higher dependence, but high resilience (not considered “vulnerable”)		
Brookings	3	0
San Francisco	3	0
Low dependence, high resilience (not considered “vulnerable”)		
Anacortes	0	0
Seattle	1	0
Hammond	1	0
Half Moon Bay	1	0

¹ Number of times the city scored in the top one-third of commercial groundfish dependency indicators in the Quigley study

² Number of times the city scored in the top one-third (least resilient) of resiliency indicators in the Quigley study

In addition to these communities, 17 counties were identified as vulnerable with regard to groundfish dependence. Clatsop, Coos, Curry, Grays Harbor, Lincoln, and Los Angeles counties score as most highly dependent (scores of two or more) and least resilient (scores of two or more).

In addition to the study described above, Appendix A to the 2005-06 groundfish harvest specifications EIS (PFMC 2004a) looked at a community’s engagement in the commercial fishery relative to other opportunities in the regional economy (Table 3-70 and Table 3-71 show engagement-related data). Both the income and employment measures show that the south Washington coast (including the towns

of Grays Harbor, Westport, Willapa Bay, and Ilwaco/Chinook) is the area most heavily invested in commercial fishing relative to its economy. Newport and Astoria-Tillamook in Oregon, and Crescent City, California, are the next most engaged. Brookings and Central Washington coast alternate for fifth and sixth place, depending on whether the income or employment measure is used. By this measure, the least engaged port areas are the large, relatively urbanized centers of Puget Sound, San Diego, San Francisco, and Los Angeles. While these areas certainly include local pockets that are heavily engaged in fishing activities, the size and diversity of the surrounding economies tend to mask the significance of locally important factors.

Table 3-70. Income and employment from commercial fishing activities by port group, Nov. 2000-Oct. 2001 (Source: PFMC 2004a, Appendix A, Table 8-3a).

Port Group Area	All Commercial Fishery						All Groundfish			
	Commercial Fishery-Related Income (\$,000)	Fishery-Related Income as a share of Total Personal Income		Commercial Fishery-Related Employment	Fishery-Related Employment as a share of Total Employment		Income (\$,000)	Employment	Groundfish-Related Income as a share of Total Fishery Income	
		(Percent)	(Rank)		(Percent)	(Rank)			(Percent)	(Rank)
Puget Sound	14,344	0.01%	17	531	0.03%	16	8,694	322	60.61%	1
North WA Coast	8,262	0.36%	9	357	1.14%	8	4,865	210	58.89%	2
Central WA Coast	29,858	2.03%	5	1,091	4.26%	6	7,442	272	24.93%	10
South WA Coast	21,053	4.78%	1	957	14.24%	1	1,557	71	7.39%	14
Astoria/Tillamook	46,402	3.29%	4	1,959	7.72%	4	24,122	1,019	51.98%	3
Newport	45,709	4.27%	2	1,968	10.76%	2	22,122	952	48.40%	5
Coos Bay	23,476	0.20%	11	948	0.44%	11	9,266	374	39.47%	7
Brookings	8,792	1.77%	6	400	5.76%	5	3,754	171	42.70%	6
Crescent City	19,111	3.90%	3	773	9.43%	3	6,246	253	32.68%	9
Eureka	14,729	0.50%	8	591	1.11%	9	7,501	301	50.93%	4
Fort Bragg	15,740	0.73%	7	650	1.82%	7	6,183	255	39.28%	8
Bodega Bay/San Francisco	39,330	0.02%	15	1,205	0.04%	15	5,744	176	14.60%	13
Monterey	34,174	0.16%	12	1,146	0.39%	12	5,091	171	14.90%	12
Morro Bay	10,348	0.16%	13	374	0.36%	13	2,482	90	23.99%	11
Santa Barbara	98,377	0.26%	10	3,075	0.78%	10	1,396	44	1.42%	16
Los Angeles	149,075	0.04%	14	3,840	0.06%	14	1,148	30	0.77%	17
San Diego	13,431	0.01%	16	367	0.03%	17	625	17	4.65%	15
TOTAL	592,209	0.06%		20,230	0.15%		118,239	4,726	19.97%	

Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

The second block in Table 3-70 shows how much of the total fishery-related income and employment in each region is generated by groundfish activity. This measure shows that Puget Sound, North Washington Coast, Astoria-Tillamook, and Eureka all depend on groundfish for at least 50 percent of fishery-related income and employment. All but four of the port groups generate at least 14 percent of fishery-related income from groundfish.

Table 3-71 splits the groundfish totals into LE trawl and other gear components. The data indicate that, of the regions highly involved in groundfish, Astoria/Tillamook, Puget Sound, Newport, and Eureka derive more than 40 percent of groundfish income from the LE trawl fishery. Only the North Washington coast derives more than one-third of groundfish income from nontrawl sources.

Table 3-71. Income and employment from commercial fishing activities by port group, Nov. 2000-Oct. 2001. (Source: PFMC 2004a, Appendix A, Table 8-3b)

Port Group Area	Groundfish Limited Entry Trawl				Other Groundfish Gear			
	Income (\$,000)	Employment	Limited Entry Groundfish Trawl-Related Income as a share of Fishery Income		Income (\$,000)	Employment	Other Groundfish-Related Income as a share of Fishery Income	
			(Percent)	(Rank)			(Percent)	(Rank)
Puget Sound	6,558	243	45.72%	2	2,136	79	14.89%	3
North WA Coast	1,318	57	15.96%	10	3,547	153	42.93%	1
Central WA Coast	6,558	240	21.96%	9	885	32	2.96%	14
South WA Coast	1,377	63	6.54%	14	180	8	0.85%	16
Astoria/Tillamook	22,338	943	48.14%	1	1,784	75	3.85%	13
Newport	19,991	861	43.74%	3	2,132	92	4.66%	10
Coos Bay	7,718	312	32.88%	5	1,548	63	6.59%	8
Brookings	1,985	90	22.58%	8	1,769	80	20.12%	2
Crescent City	5,019	203	26.26%	7	1,227	50	6.42%	9
Eureka	6,437	258	43.70%	4	1,064	43	7.23%	7
Fort Bragg	4,503	186	28.61%	6	1,680	69	10.68%	5
Bodega Bay/San Francisco	4,176	128	10.62%	11	1,569	48	3.99%	12
Monterey	2,579	86	7.55%	13	2,512	84	7.35%	6
Morro Bay	1,095	40	10.58%	12	1,388	50	13.41%	4
Santa Barbara	9	0	0.01%	16	1,387	43	1.41%	15
Los Angeles	1	0	0.00%	17	1,147	30	0.77%	17
San Diego	4	0	0.03%	15	621	17	4.62%	11
TOTAL	91,664	3,709	15.48%		26,575	1,017	4.49%	

Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

These findings echo and reinforce the vulnerability findings in the 2006 socioeconomic analysis.

3.14.6 Current Status of West Coast Communities

This section describes the port communities involved in the groundfish fisheries. The identification of communities is based on the ports and port groups identified in PacFIN data. Figure 3-29 shows these ports and port groups. Because groundfish trawl activity is minimal in Southern California, these communities are not described.

3.14.6.1 Washington State

Bellingham, Anacortes, and Seattle are located in Puget Sound. Puget Sound is dominated by the Seattle metropolitan area; the city is a regional population center and economically important regionally and nationally. Seattle has traditionally been an important intermediary center for trade and transshipment for Alaska, and many of the large catcher-processors participating in Alaska fisheries are based there. Blaine and Bellingham, both north of Seattle, have traditionally been important ports for groundfish vessels, though there are currently no groundfish trawlers operating out of Blaine. Table 3-72 shows fishery and demographic indicators for Puget Sound ports.

Puget Sound has a low share of personal income and employment derived from all commercial fishing activities (PFMC 2004a). The relative unimportance of fisheries as a share of total income and employment in the region reflects its economic dynamism, with many industries—notably computer software and commercial aircraft manufacture—providing substantial income and employment. Looking at fishery-related income alone, however, at 61 percent, more of it is derived from groundfish-

fishery-related activities than in any of the other port areas. Thus, groundfish fisheries play an important role in what is a relatively small sector of the total regional economy.

Table 3-73 shows fishery and demographic indicators for the Washington coast ports of Neah Bay, Westport, and Ilwaco

Table 3-72. Fishery and demographic indicators, Puget Sound ports, Washington.

Indicator	Bellingham	Anacortes	Seattle
Vulnerability	Vulnerable	Not vulnerable	Not vulnerable
Dependence on groundfish	Medium dependence	Low dependence	Low dependence
Resilience	Medium resilience	High resilience	High resilience
Population (2000)	67,171	14,557	563,374
Unemployment rate (2000)	10.3	5.1	5.1
Natural resources employment (2000)	0.9	2.3	0.3
Median household income (2000)	32,530	41,930	45,736
Percent below poverty level (1999)	20.6	7.7	11.8
Non-whiting groundfish trawl vessels (2005)	6	0	0
Whiting trawl vessels (2005)	0	0	0
Percentage of fishery revenue from groundfish (2005)	55.3	n/a	16
Groundfish processors (2006)	2	0	1
Federal trawl permits owned by community members (2007)	2 by 2 different owners	1	24, with 11 different owners
Vessels bought back in 2003 buyout	10	0	0

Puget Sound

Bellingham

Bellingham is located on Bellingham Bay in north Puget Sound, in Whatcom County. The closest major U.S. city is Seattle, a 90-mile drive south, while Vancouver, British Columbia, is a 54-mile drive north. Bellingham is a nonwhiting port.

Bellingham is considered vulnerable because it is highly engaged in Pacific fisheries in general, highly dependent on groundfish, and has medium resilience. Bellingham has two processors that process groundfish landed in Bellingham Bay and Neah Bay. Bellingham also has access to a large seafood cold storage facility and has a relatively well-developed level of port infrastructure. Bellingham is located on the I-5 corridor, which enhances access to distribution facilities in the Seattle area.

The Comparative Advantage Model shows that 69.9 percent of Bellingham's nonwhiting trawl catch occurs in an area identified as a high bycatch area. Yelloweye and canary rockfish are the main species of concern, and both are very constraining. Because of this, Bellingham vessels are relatively constrained compared to other ports. In addition, vessels from Bellingham have a much longer travel distance to and from fishing grounds compared to vessels from other ports. This increases cost for those vessels, suggesting that the 4 of 11 vessels that fall within the efficient range may be more appropriately categorized as inefficient. However, the efficiencies created by Bellingham's shore-based infrastructure help make up for the burden created by constraining bycatch species and lack of efficiency.

Anacortes

Anacortes, in Skagit County, is 80 miles north of Seattle and 40 miles southwest of Bellingham. Anacortes is primarily a whiting port; the at-sea whiting fleet docks there, and one at-sea whiting

company has its corporate headquarters in Anacortes. Perhaps because of this, commercial fishing in Anacortes has employed few workers, but has paid some of the area's highest salaries. In 2000, the annual average wage for commercial fishermen in the county was \$57,810. That year, the finfish fishery (which includes whiting) employed 53 workers making \$83,016 annual average pay. And in the same year, only 91 Skagit County residents identified themselves as commercial fishermen.

Anacortes is not considered vulnerable. It is engaged in Pacific fisheries in general, but it is not considered dependent on groundfish and it is highly resilient.

Anacortes currently has no groundfish processors. Many seafood processors operating in the area have closed. However, several seafood companies from Western Washington come to Cap Sante Boat Haven to purchase product (not groundfish) from local fishermen.

Seattle

Seattle is on the east side of the Puget Sound between Elliot Bay and Lake Washington, in King County. According to the 2000 U.S. Census, Seattle's population was 563,374. The larger metropolitan area (comprising all or parts of Snohomish, King, Pierce, Thurston, and Kitsap Counties) was home to 3,554,760 in 2000.

Seattle is an important whiting port, with docks for the at-sea fleet and corporate headquarters. Most of the 24 Federal trawl permits owned in Seattle are used in the at-sea whiting fishery. Although nonwhiting permit holders live in Seattle, none actively fish out of Seattle, so Seattle's proximity to a high bycatch area is irrelevant.

In 2000, west coast fisheries landings in Seattle were delivered by 909 unique vessels. They include 253 commercial vessels, 498 tribal commercial vessels, and 158 personal use vessels. Nine vessels landed 109 mt of groundfish.

Seattle is not considered vulnerable. It is engaged in Pacific fisheries in general, but it is not considered dependent on groundfish and it is highly resilient. Seattle has a high level of fisheries infrastructure.

Washington Coast

Neah Bay

Neah Bay is at the northwestern-most point of the contiguous United States, across the Strait of Juan de Fuca from Vancouver Island, British Columbia. Situated in Clallam County, Neah Bay is the main settlement on the Makah Indian Reservation. The closest major U.S. city is Seattle, a 165-mile drive and ferry ride southeast.

Neah Bay is considered quite vulnerable. It is not deeply engaged in Pacific fisheries in general, but it is dependent on groundfish and has very low resilience.

There are no known processing facilities of trawl groundfish in Neah Bay. Vessels deliver to buyers who subsequently deliver to processors in Seattle, Bellingham, Astoria, and elsewhere. Port and harbor facilities are limited, and the location is considered remote and removed from distribution and transportation networks. No Federal trawl permits are owned by community members. Vessels fishing out of Neah Bay are owned by nonresidents. As recently as 2005, eight vessels made deliveries to Neah Bay, but anecdotal information indicates that many of these vessels have since left the business due to management restrictions. As of 2008, no trawlers are believed to be operating out of Neah Bay.

Westport

Westport is on the southernmost peninsula in Washington, Point Chehalis, in Grays Harbor County. The closest major U.S. city is Seattle, a 130-mile drive northeast. Westport is primarily a whiting port, though two small nonwhiting vessels also deliver there.

Westport is considered vulnerable. It is deeply engaged in Pacific fisheries in general and is fairly dependent on the groundfish fishery, but it is also fairly resilient.

Westport has a single processor that processes trawl groundfish landed in the community. This facility concentrates primarily on Pacific whiting and is one of the largest shoreside processors for this species. Facilities near the Port of Grays Harbor include vessel fabrication services and supply centers. Westport is somewhat removed from distribution centers. Fish landed in Westport are also processed in Astoria and Ilwaco.

Westport and Ilwaco are the dominant ports for groundfish in the Central and South Coast port group. Most of the larger vessels, in excess of 60 feet, are ported in Westport and Ilwaco (PFMC 2004a). Some of these are likely participants in groundfish fisheries, particularly the industrial fishery for Pacific whiting. These two port groups are sparsely populated, more rural areas. These regions have large Native American populations, at least proportionately.

Ilwaco

Ilwaco is on the Long Beach Peninsula in southwest Washington. Situated in Pacific County, the community encompasses 2.06 square miles of land and 0.31 square mile of water. The closest major U.S. city is Portland, Oregon, a 110-mile drive southeast, while Seattle is a 170-mile drive northeast. Ilwaco is primarily a whiting port.

Ilwaco is considered vulnerable. It is deeply engaged in Pacific fisheries in general, but it is not very dependent on groundfish. Ilwaco is fairly lacking in resilience.

Ilwaco has a relatively small, but has a sufficient amount of infrastructure, with one processor, a marina, a fish wholesaler, and sources for fishing and marine supplies.

Table 3-73. Fishery and demographic indicators, Washington coast ports.

Indicator	Neah Bay	Westport	Ilwaco
Vulnerability	Vulnerable	Vulnerable	Vulnerable
Dependence on groundfish	Medium-low dependence	Medium-low dependence	Low dependence
Resilience	Very low resilience	High resilience	Low resilience
Population (2000)	794	2,137	950
Unemployment rate (2000)	24	7.5	6.2
Natural resources employment (2000)	17.9	10.8	3.7
Median household income (2000)	21,635	32,037	29,632
Percent below poverty level (1999)	29.9	14.3	16.3
Non-whiting groundfish trawl vessels (2005)	8	3	0
Whiting trawl vessels (2005)	0	8	3
Percentage of fishery revenue from groundfish (2005)	64.1	14.5	14.7
Groundfish processors (2006)	0	1	1
Federal trawl permits owned by community members (2007)	0	1	0
Vessels bought back in 2003 buyout	0	2	0

3.14.6.2 Oregon

The north Oregon coast is the most important groundfish region on the west coast in terms of total groundfish landings and revenue. In 2000-01 this area accounted for \$12.3 million in ex-vessel groundfish revenue, almost a quarter of the \$51.5 million coastwide total, including at-sea deliveries (Table 3-71). The bulk of the at-sea deliveries—which are Pacific whiting delivered to floating processors—are attributable to these port groups. Astoria/Tillamook, grouped as one port area in the fishery-related tables (but split out in the demographic tables), and Newport are at or near the top of all the groundfish species categories, indicating that although the high-volume whiting fishery is centered in this region, other groundfish are equally important, surpassing whiting in terms of ex-vessel revenue (PFMC 2004a).

Astoria and Newport are home to a large fraction of the LE groundfish trawl fleet with 57 of the 243 total vessels in the fleet in 2002 (PFMC 2004a). The vessel buyback program retired 13 LE trawl vessels in Astoria and six trawlers in Newport in 2003 (NMFS 2004b). These port areas have a relatively large number of vessels in the 60-foot-and-above length classes, also reflecting the larger LE trawlers fishing out of these ports (PFMC 2004a).

These port groups are demographically similar. Of these two ports, Newport has the highest percent nonwhite population, and Native Americans represent the largest share of this population with 3.2 percent of the total population. These port groups rank in the middle in terms of educational attainment. Although average income is comparatively modest, poverty rates also rank lower, which could suggest less wealth disparity in these areas. However, looking at rates for individual census places suggests pockets of poverty in some areas. The rate for Astoria is 15.2 percent.

Fishery-related income and employment are important in these port groups (PFMC 2004a). Newport ranked second, while Astoria/Tillamook ranked fourth in terms of contribution fisheries activities made to these economic indicators in 2001. Approximately half of all fisheries income in these port groups was derived from groundfish-fishery-related activities in that year, reflecting the significance of these ports to the west coast groundfish fishery, discussed above.

Table 3-74 shows fishery and demographic indicators for Oregon ports.

Table 3-74. Fishery and demographic indicators, Oregon ports.

Indicator	Astoria		Warrenton	Newport	Coos Bay		Charleston	Brookings
	Vulnerable	Not vulnerable	Low dependence	Relatively dependent	Vulnerable	Not vulnerable	Dependent	Not vulnerable
Dependence on groundfish	Relatively dependent	Low dependence	High resilience	High resilience	Dependent	Dependent	Relatively dependent	High resilience
Population (2000)	9,813	4,096		9,532	15,374	n/a		5,447
Unemployment rate (2000)	6.7	3.5		9	5.4	n/a		5.8
Natural resources employment (2000)	3.1	3.4		3.8	3.6	n/a		5
Median household income (2000)	33,011	33,472		33,996	31,212	n/a		31,656
Percent below poverty level (1999)	15.9	14.2		14.4	16.5	n/a		11.5
Non-whiting groundfish trawl vessels (2005)	29			23	20			7
Whiting trawl vessels (2005)	5			12	2			0
Percentage of fishery revenue from groundfish (2005)	31.9			35.9			24.6	27.8
Groundfish processors (2006)	4			3			4-5	0
Federal trawl permits owned by community members (2007)	17, with 14 different owners			19, with 16 different owners			13, with 10 different owners	9, with 5 different owners (figures include Harbor)
Vessels bought back in 2003 buyout	12	0		9	8		0	6

Astoria/Warrenton

Astoria and Warrenton are adjacent to one another and are located in Clatsop County on the northwestern tip of Oregon, bordered by the Pacific Ocean on the west and the Columbia River on the north. Portland is the closest major city, 91 miles to the east.

Astoria is considered vulnerable. It is deeply engaged in Pacific fisheries in general, and it is relatively dependent on groundfish. Astoria has medium resilience. Warrenton is not considered vulnerable. It is not very engaged in Pacific fisheries and not very dependent on groundfish. Warrenton is also fairly resilient.

Astoria has the benefit of a relatively efficient fleet, a relatively large presence of shore-based infrastructure, and a low dependence on fishing grounds located in high bycatch areas. However, Astoria is fairly removed from distribution centers.

Newport

Newport is located in Lincoln County at the mouth of the Yaquina River. The northern portion of unincorporated South Beach is within the City of Newport's boundaries. The closest major metropolitan area is Portland, 136 miles to the northeast. Newport is both a whiting and nonwhiting port.

Newport prides itself in and protects its working waterfront, realizing that the seafood industry is at the core of Newport's history and culture. Tourism on the historic bayfront complements its mixed use. While new revitalization plans have enhanced the local tourism economy, they have also increased tensions between the tourism and seafood industries.

Newport is considered vulnerable. It is deeply engaged in Pacific fisheries in general, and very dependent on groundfish, but it is also fairly resilient.

In addition, several support businesses exist in the area, and dock and harbor facilities are fairly well developed. Newport is fairly removed from distribution centers.

Coos Bay/Charleston

Coos Bay and its port, Charleston, are located at the mouth of Coos Bay in Coos County, Oregon. Coos Bay is both a whiting and a nonwhiting port. Charleston, where most of the port activity takes place, is unincorporated. Coos Bay is located 226 miles south of Portland, on Highway 101, and 539 miles north of San Francisco.

Coos Bay is considered vulnerable. It is deeply engaged in Pacific fisheries in general, and very dependent on groundfish; it has medium resilience. Charleston is not considered vulnerable. It is not as engaged in Pacific fisheries or as dependent on commercial groundfish fisheries as Coos Bay (it scored higher on recreational measures, however); it is considered resilient.

There are several support businesses in the area, and dock and harbor facilities are fairly well developed. However, Coos Bay is fairly removed from distribution centers. Coos Bay appears to be at a relative advantage because of fleet efficiency and the relatively large amount of shore-based infrastructure.

The Pacific whiting fishery diminishes in importance, measured by landings and ex-vessel revenue, in southern Oregon. Although still a component of the Coos Bay port group landings, no whiting landings are shown in the Brookings region. Groundfish landings in the Brookings port group for 2002, at 881 mt, were lower than any other port group north of San Francisco (PFMC 2004a). However, with \$2.3

million in ex-vessel revenue from groundfish in 2002, the Brookings port group is not substantially smaller than most of the other port groups. The rockfish category contributes most to revenues in Brookings. Because many of these are sold as live fish, which command higher prices, Brookings ports earned more revenue from fewer landed fish compared to the neighboring Coos Bay port group. Live fish deliveries are an important component of California groundfish fisheries, and they are increasingly important in southern Oregon as well. Also, as a proportion of revenue from all fisheries, groundfish are especially important in the Brookings region: the \$2.3 million value amounted to just over half the \$4.3 million in landings from all fisheries in 2002 (PFMC 2004a).

There are some notable differences in fleet characteristics between these two port groups (PFMC 2004a). Coos Bay had 29 LE groundfish trawlers in 2001 versus only 4 in Brookings. The vessel buyback program retired eight LE trawl vessels in Coos Bay. Five retired vessels are reported for Brookings out of nine (NMFS 2004a), more than the 2001 count (PFMC 2004a). This discrepancy is likely due to differences in the way vessel home ports are determined. Port Orford in the Brookings port group had a fleet of 14 LE fixed vessels in 2001. The table also shows a large number of vessels in the open access category of more than 5 percent of revenue from groundfish in the Brookings port group. Some of these vessels are likely participating in the live fish fishery and contributing to high-value rockfish landings.

These two fairly rural port groups are generally similar to northern Oregon ports in terms of race and ethnicity, or the comparatively small percentage of the population that is nonwhite and Hispanic. Native Americans are the largest minority group at a little over 2 percent in both port groups. These two port groups rank at the bottom for the percent of the population between 17 and 64; Coos Bay ranks first for population 65 years old and up, Brookings third. This reflects the popularity of this part of the Oregon coast as a retirement destination. They also rank at the bottom in terms of average household income and have fairly high poverty rates. Median incomes in constituent census places, however, are higher than in some Northern California communities (see below), ranging from \$31,656 in Brookings to \$29,492 in Bandon. These values are about two-thirds the statewide value of \$40,916. Fisheries made a modest contribution to income and employment in 2001, with Brookings ranking somewhat higher than Coos Bay for the percent share coming from fisheries (PFMC 2004a).

Brookings

Brookings, located in Curry County, is the southernmost coastal city of Oregon. It is situated at the mouth of the Chetco River, approximately 345 miles south southeast of Portland. According to the Port of Brookings-Harbor, it is the busiest recreational port on the Oregon coast with more than 95,000 anglers taking more than 31,000 trips.

Brookings is not considered vulnerable. It is quite engaged in Pacific fisheries in general, and very dependent on groundfish, but it is also considered very resilient. Brookings depends heavily on the recreational salmon fishery, which was closed in 2008; therefore, it may be somewhat less resilient now than it was in the past.

Brookings is fairly removed from distribution networks. The fleet is characterized as relatively efficient because five vessels fall within the efficient category.

3.14.6.3 California

Northern California

Groundfish are an important component of landings, measured by value, in Northern California even if the total amount of groundfish landed in these three port groups is lower than for most port groups in

Washington and Oregon. Groundfish landings accounted for 29 percent of total ex-vessel revenues in these three port groups compared to 34 percent in Oregon and 18 percent in Washington (PFMC 2004a). During this year, these port groups also accounted for a little over half of the value of all groundfish landed in California, but only about a quarter of all fishery landings in California (Table 8-3b). Yet the amount of groundfish landed in these three port groups, 8,303 mt in 2002, is lower than that landed in any one of three port groups in Washington and Oregon (South and Central Washington, Astoria-Tillamook, and Newport) and lower than the sum of any three port groups in those two states. As in southern Oregon, rockfish and lingcod are important components of landings, measured by ex-vessel revenue. In Fort Bragg rockfish were the largest component of groundfish landings (PFMC 2004a). As mentioned above, this likely reflects the importance of high-value live fish deliveries. Eureka represents the southern terminus of the Pacific whiting fishery in terms of landings ports with 2,775 mt landed there in 2002, a small amount in comparison to landings in southern Washington and northern Oregon.

The total number of groundfish vessels in each of these three port groups is lower than in Oregon port groups, although higher than port groups in Washington (PFMC 2004a). However, the highest number of LE trawl vessels was retired by the vessel buyback program in this region. According to the report (NMFS 2004b), 14 vessels each were retired in Crescent City and Eureka. Another four vessels in Fort Bragg were retired. The open access sector also plays a larger role in these ports. In Eureka, for example, of the 98 vessels making groundfish landings in 2001, 68 were in the open access sector with groundfish accounting for more than 5 percent of their revenue for the year. Smaller vessels are more prevalent in the fishing fleets in these port groups; only 7 percent of the vessels are in the 60-foot-and-above size groups, half or less of the comparable percentage in Oregon port groups such as Astoria-Tillamook and Newport.

Hispanics are the largest minority group in these three port groups, although their share of the population is less than in most of the other port groups in California. The next largest minority group after Hispanics is Native Americans, who make up 5.4 percent of the population in the Crescent City area, 4.0 percent in Eureka, and 2.9 percent in Fort Bragg, ranking them first, third, and fifth among the port groups, respectively, for this statistic. Crescent City and Eureka rank low in terms of average household income and have the highest poverty rates among all the port groups. Median incomes in constituent census places are also comparatively low; in fact the median income for Crescent City—\$20,133—is less than half the value for California as a whole. Fort Bragg is notable in terms of the comparatively high percentage of the population employed in natural resource related jobs. Estimated employment in fisheries in 2001 was relatively high in Crescent City but more modest in the other two port groups (PFMC 2004a). Groundfish fisheries played a more prominent role in Eureka than the other two port groups in this region, likely because of the shore-based processing of Pacific whiting at this port.

Crescent City

Crescent City is in Del Norte County in northern California, approximately 330 miles south of Portland, Oregon, and 356 miles north of San Francisco. The Crescent City Harbor supports recreational and commercial fisheries, along with tourism. The harbor includes an ice plant, hoist, fuel supplier, boatyard, tackle shops, dry storage, marine supply store, vessel repair and maintenance, and other amenities.

The groundfish vessel buyback program and sales of other local vessels have removed many of the larger rent-paying vessels from the port. The absence of this revenue stream has reportedly caused an increase in rent. A new port master plan aims to attract shops and other business.

Crescent City is considered vulnerable. It is very engaged in Pacific fisheries in general and quite dependent on groundfish, with medium resilience. In addition, Crescent City has been affected by the recent closure of the commercial and recreational salmon fishery.

Eureka

Eureka is the county seat of Humboldt County in northern California on Humboldt Bay south of Redwood National Park. San Francisco is 272.3 miles south. The economic base of Eureka was founded on fishing and timber. Commercial fishing has downsized in recent years, and now the major industries are tourism and timber. Eureka is located on Humboldt Bay, the only deep water port between Coos Bay, Oregon, and San Francisco.

Eureka has one large processing facility engaged in trawl groundfish. This processor also processes fish landed in Bodega Bay, Brookings, Fort Bragg, San Francisco, and Crescent City. Fish landed in Eureka are also processed in Fort Bragg and Watsonville. Eureka's harbor facilities include berthing, dry storage, cold storage, a hoist, a boatyard, fuel facilities, ice, vessel repair and maintenance, electrical services, marine supplies, and other amenities. Eureka is relatively removed from transportation networks and seafood distribution facilities.

Eureka is considered vulnerable. It is very engaged in Pacific fisheries in general and very dependent on groundfish, with medium resilience. Like Crescent City, Eureka has been affected by the recent closure of the commercial and recreational salmon fishery.

Fort Bragg

Fort Bragg is in Mendocino County on northern California's Pacific Coast. The community is bordered on the north by Pudding Creek, which flows into the Pacific Ocean through a narrow inlet. Noyo Harbor is at the southern edge of the city. Noyo Bay provides a natural harbor and access to ocean fisheries.

Fishing has historically been, and remains, an important part of Fort Bragg's economy and community identity. Many boat owners offer private charter services for tourists and sport fishermen. In addition to salmon, commercial and recreational fisherman take rockfish, abalone, crabs, and mussels. Several festivals point to the city's dependence on fishing and logging. The city has two fish processors, a liquid fish fertilizer processing plant, and numerous businesses associated with fishing and coastal tourism. Harbor facilities include berthing, two hoists, dry storage, fuel, ice, marine supplies, vessel repair and maintenance, and other amenities.

Fort Bragg is considered vulnerable. It is very engaged in Pacific fisheries in general, and it is very dependent on groundfish, with medium resilience. As with other California and Oregon communities, Fort Bragg has been affected by the recent closure of the commercial and recreational salmon fishery.

Table 3-75. Fishery and demographic indicators, Northern California ports.

Indicator	Crescent City	Eureka	Fort Bragg
Vulnerability	Vulnerable	Vulnerable	Vulnerable
Dependence on groundfish	Relatively dependent	Relatively dependent	Dependent
Resilience	Medium resilience	Medium resilience	Medium resilience
Population (2000)	4,006	26,128	7,026
Unemployment rate (2000)	6.5	9.7	8.4
Natural resources employment (2000)	3.9	3.2	8.3
Median household income (2000)	20,133	25,849	21,587
Percent below poverty level (1999)	34.6	23.7	40.9
Non-whiting groundfish trawl vessels (2005)	5	14	10
Whiting trawl vessels (2005)	0	3	0
Percentage of fishery revenue from groundfish (2005)	19	52.8	40.6
Groundfish processors (2006)	0-1	1	1
Federal trawl permits owned by community members (2007)	4, with 3 different owners	4, with 3 different owners	8, with 6 different owners
Vessels bought back in 2003 buyout	16	16	5

Central California

In Central California, and Southern California especially (see below), groundfish diminish as a significant component of commercial landings. In 2002, San Francisco ranked below Eureka and Fort Bragg port groups in terms of the amount of groundfish landings, but second only to Eureka in California measured by ex-vessel value. In the fishery-related tables, as opposed to the demographic tables, Bodega Bay ports are included in the San Francisco port group. Rockfish were an important component of landings in all three port groups in 2002; however, in Morro Bay especially, they provided a large portion of ex-vessel revenue. As noted above, this reflects the importance of the live fish fishery. Flatfish are also an important contributor to landings in all three port groups, while sablefish are significant in the Monterey port group.

As in Northern California, open access vessels were an important part of the fleet in these port groups, based on landings at member ports, as shown in Table 8-4. The LE trawl vessel buyback program retired 11 vessels in this region (NMFS 2004a), further reducing the importance of that sector. Taking the three port groups together, 86 percent of vessels making groundfish landings were in the open access sector, and the great majority of these likely targeted groundfish on some trips, given the number for which groundfish account for more than 5 percent of total landings value. In Morro Bay, almost all of these vessels made landings of nearshore species, again suggesting the importance of the live fish fishery—which targets fish in relatively shallow water—in this port group. Table 8-5 shows that these port groups have more small vessels—97.5 percent are less than 60 feet long compared to the coastwide value of 92 percent.

This region is more ethnically diverse, better educated, and wealthier than port groups to the north. Like Seattle in Puget Sound, San Francisco and the Bay Area metropolis dominate this region in terms of population and economic activity. The sparsely populated Bodega Bay port group includes affluent Sausalito, just across the Golden Gate Bridge from San Francisco. Its median income of \$87,469 places it above all other communities except for the Newport Coast CDP in Southern California. Yet all of these port groups compare positively in terms of the statistics measuring income and education, with Morro Bay somewhat of a laggard in comparison to the other three port groups. As might be expected, natural-resource-related employment is insignificant in the San Francisco port group and modest in the other three. Table 3-70 further underscores the relatively unimportant role that fisheries play in large

regional economy of Central California. These ports rank near the bottom of the west coast port groups in estimates of 2001 income and employment from fisheries. Groundfish-related activities were also a less important share of fisheries income and employment in the Central California port groups, outranking only Southern California.

Table 3-76. Fishery and demographic indicators, Central California ports.

Indicator	San Francisco	Moss Landing	Half Moon Bay	Princeton	Morro Bay
Vulnerability	Not vulnerable	Vulnerable	Not vulnerable	Not vulnerable	Vulnerable
Dependence on groundfish	Relatively dependent	Somewhat dependent	Low dependence	Low dependence	Medium dependence
Resilience	High resilience	Low resilience	High resilience	High resilience	High resilience
Population (2000)	776,733	300	11,842	489	10,350
Unemployment rate (2000)	4.6	17.4	4	7.8	2
Natural resources employment (2000)	0.1	9.6	2.2	35.1	3.7
Median household income (2000)	55,221	66,442	78,473	40,417	34,379
Percent below poverty level (1999)	11.3	18.8	6.1	21.8	13
Non-whiting groundfish trawl vessels (2005)	16	13		11	8
Whiting trawl vessels (2005)	0	1		0	0
Percentage of fishery revenue from groundfish (2005)	33.6	23		23.1	48.3
Groundfish processors (2006)	6	0		3	0
Federal trawl permits owned by community members (2007)	10, with 4 different owners*	1	4, with 3 different owners		0*
Vessels bought back in 2003 buyout	1	3	0	0	5

*The Nature Conservancy, headquartered in San Francisco, owns 7 permits 1 used in Monterey, 6 used in Morro Bay)

San Francisco

San Francisco is located on the San Francisco Peninsula. A large and diverse city, San Francisco still has active commercial and recreational fisheries. San Francisco-area fisheries, like many west coast fisheries, fluctuate depending on fisheries management decisions, ocean and weather cycles, and economic factors. Fishermen's Wharf is the traditional home of the fishing fleet and still serves commercial fishermen, although to a lesser extent than in the past; it is now primarily a tourist attraction. The Port of San Francisco provides berthing for commercial fishing boats at Fisherman's Wharf. The port offers full service ship repair, two dry docks, fuel, ice and other supplies, and numerous portside facilities. Additionally, the wharf's Pier 45 houses the west coast's largest concentration of commercial fish processors and distributors. It is port policy that commercial fishing vessels have top priority for berths at the harbor. Many of the fishermen in the wharf community are not San Francisco residents due to San Francisco's high cost of living. Fishermen live in the nearby communities of East Bay, South Bay, Sonoma, Peninsula, and others.

San Francisco is not considered vulnerable. It is very engaged in Pacific fisheries in general, and its fisheries are quite dependent on groundfish, but it has very high resilience.

Moss Landing

Moss Landing is in Monterey County on the eastern shore of Monterey Bay at the mouth of Elkhorn Slough. The community is 25.4 miles south of Santa Cruz and 95.8 miles south of San Francisco.

Fisheries in Moss Landing traditionally targeted sardines and other CPS species. After the sardine population collapsed, fishermen and buyers shifted their focus to anchovies, mackerel, and squid. Over time, fisheries for groundfish, halibut, spot prawn, crab, salmon, albacore, and other species developed at Moss Landing. Today, Moss Landing Harbor is one of the largest commercial fishing ports in California. In 2001, it ranked third in pounds landed behind the Los Angeles and Ventura/Port Hueneme/Oxnard Harbor complexes and fourth in ex-vessel revenues behind the San Francisco Bay area. Moss Landing Harbor, Woodward's Marine (a small supply/tackle store and fuel dock), a boatyard

with travelift, a marine electrician, a marine diesel mechanic, a marine covers/upholstery shop, and a metal fabricator/welder provide fishing-related goods and services. Fish landed in Moss Landing are processed in San Francisco, Santa Rosa, Watsonville, and Hawaiian Gardens. Moss Landing's economy is now based on commercial fishing, research, and recreation and tourism.

Moss Landing is considered vulnerable. It is quite engaged in Pacific fisheries in general, and somewhat dependent on groundfish, and it has very low resilience.

Princeton/Half Moon Bay

Princeton, also known as Princeton-by-the-Sea, is one of several unincorporated coastal communities south of San Francisco. It is 25 miles south of San Francisco and 44 miles northwest of San Jose. Half Moon Bay is located nearby. Princeton generally serves as the port for Half Moon Bay.

Neither Princeton nor Half Moon Bay is considered vulnerable. As their relatively high median household income shows, both are quite well off, though Princeton also has a high percentage of residents whose income is below poverty level. Both communities' dependence on the groundfish fishery is low, and both are highly resilient.

Originally envisioned as an ocean resort, Princeton is now known principally for its harbor, Pillar Point. The land adjacent to Pillar Point is primarily industrial for boatbuilding and other marine-related industries. Pillar Point is a working fishing harbor with 369 berths. The harbor was constructed in 1961, and the inner breakwater was added in 1982. Pillar Point offers a modern fish dock, six-lane boat launch ramp, ice-making facility, and serves as a fish-buying hub for local commercial vessels.

Morro Bay

Morro Bay is considered vulnerable. It is quite engaged in Pacific fisheries in general, is very dependent on groundfish, but it also is very resilient.

In 2006, The Nature Conservancy purchased six federal trawling permits and four trawling vessels from commercial fishermen in Morro Bay. In addition to the six permits, the Conservancy purchased four trawling vessels and is exploring alternative uses for them. One vessel associated with the acquired trawling permits remains with its current owner, who holds permits for other types of fishing, but is not trawling at this time. The vessel is legally constrained from bottom trawling for groundfish in the future. Any fisherman who sells his permit to the Conservancy cannot re-enter the trawl groundfish fishery.

There are currently no trawlers operating out of Morro Bay. For now, all but one of The Nature Conservancy permits are inactive. In the future, however, it may lease back permits to central coast fishermen who would use more selective gear; Morro Bay fishermen will be given preference for using these permits. Therefore, it is impossible to predict how efficient Morro Bay's future fleet may be, though The Nature Conservancy materials suggest it is unlikely that much trawling will take place there.

Groundfish landed in Morro Bay are processed in Atascadero (15 miles away), San Francisco, Watsonville, and Port San Luis/Avila. The town is relatively removed from distribution facilities, but infrastructure exists in the harbor area to support commercial fishing operations.

3.14.7 Minority and Low Income Communities

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to identify and address "disproportionately high adverse human health or environmental effects of its programs, policies, and activities on minority and low-income

populations in the United States.” Fishery management actions promulgated by the Pacific Council and implemented by NMFS can have environmental and socioeconomic impacts over a very wide area; the affected area of many actions covers all west coast waters and adjacent coastal communities involved in fishing. This makes it difficult to identify minority and low-income populations that may be disproportionately affected.

An analysis included in the 2005-06 groundfish harvest specifications used 2000 census data to identify coastal communities that may be considered low income and/or having a large minority population (PFMC 2004a). Impacts of the proposed action on those communities can then be assessed to determine if they are disproportionate. That analysis is incorporated by reference. Five criteria were used to identify low income and minority communities: percent nonwhite population, percent Native American population, percent Hispanic population, average income, and poverty rate. Census block group data encompassing each port were compared to a reference, in this case, the census data for all the ports within a region. Three regions were identified: Washington, Oregon, and Northern California; Central California; and Southern California. Ports that fell into the top or bottom twentieth percentile, depending on the statistic, were identified. Table 3-77 summarizes this information by showing the number of ports in each region that fell within the top or bottom twentieth percentile. Table 3-78 and Table 3-79 indicate which ports fell into the top or bottom percentile, indicated by shaded cells.

Table 3-77. Number of ports in each region falling within the top or bottom twentieth percentile by indicator.

	% Nonwhite	% Native Am.	% Hispanic	Income	Poverty
North	4	15	5	13	12
Central	1	2	1	0	2
South	0	2	2	1	3
Grand Total	5	19	8	14	17

Table 3-78. Demographic indicators related to environmental justice, Washington and Oregon ports.

	% Nonwhite	% Native Am.	% Hispanic	Income	% Poverty
Washington					
Puget Sound					
Blaine					
Bellingham Bay					■
Friday Harbor		■			
Anacortes		■			
La Conner			■		
Everett					
Seattle	■				
Tacoma					
Olympia					
Shelton					
North Washington Coast					
Port Townsend					
Sequim					
Port Angeles		■			
Port Angeles E					
Neah Bay	■			■	■
La Push					
South & Central WA Coast					
Copalis Beach				■	
Grays Harbor		■			■
Westport				■	■
Willapa Bay				■	■
Ilwaco/Chinook					
Oregon					
Astoria					
Astoria					
Gearhart					
Seaside					
Cannon Beach					
Tillamook					
Nehalem Bay					
Tillamook / Garibaldi				■	
Netarts Bay					
Pacific City					
Newport					
Salmon River		■			
Depoe Bay		■			
Siletz Bay		■			
Newport					
Waldport				■	
Yachats					
Coos Bay					
Florence				■	
Winchester Bay					■
Coos Bay		■		■	■
Bandon					
Brookings					
Port Orford				■	■
Gold Beach					
Brookings		■		■	

Table 3-79. Demographic indicators related to environmental justice, California ports.

	% Nonwhite	% Native Am.	% Hispanic	Income	% Poverty
California					
Crescent City					
Crescent City					
Eureka					
Trinidad					
Eureka					
Fort Bragg					
Fort Bragg					
Albion					
Point Arena					
Bodega Bay					
Bodega Bay					
Tomaes Bay					
Point Reyes					
Sausalito					
San Francisco					
San Francisco					
Richmond					
Berkeley					
Oakland					
Alameda					
Princeton					
Monterey					
Santa Cruz					
Moss Landing					
Monterey					
Morro Bay					
Morro Bay					
Avila Beach					
Santa Barbara					
Santa Barbara					
Ventura					
Oxnard					
Port Hueneme					
Los Angeles					
San Pedro					
Willmington					
Long Beach					
Terminal Island					
Newport Beach					
Dana Point					
San Diego					
Oceanside					
San Diego					

3.15 Tribes

Section 6.2.5 of the Groundfish FMP describes Indian treaty rights:

Treaties with a number of Pacific Northwest Indian tribes reserve to those tribes the right of taking fish at their usual and accustomed fishing grounds and stations (U&A) in common with other citizens of the United States. NMFS has determined that the tribes that have groundfish U&A in the area managed by this FMP are the Makah, Hoh, and Quileute Tribes, and the Quinault Indian Nation. Several tribal fisheries exist for species covered by the FMP. The Federal government has accommodated these fisheries through a regulatory process, found at 50 CFR 660.324. Until such time as tribal treaty rights are finally adjudicated or the regulatory process is modified or repealed, the Council will continue to operate under that regulatory process to provide recommendations to the Secretary on levels of tribal groundfish harvest.

Sections 2.2.1.1 and 7.2.6 in the 2009-10 Groundfish Harvest Specifications EIS (PFMC 2008a) describe tribal fisheries pursuant to these treaty rights. Those sections are incorporated by reference. Some species—sablefish, black rockfish, and Pacific whiting—are subject to formal allocations or “set asides.” Tribal harvest guidelines have been established for Pacific cod and lingcod. Tribal set asides have also been established for overfished species as part of the biennial harvest specifications process. Other species are not formally allocated; instead, during the biennial harvest specifications process, the tribes recommend management measures, in the form of trip limits, from which their total harvest can be estimated. The Council then works to accommodate these requests within the constraints imposed by the OYs for target and nontarget species, including overfished species. Fishing by a treaty tribe outside its U&A area is subject to Federal regulations applicable to other groundfish fisheries.

During the biennial harvest specifications process, set asides are deducted from the OYs for overfished species for tribal catches. Set asides are also established for scientific research, principally trawl surveys, and catches under EFPs. Once the set asides have been deducted, management measures for nontribal fisheries are modeled to conform to the resulting quantity of fish.

The tribal fisheries are principally longline, with only the Makah Tribe deploying trawl vessels. The longline fisheries target Pacific halibut and sablefish. The Makah Tribe participates in both the bottom trawl fisheries and whiting fisheries. Table 3-80 shows tribal landings by gear type from 1995 to 2007. Hook-and-line has always been an important component of landings but in recent years trawl landings have increased substantially, mainly due to the Makah Tribe’s participation in the Pacific whiting fishery. Dungeness crab and groundfish predominate in terms of the value of landings; in 2007 crab accounted for 53 percent of ex-vessel revenue and groundfish 31 percent.

Table 3-80. Tribal landing (mt) and revenue (\$) by gear type, 1995-2008.

Year		Gear group				
		Hook and line	Net	Pot	Troll	Trawl
1995	Landed weight (mt)	577	39	144	119	-
	Exvessel rev (\$)	3,194,999	47,683	588,088	268,213	-
1996	Landed weight (mt)	635	13	478	115	-
	Exvessel rev (\$)	3,366,492	22,705	1,650,108	292,701	-
1997	Landed weight (mt)	607	9	495	100	-
	Exvessel rev (\$)	3,572,272	13,171	2,032,475	207,340	-
1998	Landed weight (mt)	428	4	381	119	9
	Exvessel rev (\$)	1,733,785	6,907	1,284,397	252,236	10,707
1999	Landed weight (mt)	597	2	439	200	15
	Exvessel rev (\$)	2,625,825	5,470	2,150,331	497,457	12,037
2000	Landed weight (mt)	598	21	428	90	36
	Exvessel rev (\$)	3,264,873	51,357	2,022,224	226,521	34,420
2001	Landed weight (mt)	638	54	302	298	119
	Exvessel rev (\$)	3,297,688	85,410	1,293,899	562,091	123,789
2002	Landed weight (mt)	511	5	818	272	459
	Exvessel rev (\$)	2,447,514	8,185	3,242,007	457,701	503,830
2003	Landed weight (mt)	618	2	780	258	4,947
	Exvessel rev (\$)	3,423,536	4,636	3,269,302	554,518	1,471,241
2004	Landed weight (mt)	738	2	1,212	519	7,965
	Exvessel rev (\$)	3,949,481	4,720	5,704,054	1,696,718	1,605,861
2005	Landed weight (mt)	623	2	2,277	353	13,016
	Exvessel rev (\$)	3,406,709	4,552	7,945,838	1,495,075	2,551,583
2006	Landed weight (mt)	583	1	997	295	30,859
	Exvessel rev (\$)	3,577,353	3,313	3,875,111	1,413,858	4,652,760
2007	Landed weight (mt)	524	0	1,622	256	12,845
	Exvessel rev (\$)	3,692,577	824	8,878,281	1,254,271	2,952,536

Table 3-81. Tribal landings (mt) and revenues (\$) by species group, 1995-2007.

Year		Species Group				
		Crab	Groundfish	Highly Migratory Species	Other	Salmon
1995	Landed weight (mt)	104	544	-	91	139
	Exvessel rev (\$)	294,191	3,112,506		390,477	301,810
1996	Landed weight (mt)	995,966	1,290,009	57,088	192,080	200,358
	Exvessel rev (\$)	1,526,248	3,055,675	48,692	447,144	254,247
1997	Landed weight (mt)	466	544	24	99	78
	Exvessel rev (\$)	1,954,136	3,207,092	39,831	452,342	171,856
1998	Landed weight (mt)	367	330	18	129	96
	Exvessel rev (\$)	1,205,280	1,330,811	14,170	501,865	235,906
1999	Landed weight (mt)	439	511	6	117	181
	Exvessel rev (\$)	2,149,703	2,106,883	10,719	544,134	479,682
2000	Landed weight (mt)	419	523	-	128	103
	Exvessel rev (\$)	1,957,757	2,625,799		748,237	267,603
2001	Landed weight (mt)	302	578	7	190	334
	Exvessel rev (\$)	1,293,899	2,590,711	11,876	841,566	624,826
2002	Landed weight (mt)	818	760	10	218	260
	Exvessel rev (\$)	3,242,007	2,012,410	11,525	948,640	444,655
2003	Landed weight (mt)	780	5,354	17	220	233
	Exvessel rev (\$)	3,269,302	3,634,134	33,453	1,272,160	514,172
2004	Landed weight (mt)	1,212	8,479	7	244	495
	Exvessel rev (\$)	5,704,054	4,088,613	11,162	1,508,269	1,648,764
2005	Landed weight (mt)	2,277	13,479	6	191	318
	Exvessel rev (\$)	7,945,838	4,857,119	12,949	1,177,747	1,410,098
2006	Landed weight (mt)	997	31,295	10	201	233
	Exvessel rev (\$)	3,875,103	7,132,410	15,603	1,302,379	1,196,873
2007	Landed weight (mt)	1,622	13,201	33	180	210
	Exvessel rev (\$)	8,878,281	5,231,044	51,857	1,456,977	1,160,125

3.16 Management Approach and Management Agencies

This description of status quo management begins with an overview of the groundfish fishery management system, which includes sectors in addition to the LE trawl sector which would be directly affected by the proposed action. Described below are the management approach and measures specific to the LE trawl fishery, with reference to the relevant sections in the groundfish FMP. Although the proposed action only involves changes to the LE trawl fishery management system, abbreviated information on some other groundfish fisheries is included because these sectors may be affected by the proposed action. The 2008 Status of the Pacific Coast Groundfish Fishery, SAFE document Volume 1, Chapter 5, further describes the fishing sectors and communities that participate or are affected by the west coast groundfish fishery (PFMC 2008c).

3.16.1 Current Groundfish Management System

The groundfish fishery is a multi-species fishery including many species of rockfish, flatfish, sharks and skates, and roundfish. Various targeting strategies are pursued using different types of gear, resulting in wide variation in the mix of species caught. Currently the groundfish fishery is divided into sectors: LE trawl (further subdivided into the shoreside sector and at-sea whiting sectors); LE fixed-gear (line gear and pot or trap gear); directed open access using line, pot gear, or other nongroundfish trawl gears; incidental open access (vessels targeting nongroundfish species, like crab, salmon, or California halibut,

but which occasionally catch groundfish); and a tribal groundfish sector, which includes whiting mothership, trawl and fixed-gear vessels.

Allocating harvest opportunity among different fishery sectors is an integral part of the management process. Some stocks, such as sablefish and Pacific whiting, have fixed or “hard” allocations established under the groundfish FMP. Management measures for these species are structured as much as possible to allow particular sectors the opportunity to catch a fixed percentage of the OY. However, allocations for the majority of groundfish species are determined as part of the process of developing management measures. In these cases, rather than establishing a hard allocation, the Council proposes management measures through the biennial harvest specifications process, evaluates the likely allocations resulting from those measures, and modifies the proposed measures. Catch projections (and estimates of total catch inseason) are made using what is often described as the “trawl bycatch model.” This model uses discard estimates from the WCGOP and logbook information to develop temporal and spatially stratified bycatch rates for overfished species. The bycatch model can be used to estimate both target species and overfished species catch based on a proposed set of management measures (two-month cumulative trip limits and RCA configurations). The proposed modification takes place on the basis of the expected catches and either establishes an ad hoc allocation (harvest guideline) for the purpose of the period covered by the management measures, or an implicit de facto allocation. In this way, allocation among sectors is achieved, particularly in deciding harvest allocations between commercial and recreational sectors. The objective in setting management measures is to allow for the greatest harvest of healthy stocks within the constraints of overfished species rebuilding.

The harvest of the four Indian tribes in Washington State is also taken into account when OYs are established. For a few species (sablefish and whiting, for example) a share of the OYs for groundfish species taken in these tribal fisheries is explicitly allocated. For most species, expected tribal harvest levels are taken into account in setting regulations for other sectors, but there is no allocation to the tribes. For the species for which they receive an allocation and for other species for which expected harvest levels are identified, the tribes then oversee the prosecution of their fisheries separate from the management of other groundfish fishery sectors.

Since the adoption of FMP Amendment 17 in 2003, groundfish harvest specifications and management measures have been set on a biennial basis. Every even-numbered year, the Council adopts OYs and management specifications covering groundfish fisheries for the following two years. The two-year management cycles began with the 2005-06 fishery. ABCs and OYs are set based on the most recent stock assessments and recommendations from Council advisory bodies and comments from the public. Separate ABCs and OYs are identified for each year in the two-year cycle. Management measures are then crafted to optimize opportunities for commercial and recreational fishermen while keeping harvest within the adopted OYs. Recently this process has become a delicate balancing act between the competing demands for groundfish target species from the different sectors and the additional constraint to minimize mortality of several constraining overfished species, including bycatch (discard) mortality.

Management of commercial fisheries is currently based on four elements: seasons, bimonthly cumulative landings limits, management areas, and exclusion zones or GCAs. Landed species can be caught outside of designated exclusion zones that, for commercial fisheries, generally encompass bottom areas on the continental shelf between approximately 75 fm and 150 fm in depth (varying somewhat with season and year) and are referred to as RCAs. Landings limits are set based on historical landings of target species from fish tickets and discard rates for target and incidental catch species obtained from observer sampling of commercial fishing vessels.

3.16.1.1 Commercial Fishery Management Measures

Groundfish are taken in four different types of fisheries: LE trawl, LE fixed-gear (line gear and pot or trap gear), directed open access (line, pot gear, or other nongroundfish trawl gears), and incidental open access (vessels targeting nongroundfish species like crab, salmon, or California halibut, but which occasionally catch groundfish). A description of the LE fixed-gear and directed open access sectors can be found in the 2008 SAFE document, Chapter 5 (PFMC 2008c).

Seasons

Most groundfish fisheries are managed to achieve a year-round season. In fact, this is one of the key objectives expressed in the Groundfish FMP because buyers and processors regard a continuous and consistent supply of fish as essential to maintaining markets. Recently, managing fisheries to prevent OYs from being exceeded before the end of the year has become increasingly difficult because of the low harvest limits for some overfished species. Consequently, some fisheries have been closed early. A few groundfish fisheries are managed according to shorter seasons. The Pacific whiting fishery is the largest fishery in terms of the volume of landings; it is managed to occur during only part of the year. Its season usually begins on April 1 and runs until the OY has been caught, usually by late October. The Pacific whiting OY is allocated according to a formula between shoreside, at-sea mothership, at-sea catcher-processor, and tribal fleets. Within the catcher-processor fleet, participants coordinate fishing behavior to determine how quickly their allocation will be taken or, conversely, how long the season will last. The LE fixed-gear sablefish fishery is also limited to a primary season from April 1 to October 31. There are separate allocations of sablefish for catch by other sectors. These are managed with cumulative limits.

Cumulative landings limits

Trip limits have been a feature of groundfish management since the inception of the Groundfish FMP. Over time, the regime has become more complex, covering a wider range of species and sectors. The basic concept is to set a limit on how much of a given species (or multi-species complex⁶⁹) an individual vessel may land in a fixed time period. Originally, these limits were on a per trip basis. Currently, to reduce the likelihood of regulatory discards, the limits are cumulative totals for a two-month period (January-February, March-April, May-June, etc.). Two-month cumulative landings limits are set separately for the LE trawl, LE fixed-gear, and open access sectors. For each of these sectors, there are separate limits for U.S. waters north and south of 40E10' N. latitude (approximately Cape Mendocino, California). The Pacific whiting fishery is a significant exception to trip limit management. As noted above, it occurs during a season whose length is determined by how quickly the OY is taken.

Management Areas

The west coast EEZ is divided into several, sometimes overlapping, areas, as shown in Figure 1-1. The five named areas (Vancouver, Columbia, Eureka, Monterey, and Conception) were originally devised by the International North Pacific Fishery Commission (INPFC) as statistical areas for cataloguing fish catch. Although still occasionally referred to as “INPFC areas,” this organization is defunct and “management area” is now the preferred term. Landings are sometimes reported by these areas and these boundaries are sometimes used to demarcate the application of different management measures. However, other latitudinal lines have emerged as important management boundaries. The 40E10' N. latitude line (near the Eureka-Monterey boundary) is also one of the most used management boundaries;

⁶⁹ Many commercially less important or less frequently caught species are combined in stock complexes for the purposes of management. These species are not generally differentiated in reported landings, and most have not had stock assessments. Multi-species complexes currently in use include the “minor rockfish” (additionally separated into several sub-categories), “other flatfish,” and “other fish” categories.

as noted above for cumulative landing limits, landings are regulated differently north and south of this line. Landings limits differ north and south of this boundary. Other boundaries in use for management include latitude lines near significant coastal landmarks, such as Point Reyes and Point Conception in California. The latter represents an important marine biogeographic boundary, and is used to bifurcate some stocks (such as sablefish), as well as to differentiate management measures. Other latitudinal demarcations are used to vary the shoreward and seaward boundaries of GCAs, discussed below.

Groundfish Conservation Areas

Three different types of closed areas have been implemented to limit bycatch of overfished species. A relatively small Yelloweye Rockfish Conservation Area (YRCA) closes a hotspot off the Washington coast. Recreational fishing is prohibited within the YRCA, and the area is designated as a voluntary closure for the LE fixed-gear sablefish fleet and salmon trollers. The YRCA was first implemented in 2003. There are two areas off the southern California coast designated Cowcod Conservation Areas (CCAs), intended to protect cowcod. Recreational and commercial fishing are prohibited within the CCAs, except that rockfish and lingcod fishing have been permitted shoreward of 20 fathoms. The CCAs were first implemented in 2001.

RCAs are by far the most extensive and complex closed areas. First implemented in late 2002 as part of an in-season management action, RCAs extend from the Canadian border to the Mexican border of U.S. waters. The RCAs were implemented to reduce bycatch of overfished species. These species are more frequently caught within certain depth ranges. Based on analysis of observer reports and vessel logbooks, the boundaries of the RCAs were set to prohibit groundfish fishing within a range of depths where encounters with overfished species were most likely. To make enforcement possible, in most cases the actual isobaths—lines of equal depth—are approximated by straight lines between published waypoints. The depths included in RCAs vary by season, latitude, and regulatory sector. Boundaries for LE trawl vessels are different than those for the LE fixed-gear and open access sectors. Figure 3-30 and Figure 3-31 depict the general configuration of the trawl and nontrawl RCAs during January and February 2008 (period 1). The nontrawl RCA has the same configuration throughout 2008, unless changed by an inseason management action. The 2008 period 1 trawl RCA is estimated to cover an area of about 7,800 square miles.

Salmon Conservation Areas

In 2005, NMFS implemented an Ocean Salmon Conservation Zone (OSCZ) during the primary Pacific whiting season to apply to all sectors of the commercial Pacific whiting fishery (70 FR 51682, August 31, 2005.) In that year, incidental catch of Chinook salmon were relatively high, and the OSCZ moved the Pacific whiting fishing offshore of a boundary line approximating the 100-fm (183-m) depth contour. Incidental catch rates of Chinook salmon tend to be higher in the nearshore area. Because the 2005 incidental catch of Chinook salmon had exceeded an 11,000-fish threshold specified in the biological opinion, NMFS reinitiated Endangered Species Act (ESA) section 7 consultation on the groundfish fishery in winter 2005-06. The supplemental biological opinion concluded that, although the 2005 catch of Chinook had been high, continued operation of the groundfish fisheries under the FMP would not jeopardize the recovery of salmon stocks listed as threatened or endangered under the ESA. The supplemental biological opinion also recommended that, as a longer-term management measure, the OSCZ be implemented via Federal regulation as a management measure available for inseason implementation, as needed to constrain salmon bycatch in the Pacific whiting fishery. As part of the 2007-2008 specifications and management measures, the OSCZ was implemented as a potential inseason management tool for the Pacific whiting fishery. Observer data collected on board the mothership processors continues to be the primary data used to estimate salmon catch in the mothership sector and to ensure that the fishery as a whole stays within the guideline set out within the biological opinions.



Figure 3-30. Configuration of the trawl RCA and Cowcod Conservation Area during January-February 2008.



Figure 3-31. Configuration of the trawl RCA and Cowcod Conservation Area during March-October 2008.

Gear Restrictions

Although various gear restrictions were a key feature of groundfish management even before the FMP was implemented, the most important current measures distinguish between large and small footrope gear. This refers to the size of the roller gear affixed to the bottom leading edge of a bottom trawl net. Large footrope gear can allow the net to be fished over rougher ground. Large footrope gear is also preferred when trawling for DTS species on the soft bottom areas offshore, while small footropes are more commonly used to fish in areas shoreward of the RCAs. Since rocky habitat areas nearshore and on the continental shelf are important to a range of organisms, including several overfished rockfish species, the Council developed measures to discourage fishing on these sites. Beginning in 2003, vessels using small footrope trawl gear (and, therefore, more likely to be fishing shoreward of the RCA) at any time during a cumulative limit period are subject to lower DTS species landings limits. So if small footrope gear is used at all during that period, the amount of fish that can be landed during the period is significantly reduced. This restriction is meant to encourage vessels to fish exclusively seaward of the RCA (and using large footrope gear), thereby avoiding bycatch of overfished groundfish species (particularly canary rockfish) that are found on the continental shelf. An exception is SFT gear, which can be used shoreward of the RCA in association with relatively higher cumulative trip limits to target flatfish. To qualify as SFT gear, the net must have a headrope at least 30 percent longer than the footrope, the rise of the net cannot exceed 3 feet, the headrope must not have any floats along the center 50 percent of its length, it must be a two-seam trawl net, and it must otherwise qualify as legal small-footrope trawl gear as defined in Federal regulations. Also, in some nongroundfish (incidental open access) fisheries, such as the pink shrimp fishery, bycatch reduction devices (BRDs) are required. These devices are added to the trawl net and divert finfish (such as canary rockfish) out of the codend of the net, where the shrimp catch is accumulated.

Observer Coverage

Vessels participating in the at-sea Pacific whiting fisheries have been voluntarily carrying observers since 1991. NMFS first implemented the WCGOP in August 2001 to directly observe groundfish discards in the commercial fishery. Current groundfish trawl observer programs are discussed in Section 3.3.2.1.

3.16.1.2 Recreational Fishery Management Measures

Recreational fisheries typically occur closer inshore than most commercial fisheries and are actively managed by the states. Thus, recreational management measures, although developed through the Council process, tend to differ between states. The main recreational management measures used are season limitations, and bag limits, which restrict the number of groundfish an angler may land, and size (length) restrictions. Since some overfished species are frequently caught in recreational fisheries, species-specific sub-limits are applied within the overall groundfish bag limit. Closed seasons have also been imposed in response to overfishing. The newest management measures responding to recreational take of overfished species are depth-based area restrictions. Although similar in concept and intent to the RCAs, recreational area restrictions generally limit recreational groundfish fishing to depths less than a specified value (e.g., 30 fm). Boundaries defined by waypoints for these areas generally have not been used.

3.16.2 Tribal Fishery Management Approach

Tribal fisheries include subsistence, ceremonial, and commercial fisheries. Commercial tribal fisheries use the same gear type as nontribal commercial fisheries, including whiting mothership, trawl and fixed-gear vessels. The Makah Tribe is the only tribe to have trawlers and to participate in the Pacific whiting fishery. Tribal commercial fisheries are limited to the U&A areas and cannot move to another location.

Tribes develop tribal rules and regulations to stay within the harvest limits established by the Council. For more information regarding tribal fisheries, see Section 5.2.7 of the 2008 SAFE document (PFMC 2008c).

3.16.3 State Fishery Management Approach

3.16.3.1 California

Management of the commercial groundfish fishery in California is done in conjunction with the Federal government. To facilitate management, California Law (Section 189(b)(8), Title 14, CCR) allows the state to take concurrent action to incorporate changes to Federal groundfish regulations that apply to state waters zero to 3 miles from shore. Although the state has the authority to implement more restrictive management measures than those listed in Federal regulation, none has been implemented at this time except for those species with state authority.

California allows commercial fishing for groundfish in the state's coastal waters using hook-and-line and trap gears (gill net gear is limited by minimum depth and area restrictions). In 2004, directed trawling was prohibited for Federal groundfish in state waters. Limited trawling for California halibut is permitted, but it is restricted to specific California halibut trawl grounds in southern California. A restricted access nearshore permit (shallow and/or deeper) is required to possess or land specific nearshore species. Additionally, a general commercial fishing license is needed to possess or land all groundfish species.

California is also in the process of designing and managing a network of MPAs in state waters to protect marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational and study opportunities provided by marine ecosystems. MPAs have been implemented in central California (September 2007), and the planning process is nearly completed for the northern California coast.

3.16.3.2 Oregon

The Oregon State Legislature granted the Oregon Fish and Wildlife Commission (OFWC) the authority to adopt regulations under the Oregon Administrative Rules (OAR). The OFWC delegates the authority to adopt temporary rules to the Director (Director) of the ODFW. Temporary rules may be considered for various reasons, including the achievement of quotas, OYs, harvest limits or HGs, as well as to conform to Federal regulations. Temporary regulations can be adopted, filed, and put in effect within a single business day, but in practice, a 72-hour public notice is usually provided. A temporary rule approved by the Director is ratified by the OFWC at its next meeting, usually within 30 days.

Once filed, copies of the temporary rule are distributed to all marine-related ODFW and Oregon State Police offices. The ODFW Information and Education Program creates and distributes a general public news release, and/or specific industry notices are developed and distributed throughout local fishing communities.

Once adopted, temporary regulations are in effect for 180 days. If the regulations have to remain in place for a longer duration, ODFW can adopt a permanent rule through the full OFWC process. This two-meeting process includes public notice of the intent for rulemaking, an economic analysis, and adequate public review.

Federal rules governing commercial groundfish fisheries are adopted in state rule by reference to the Code of Federal Regulations through OAR 635-004-0018. As inseason changes are made through the

Council process, and adopted in Federal regulations, corresponding state temporary rules are adopted through OAR 635-004-0019.

Regulations governing the recreational groundfish fishery are specified in state rule through OAR 635-039-0090. Inseason changes are made in state rule using the temporary rule process described above. Requests may be made by the ODFW representative on the Council to take concurrent action through Federal rule; however, due to the increasing number of inseason adjustments in recent years, flexibility has been maintained for the state to take action outside of the Federal process.

3.16.3.3 Washington

Washington's recreational fishery occurs in state waters from the shore west to 3 miles and in Federal waters outside 3 miles. The Washington State Legislature has granted the Washington Fish and Wildlife Commission (WFWC) the authority to adopt emergency regulations under the Revised Code of Washington (RCW) 77.04.090. The WFWC has delegated the authority to the WDFW Director to adopt regulations that conform to Federal groundfish regulations adopted through Council actions, either through emergency regulation or through a permanent rule-making process.

Washington prohibits commercial fishing for groundfish in the state's coastal waters and requires a state nonLE delivery license to deliver groundfish taken in Federal waters into the state. State regulations incorporate the Federal groundfish regulations by reference and are updated by emergency rule each time NMFS promulgates new groundfish rules. WDFW first prohibited the directed hook-and-line rockfish fishery and limited the size of the trawl footrope that could be used in state waters in 1996 to protect rockfish and other nearshore species. In 2000, WDFW completely prohibited trawling within 3 miles of the shore and also preemptively prohibited the live-fish fishery.

3.16.4 Federal Management Agencies

National Marine Fisheries Service is a branch of the National Oceanic and Atmospheric Administration in the Department of Commerce. NMFS has Regional Offices around the country and a corresponding Science Center. The Northwest Regional Office provides management, regulations and, in conjunction with the Council, policy leadership on fishery management. The Northwest Fishery Science Center conducts research and provides the scientific advice on which policy is based. The NMFS Office of Law Enforcement and NOAA General Counsel are separate branches within NOAA that help with the development, refinement, enforcement and defense of fisheries law, regulations, and policy. The PSMFC is a Congressionally established entity that helps with the coordination of fishery research, monitoring, data collection and management on the west coast.

3.16.4.1 Catch Monitoring

Various state, Federal, and tribal catch monitoring systems are used in west coast groundfish management. These are coordinated through the PSMFC. PacFIN is the commercial catch monitoring database. There are two components to total catch: (1) catch landed in port, and (2) catch discarded at sea. Sorting requirements are now in place for all species with trip limits, harvest guidelines, or OYs, including all depleted species. This provides accounting for the weight of landed depleted species when catches are hailed at sea or landed. Limited entry groundfish trawl fishermen must also maintain state logbooks to record the start and haul locations, time, and duration of trawl tows, as well as the total catch by species market category (i.e., those species and complexes with sorting requirements).

Landings are recorded on state fish receiving tickets. Fish tickets are designed by the individual states, PSMFC coordinates recordkeeping requirements between state and Federal managers. Poundage by

sorted species category, area of catch, vessel identification number, and other data elements are required on fish tickets. Landings are also sampled in port by state personnel to collect species composition data, otoliths for ageing, lengths, and other biological data. Federal observer sample rates vary, but the WCGOP attempts to sample about 20 percent of the landed catch. A suspension of at-sea sorting requirements coupled with full retention of catch is allowed in the whiting fishery. The at-sea whiting fishery has 100 percent on-board observer coverage, while the shoreside whiting sector brings most of its catch to port for sampling. Landings, logbook data, and state port sampling data are reported inseason to the PacFIN database managed by PSMFC. The GMT and PSMFC manage the Quota Species Monitoring (QSM) dataset reported in PacFIN. All landings of groundfish stocks of concern (depleted stocks and stocks below B_{MSY}), target stocks, and stock complexes in west coast fisheries are tracked in QSM reports of landed catch. The GMT recommends prescribed landing limits and other inseason management measures to the Council to attain, but not exceed, total catch OYs of QSM species. Stock and complex landing limits are modified inseason to control total fishing-related mortality; QSM reports and landed catch forecasts are used to control the landed catch component.

Management measures are normally imposed, adjusted, or removed at the beginning of the biennial fishing period, but may, if the Council determines it necessary, be imposed, adjusted, or removed at any time during the period. Management actions range from automatic actions initiated by NMFS to full rulemaking actions requiring a minimum of two Council meetings. Inseason adjustments typically fall under the category of notice actions that are routine (as defined by the FMP) in nature and usually require one Council meeting and one FR notice.

3.16.4.2 Bycatch Reporting

Establishing a standardized bycatch reporting methodology and limiting bycatch to the extent practicable are MSA mandates. Federal west coast programs designed to achieve bycatch reporting goals include the WCGOP, the At-Sea Pacific Whiting Observer Program, and the SHOP. These programs are described in Section 3.3.2.

3.16.4.3 Enforcement

The Northwest Division of the NMFS Office of Law Enforcement (OLE) use traditional methods to ensure compliance with groundfish fishery regulations including dockside sampling, at-sea patrols, air surveillance, and if necessary, investigation. Fishery management regulations that OLE enforces include fishing seasons, closed areas, types of gear authorized, amounts of targeted species, and bycatch species catch. Technologies such as VMS dramatically enhance, rather than replace, traditional enforcement techniques. VMS was initially implemented on January 1, 2004, and is currently required on all vessels participating in the groundfish fishery with a LE permit. In addition to implementing VMS in the west coast ground fishery, other high priorities for OLE are endangered salmon recovery and minimizing marine mammal harassments.

3.16.4.4 Regulations and Permits

NMFS Northwest Region write and update the federal groundfish regulations, which include groundfish harvest levels and fishing restrictions (trip limits, area closures, season lengths, etc.) and are known as the “harvest specifications and management measures.” NMFS Service publishes the Pacific Coast Groundfish Biennial Specifications and Management Measures before the start of the fishing year on January 1, every other year, beginning in 2005. Throughout the following two years, NMFS Northwest Region will amend these regulations inseason, either to correct mistakes, to revise trip limits, or other management measures according to recommendations from the Council. These changes are tracked and

documented in the Revised Groundfish Regulations, a document that tracks inseason adjustments throughout the management cycle.

The NMFS Northwest Region's Permits Office and Groundfish Management Branch issue Groundfish Limited Entry Permits (LEP), Scientific Research Permits (SRP), and EFP. The LEP authorizes the holder to participate in the federal LE groundfish fishery in waters off of Washington, Oregon, and California. NMFS no longer issues new LEPs; therefore, entering the groundfish LEP fishery, requires either purchase or lease of an existing LEP. An SRP is required for NMFS controlled scientific research. EFPs are issued by NMFS to allow limited fishing that would otherwise be prohibited. EFP applications must be submitted to the Council for review before the June Council meeting each year. EFPs can be issued to federal or state agencies, marine fish commissions, or other entities, including individuals.

3.17 Fish Resources

There are more than 90 species of groundfish managed under the groundfish FMP, which comprise the vast majority of the catch by the groundfish trawl sector. These species include more than 60 species of rockfish in the family Scorpaenidae, 7 roundfish species, 12 flatfish species, assorted shark, skate, and a few miscellaneous bottom-dwelling marine fish species. The 2008 Groundfish SAFE document and Biennial Harvest Specifications and Management Measures EIS (PFMC 2008a; PFMC 2008c) includes species accounts and description of stock status for groundfish that are commonly caught in fisheries. These descriptions are incorporated by reference.

Seven of the federally managed groundfish species are considered overfished with rebuilding plans governing the amount of allowable incidental fishing-related mortality in west coast fisheries and the duration of rebuilding. These species are bocaccio, canary rockfish, cowcod, darkblotched rockfish, Pacific ocean perch, widow rockfish, and yelloweye rockfish. Of these, only three species are predominantly caught in LE trawl fisheries (darkblotched rockfish, Pacific ocean perch, and widow rockfish).

Three of the federally managed groundfish species are in the precautionary zone, or not overfished, but are below the target spawning biomass (cabezon in waters off California, petrale sole, and sablefish). All other species are either healthy or their status is unknown. The 2008 Status of the Pacific Coast Groundfish Fishery, SAFE document Volume 1, Chapter 1 describes the distributions, life histories and management areas for the groundfish species managed under the groundfish FMP (PFMC 2008c).

The groundfish trawl fishery also catches a wide variety of nongroundfish species, albeit in relatively small quantities.

Table 3-82 reproduces information from Table 3a from the WCGOP 2008 data report (WCGOP 2008), which shows observed catch and discard amounts from the 2007 LE bottom trawl fishery. An additional column has been added that shows the percent of the total observed catch accounted for by each species. The table contents have then been sorted in descending order on this column to show the most frequently caught species. For accounting purposes, Pacific hake (whiting) is included as a nongroundfish species, although it is a groundfish MUS, because it is not a target or retained species in the bottom trawl (nonwhiting) segment of the fishery. It can be seen from the table that whiting is the most common nongroundfish bycatch species as a percent of total observed catch, by weight. Other commonly caught nongroundfish species are tanner crab, Pacific halibut, Dungeness crab, and squid. All these species are the target of other, commercially important, fisheries. Crab, like halibut, may not be retained in groundfish trawl fisheries.

Table 3-82. Observed catch of nongroundfish species, 2007. (Source: WCGOP 2008)

	North of 40° 10' N			South of 40° 10' N			% of Total Observed Catch
	Total Catch (mt)	Discard (mt)	Total % Discarded	Total Catch (mt)	Discard (mt)	Total % Discarded	
Pacific hake	138.59	137	98.90%	52.04	51.67	99.30%	47.04%
Tanneri tanner crab	56.82	56.82	100.00%	24.83	24.83	100.00%	20.15%
Pacific halibut	43.43	43.43	100.00%	1.66	1.65	99.30%	11.13%
Dungeness crab	31.9	31.9	100.00%	1.73	1.73	100.00%	8.30%
Squid (unidentified)	5.05	4.41	87.30%	7.8	2.01	25.80%	3.17%
Tanner crab (unidentified)	6.29	6.29	100.00%	0.56	0.56	100.00%	1.69%
Eelpout (unidentified)	5.81	5.81	100.00%	0.87	0.87	100.00%	1.65%
Brown cat shark	4.26	4.26	100.00%	1.97	1.97	100.00%	1.54%
California slickhead	1.91	1.91	100.00%	1.92	1.92	100.00%	0.95%
Shark (unidentified)	2.38	2.38	100.00%	0.75	0.69	91.40%	0.77%
Pacific flatnose	2.02	2.02	100.00%	0.73	0.73	100.00%	0.68%
Other unidentified nongroundfish	2.31	0.33	14.30%	0.1	0.09	88.50%	0.59%
Octopus (unidentified)	1.3	1.13	87.30%	0.28	0.19	66.50%	0.39%
Brown box crab	0.02	0.02	100.00%	0.9	0.9	100.00%	0.23%
Snailfish (unidentified)	0.79	0.79	100.00%	0.04	0.04	100.00%	0.20%
Pacific sleeper shark	0.6	0.6	100.00%	0.08	0.08	100.00%	0.17%
Bigfin eelpout	0.47	0.47	100.00%	0.19	0.19	100.00%	0.16%
Sea cucumber (unidentified)	0.65	0.65	100.00%	0	0	100.00%	0.16%
Twoline eelpout	0.4	0.4	100.00%	0.06	0.06	100.00%	0.11%
American shad	0.33	0.33	100.00%	0.08	0.08	100.00%	0.10%
Albacore tuna	0.34	0	0.00%		--	--	0.08%
Armored box crab		--	--	0.32	0.32	100.00%	0.08%
Urchin (unidentified)	0.27	0.27	100.00%	0.02	0.02	100.00%	0.07%
Sculpin (unidentified)	0.25	0.25	100.00%	0	0	100.00%	0.06%
Mola mola (sunfish)	0.18	0.18	100.00%	0	0	100.00%	0.04%
Jellyfish (unidentified)	0.06	0.06	100.00%	0.09	0.09	100.00%	0.04%
Ragfish	0.1	0.1	100.00%	0.03	0.03	100.00%	0.03%
California halibut		--	--	0.11	0	0.00%	0.03%
Pacific herring	0.02	0.02	100.00%	0.09	0.09	100.00%	0.03%
White croaker	0.01	0.01	100.00%	0.1	0.01	8.90%	0.03%
Threadfin slickhead	0.09	0.09	100.00%		--	--	0.02%
Filetail cat shark	0.02	0.02	100.00%	0.06	0.06	100.00%	0.02%
Blue shark	0.07	0.01	13.40%				0.02%
Longspine combfish	0	0	100.00%	0.07	0.07	100.00%	0.02%
Jackmackerel	0.06	0.06	100.00%	0	0	100.00%	0.01%
Longnose cat shark	0.06	0.06	100.00%				0.01%
Poacher (unidentified)	0.05	0.05	100.00%	0.01	0.01	100.00%	0.01%
Surfperch (unidentified)	0.02	0.02	100.00%	0.04	0.04	100.00%	0.01%
King (Chinook) salmon	0.05	0.05	100.00%		--	--	0.01%
Plainfin midshipman	0	0	100.00%	0.05	0.05	100.00%	0.01%
Slickhead (unidentified)	0.05	0.05	100.00%		--	--	0.01%

	North of 40° 10' N			South of 40° 10' N			% of Total Observed Catch
	Total Catch (mt)	Discard (mt)	Total % Discarded	Total Catch (mt)	Discard (mt)	Total % Discarded	
Angulatus tanner crab	0.04	0.04	100.00%	--	--	--	0.01%
Brown smoothhound shark		--	--	0.04	0.04	100.00%	0.01%
Pacific staghorn sculpin	0.04	0.04	100.00%	--	--	--	0.01%
Blob sculpin	0.03	0.03	100.00%	--	--	--	0.01%
Common thresher shark		--	--	0.03	0	0.00%	0.01%
Green sturgeon	0.03	0.03	100.00%	--	--	--	0.01%
Pink surfperch		--	--	0.03	0.03	100.00%	0.01%
Prowfish	0.03	0.03	100.00%	--	--	--	0.01%
Scarlet king crab	0.03	0.03	100.00%	0	0	100.00%	0.01%
Tubeshoulder (unidentified)	0.03	0.03	100.00%	--	--	--	0.01%
Cat shark (unidentified)	0.02	0.02	100.00%	--	--	--	0.00%
Midshipman (unidentified)	0.02	0.02	100.00%	0	0	100.00%	0.00%
Pacific mackerel	0.01	0.01	100.00%	0.01	0.01	100.00%	0.00%
Pacific sardine	0.02	0.02	100.00%	0	0	100.00%	0.00%
Stone coral	0.02	0.02	100.00%	--	--	--	0.00%
Threadfin sculpin	0.02	0.02	100.00%	0	0	100.00%	0.00%
Bat ray		--	--	0.01	0.01	100.00%	0.00%
Black eelpout	0.01	0.01	100.00%	--	--	--	0.00%
Deep-sea spider crab	0.01	0.01	100.00%	--	--	--	0.00%
Giant wrymouth	0.01	0.01	100.00%	--	--	--	0.00%
Hair crab	0.01	0.01	100.00%				0.00%
King of the salmon	0.01	0.01	100.00%	--	--	--	0.00%
Mackerel (unidentified)	0.01	0.01	100.00%	--	--	--	0.00%
Market squid	0.01	0	0.00%				0.00%
Monkeyface prickleback	0.01	0.01	100.00%	0	0	100.00%	0.00%
Pacific scabbardfish	0.01	0.01	100.00%	--	--	--	0.00%
Pacific tom cod	0.01	0.01	100.00%	--	--	--	0.00%
Prickleback (unidentified)	0.01	0.01	100.00%	--	--	--	0.00%
Red rock crab		--	--	0.01	0.01	100.00%	0.00%
Salmon shark	0.01	0.01	100.00%	--	--	--	0.00%
Shrimp (unidentified)	0	0	100.00%	0.01	0.01	88.10%	0.00%
Sixgill shark		--	--	0.01	0.01	100.00%	0.00%
Warty poacher	0.01	0.01	100.00%	--	--	--	0.00%
Wolf-eel	0.01	0	6.40%	0	0	100.00%	0.00%
Pacific argentine		--	--	0	0	100.00%	0.00%
Spiny king crab		--	--	0	0	100.00%	0.00%

Bycatch of Pacific halibut has received particular management attention under the proposed action, through the requirement to cover all catch by the nonwhiting trawl fishery with IBQ, because halibut is an important commercial and recreational species. Retention in the trawl fishery is prohibited to discourage targeting. As discussed in Section 3.3.4, the allocation to the trawl fishery for IBQ represents a substantial reduction in catch compared to historical levels. The west coast EEZ represents the southern extent of the species' range, and larger, commercially important fisheries are found in

Canadian and Alaska waters. Pacific halibut is managed through IPHC, an intergovernmental organization of Canada and the U.S. The IPHC assesses the Pacific halibut population annually by management area, deriving a management target called the constant exploitation yield, or CEY. Allocation to the groundfish trawl fishery for IBQ is based on the CEY for Area 2A. IPHC computes a fishery CEY, which is determined by making certain deductions, including expected bycatch in the groundfish trawl fishery. The fishery CEY is then used to determine a catch limits for target fisheries. The CEY is based on legal-sized fish—those greater than 81 cm in length. As noted in Section 3.3.4, both legal and sublegal sized fish (those less than 81 cm) must be covered by IBQ under the proposed trawl rationalization program.

The most recent assessment indicates that Pacific halibut exploitable biomass is on a steadily declining trend in Area 2 (Area 2 comprises three subareas—A, B, C—covering waters from Southeast Alaska southward) (Hare and Clark 2008). This is due, first, to two strong year classes (1987-88) passing through the population with subsequent, smaller year classes now representing the bulk of the exploitable biomass. Second, harvest rates in Area 2 have been higher than thought sustainable over the past decade. Figure 3-32 uses recent CEY values to provide some context for the adopted allocation formula for Pacific halibut (see Section 3.3.4). The formula is 15 percent of the total CEY with a ceiling of 130,000 pounds (to be reduced to 100,000 pounds in the fifth year of the trawl rationalization program). Therefore, once the CEY drops below 866,667 pounds (130,000 divided by 0.15), the allocation would begin being reduced by application of the 15 percent fraction. As can be seen in the figure, 15 percent of the CEY exceeded 130,000 pounds until 2009, and the groundfish trawl bycatch levels exceeded what would be the allocation limit had it been in place. The bycatch levels are shown for the year they were applied to the CEY to derive the fishery CEY. These bycatch estimates are from the preceding year. With declining abundance, the allocation level could remain below the 130,000 pound ceiling. However, bycatch levels have also been reduced substantially since 2005.

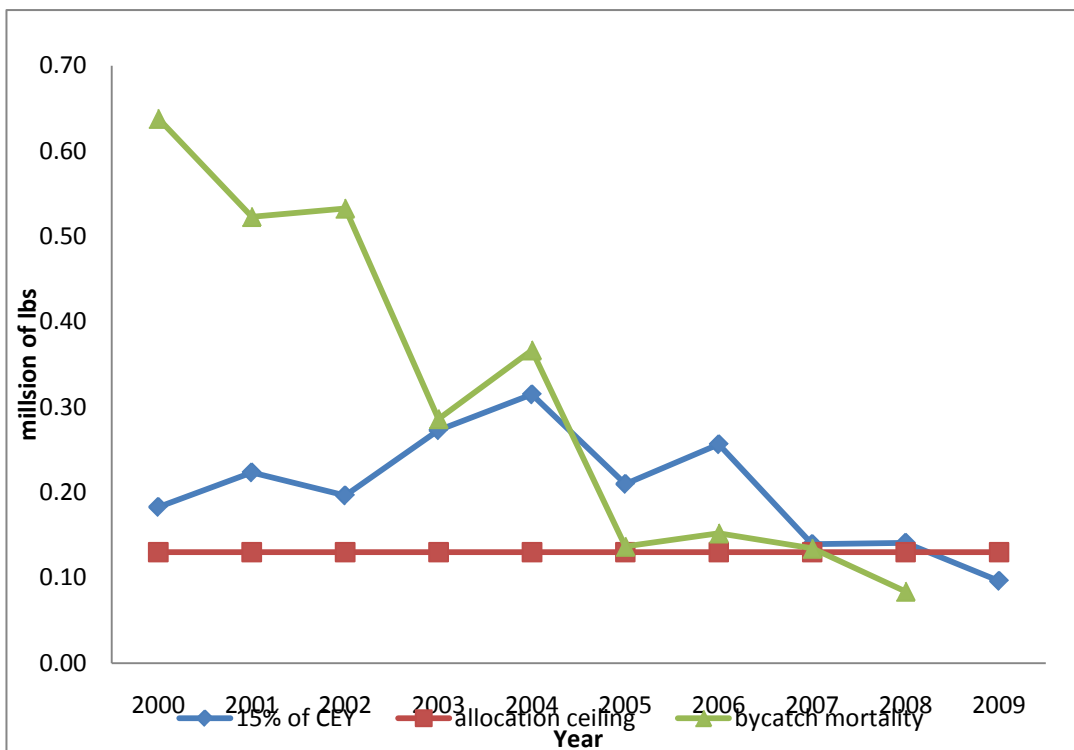


Figure 3-32. Historical Pacific halibut Area 2A CEY used to illustrate effect of allocation for IBQ.

3.18 ESA-listed Salmon

Salmon occurring in the west coast region include Chinook or king salmon (*Oncorhynchus tshawytscha*), and coho or silver salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), Sockeye salmon (*O. nerka*), chum salmon (*O. keta*) and steelhead (*O. mykiss*). Groundfish fishery interception of salmon species other than Chinook is negligible and infrequent (NMFS 2006c). The 2008 Status of the Pacific Coast Groundfish Fishery, SAFE document Volume 1, Chapter 3, briefly describes the management history, ESA consultations, and biological opinions pertaining to salmon bycatch in the west coast groundfish fishery (PFMC 2008c).

The most recent Biological Opinion covering the incidental take of ESA-listed salmon in groundfish fisheries was published in 2006 (NMFS 2006c). That document includes a detailed history of section 7 consultations on the groundfish fishery.

Salmon are caught incidentally in both the at-sea and shore-based segments of the whiting fishery. This bycatch is closely monitored through an at-sea observer program and dockside sorting of shore deliveries. A salmon bycatch reduction plan has also been implemented in this fishery. Past section 7 consultations have established a standard of 11,000 Chinook salmon caught in Pacific whiting fisheries. Although the 11,000 fish threshold is used as a trigger to reinitiate consultations, occasionally exceeding this threshold is not, by itself, a basis for making a jeopardy determination. Chinook bycatch has averaged approximately 7,300 over the last 15 years and exceeded the reinitiation trigger of 11,000 in 1995, 2000, and 2005.

The 1992 Biological Opinion (NMFS 1992) estimated the take of salmon in other, nonwhiting groundfish trawl fisheries at 6,000 to 9,000 fish annually, with most of these taken in waters north of 43° N. latitude. Bycatch levels in 2002 (18,120 salmon) and 2003 (13,862 salmon) exceeded the 6,000 to 9,000 Chinook specified to be taken in the incidental take statements. NMFS reinitiated its consultation on the Groundfish FMP and included an evaluation in the 2006 supplemental Biological Opinion.

The magnitude and distribution of bycatch in the trawl fishery from 2002 to 2004 was affected by significant changes in regulation and management of the fishery to protect overfished groundfish stocks. Because of changing regulations, shifts in fishing areas, reductions in trawl fishery effort from the December 2003 trawl vessel and permit buyback program, and gear innovations (including the new SFT gear) coastwide, it is difficult to pinpoint which of these various factors may be affecting Chinook bycatch numbers negatively or positively.

The supplemental Biological Opinion (NMFS 2006c) evaluates Chinook salmon bycatch by latitudinal and depth strata based on estimates from WCGOP data. The highest bycatch occurs in depths shallower than 125 fm across all latitudinal strata with the highest overall bycatch occurring off the Oregon coast from Cape Falcon to Cape Blanco, followed by the region to the south to Cape Mendocino in northern California. Looking at latitudinal differences alone over the three years, 56 percent of estimated Chinook bycatch occurred in the Cape Falcon-Cape Blanco region; in 2003, two-thirds of estimated bycatch was from that region. The 2006 supplemental Biological Opinion notes that “more bycatch, in the bottom trawl fishery in particular, was shifted south into northern California than was previously thought” (page 30). As a result, Sacramento winter-run Chinook, California coastal Chinook, and Central Valley spring-run Chinook may be disproportionately affected than other runs.

3.19 Protected Species Other than ESA-Listed Salmon

Protected resources are those species or stocks that are regulated by one or more of the following laws, ESA, Marine Mammal Protection Act (MMPA), and the Migratory Bird Treaty Act (MBTA) and EO. For more information on these laws, please refer to page 99 and 100 of the Council's 2008 Fishery SAFE (PFMC 2008c). Three types of protected species are known to be affected by groundfish fisheries: ESA-listed salmon, marine mammals, and seabirds. Therefore, this section describes these species and historical takes in groundfish fisheries in the most detail. Although sea turtles have been sighted off the west coast, no takes of these species have been documented and will not be described here.

3.19.1 Marine Mammal Species

The following marine mammal species or stocks have been known to occur in the California Current ecosystem. The six species/stocks highlighted in gray have known past interactions with west coast groundfish gears (NMFS SHOP & WCGOP 2008). Species/stocks listed at the bottom of the table are not likely to interact with groundfish gears.

Table 3-83. Marine mammals occurring on the west coast; shading indicate stocks observed taken in the groundfish trawl fishery (T = threatened, E = endangered, D = depleted).

Common Name (<i>Scientific Name</i>)	Stock	ESA Status	MMPA Status
Pinnipeds			
California sea lion (<i>Zalophus californianus</i>)	U.S.		
Pacific harbor seal (<i>Phoca vitulina richardsi</i>)	CA; OR and WA		
Northern elephant seal (<i>Mirounga angustirostris</i>)	CA breeding		
Guadalupe fur seal (<i>Arctocephalus townsendi</i>)	Only one extant population	T	D
Northern fur seal (<i>Callorhinus ursinus</i>)	San Miguel Island		
Steller sea lion (<i>Eumetopias jubatus</i>)	Eastern	T	D
Sea otters			
Southern (<i>Enhydra lutris nereis</i>)		T	D
Northern (<i>Enhydra lutris kenyoni</i>)		T (SW Alaska only)	
Cetaceans			
Minke whale (<i>Balaenoptera acutorostrata</i>)	CA/OR/WA		
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	CA/OR/WA		
Gray Whale (<i>Eschrichtius robustus</i>)	Eastern North Pacific		
Harbor porpoise (<i>Phocoena phocoena</i>)	Morro Bay, Monterey Bay, San Francisco-Russian River, Northern CA/Southern OR, OR/WA		
Dall's porpoise (<i>Phocoenoides dalli</i>)	CA/OR/WA		
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)	CA/OR/WA, northern and southern stocks		
Short-beaked common dolphin (<i>Delphinus delphis</i>)	CA/OR/WA		
Long-beaked common dolphin (<i>Delphinus capensis</i>)	CA		
The following cetaceans are present within the area managed by the Groundfish FMP but not likely to interact with groundfish fisheries or have not been documented having had interactions in observed groundfish fisheries:			
Bottlenose dolphin (<i>Tursiops truncatus</i>)	CA/OR/WA		
Striped Dolphin (<i>Stenella coeruleoalba</i>)	CA/OR/WA		
Sei whale (<i>Balaenoptera borealis</i>)	Eastern North Pacific	E	D
Blue whale (<i>Balaenoptera musculus</i>)	Eastern North Pacific	E	D
Fin whale (<i>Balaenoptera physalus</i>)	CA/OR/WA	E	D
Sperm whale (<i>Physeter macrocephalus</i>)	CA/OR/WA	E	D
Dwarf sperm whale (<i>Kogia sima</i>)	CA/OR/WA		
Humpback whale (<i>Megaptera novaeangliae</i>)	Eastern North Pacific	E	D
Bryde's whale (<i>Balaenoptera edeni</i>)			
Killer whale (<i>Orcinus orca</i>)	Eastern North Pacific off-shore, Eastern North Pacific southern resident		
Killer whale	Puget Sound southern resident stock	E	D
Baird's beaked whale (<i>Berardius bairdii</i>)	CA/OR/WA		
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	CA/OR/WA		
Pygmy sperm whale (<i>Kogia breviceps</i>)	CA/OR/WA		
Risso's dolphin (<i>Grampus griseus</i>)	CA/OR/WA		
Northern right-whale dolphin (<i>Lissodelphis borealis</i>)	CA/OR/WA		
Mesoplodont beaked whales (<i>Mesoplodon</i> spp.)	CA/OR/WA		

Source as of January 2008: NMFS Office of Protected Resources website: www.nmfs.noaa.gov/pr/species/mammals/

The following table shows the known interactions of marine mammals with a groundfish gear type in the west coast groundfish fishery.

Table 3-84. Observed takes of marine mammals in west coast gear types.

	At-sea Whiting	LE Trawl	LE Fixed-gear Sablefish Endorsed	LE Fixed-gear Non endorsed
California sea lion	X	X	X	X
Harbor seal	X			
Harbor Porpoise		X		
Pacific white-sided dolphin		X		
Sea lion UnID		X		
Northern elephant seal	X			
Stellar sea lion	X	X		

A more complete description of those species known to have a past interaction with one or more types of west coast groundfish gear is provided below.

California sea lion (*Zalophus californianus*)-U.S. Stock

California sea lions have a diverse diet, feeding on northern anchovy, market squid, sardines, Pacific and jack mackerel, and rockfish (Reeves, *et al.* 2002). Population estimates are made from pup counts and the proportion of pups in the population, since not all age classes of sea lions are ashore at the same time. California sea lions breed at the Channel Islands, off southern California, at islands along the northern Pacific coast of Baja California, and on the east coast of Baja California in the middle and southern Gulf of California (Reeves, *et al.* 2002). After the breeding season, large numbers, particularly males, migrate north along the Pacific coast. The U.S. stock of California sea lions' population ranges between the United States/Mexico border and extends northward into Canada. Based on a 2005 survey of pups and taking into account the mortality and growth rates, the population abundance estimate for this stock is 238,000 animals with a minimum population estimate of 141,842 (Carretta, *et al.* 2007). The potential biological removal (PBR) for this stock is calculated to be 8,511 animals per year. Estimated mean annual take in commercial fisheries is 159 animals, based on 2000 to 2004 data; however, the set gillnet fishery, which has been responsible for the majority of fishery-related mortalities of California sea lion has not been observed recently. Takes have been documented between 2000 and 2004 in the California/Oregon drift gillnet fishery, the California set gillnet fishery for halibut and angel shark, the west coast groundfish trawl fishery, the California anchovy, mackerel, and tuna purse seine fishery, the Washington/Oregon salmon net pen fishery, and the salmon pen fishery operating out of British Columbia. Other threats to this stock include shooting, entrainment in power plants, marine debris, and boat collisions. The stock is not classified as strategic under the MMPA (Carretta, *et al.* 2007).

Harbor seal (*Phoca vitulina richardsi*)-California Stock

Harbor seals range widely in coastal areas of the North Pacific and North Atlantic. Five subspecies are recognized, based on geographic distribution. Two stocks of harbor seals are found off the U.S. west coast EEZ: the California stock and the Oregon and Washington outer coast stock. Both stocks inhabit nearshore coastal and estuarine waters. Although they do not migrate extensively, they have been documented traveling 300 to 500 km on extended foraging trips or to find suitable breeding areas. There are approximately 400 to 600 harbor seal haulout sites in California, including both the mainland and offshore islands. Harbor seals eat a varied diet, consisting of fish, octopus, and squid (Reeves, *et al.* 2002); . The best estimate of abundance is 34,233 harbor seals in California based on recent harbor seal counts (May to July 2004) and a revised correction factor. Given a minimum population estimate of 31,600 animals in the California stock, the PBR for this stock is 1,896 harbor seals per year (Carretta, *et al.* 2007). Estimated mean annual take in commercial fisheries is 388 animals, based on data from 1998

to 2003. The California stock of harbor seal is not classified as strategic under the MMPA (Carretta, *et al.* 2007).

Northern elephant seal (*Mirounga angustirostris*)-California Breeding Stock

The California breeding population of northern elephant seals is considered one stock in the stock assessment reports (SAR), separate from the breeding population in Baja California, Mexico. Generally, northern elephant seals breed and pup from December to March. Males then forage further north in Alaska waters, while females forage off Oregon and Washington waters, typically south of 45° N. latitude. Adults return to land to molt between March and August, with males beginning their molt later than females. Northern elephant seals eat mesopelagic fish and squid, though some may forage on the sea bottom and continental shelf for skates, rays, sharks, and rockfish (Reeves, *et al.* 2002). The 2001 estimate of population abundance for the California breeding stock was 101,000, with a minimum population estimate of 60,547 animals. The 2005 estimate was approximately 124,000 (and a minimum population estimate of 74,913) and was based on an estimated 35,549 pups born in California in 2005. The PBR level for this stock was calculated in 2005 at 4,382 (Carretta, *et al.* 2008). Threats to this stock include mortality and injury in fishing gear. Takes have been documented in the California/Oregon drift gill net fishery, the California set gillnet fishery for halibut and angel shark, and the west coast at-sea groundfish trawl fishery, although none have been documented in the west coast groundfish bottom trawl fishery (Carretta, *et al.* 2008). Other threats include boat collisions, collisions with automobiles, shootings, and entanglement in marine debris. Stranding data reported to the California, Oregon, and Washington Marine Mammal Stranding Networks from 2000 to 2004 include elephant seal injuries caused by hook-and-line fisheries (two injuries) and gillnet fisheries (one injury) (Carretta, *et al.* 2008). The average rate of incidental fishery mortality for this stock over the last five years (more than 8.8) is lower than 10 percent of the calculated PBR; therefore, the total fishery mortality appears to be insignificant and approaching a zero mortality and serious injury rate. The population is continuing to grow and fishery mortality is relatively constant. The stock is not classified as a strategic stock under the MMPA (Carretta, *et al.* 2008).

Steller Sea Lion (*Eumetopias jubatus*)

The northern or Steller sea lion (*Eumetopias jubatus*) ranges along the North Pacific Ocean from Japan to California (Loughlin, *et al.* 1984). Two stocks are designated in U.S. waters with the eastern stock extending from Cape Suckling, Alaska, to southern California (Loughlin 1997). The eastern stock of Steller sea lion has a threatened listing under the ESA, is listed as depleted under the MMPA, and is, therefore, classified as a strategic stock (Angliss and Lodge 2002). They do not make large migrations, but disperse after the breeding season (late May to early July), feeding on rockfish, sculpin, capelin, flatfish, squid, octopus, shrimp, crabs, and northern fur seals (Fiscus and Baines 1966). Eastern stock Steller sea lions were observed taken incidentally in west coast groundfish trawls and marine set gillnet fisheries (Angliss and Lodge 2002). Total estimated mortalities of this stock (44) are lower than the 1,396 Steller sea lions allowed under the PBR formula (Angliss and Lodge 2002).

Harbor porpoise (*Phocoena phocoena*)

They are coastal animals, often found in fjords, bays, estuaries, and harbors. They are limited to northern temperate and subarctic waters. In their Pacific range, they occur from Monterey Bay and Japan, north to the Chukchi Sea, but they have been seen as far south as Point Conception. They are often encountered singly, in pairs, or in groups of five or ten. The principal mating season is reportedly summer, from June to possibly October, and gestation lasts for about 10 to 11 months (Leatherwood 1983). Most seasonal movements seem to be inshore-offshore rather than north-south. Schooling fish such as herring, capelin, sprat, and silver hake form the bulk of their diet.

Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)

They are most often seen in the deep inshore waters of Alaska, British Columbia, and the states of Washington and Oregon during the late spring. During the winter months (November through April), they are often seen off Southern California. Pacific white-sided dolphins are opportunistic feeders, foraging on available small schooling fish, squid, and other species associated with the nightly deep scattering layer. They are often seen in groups of 10 to 50 animals, but thousands have been seen traveling together on occasion (Reeves, *et al.* 2002). There appears to be a north-south seasonal migration in the eastern North Pacific. Although there is clear evidence that two forms of Pacific white-sided dolphins occur along the U.S. west coast, it is not currently possible to distinguish animals without genetic or morphometric analyses. Thus, the SAR grouped Pacific white-sided dolphins into two discrete, noncontiguous areas, waters off California/Oregon/Washington (northern and southern stocks) and Alaska waters. The 2006 SAR stated the following:

The most recent estimates of abundance for Pacific white-sided dolphins are based on two summer/autumn shipboard surveys conducted within 300 nmi of the coasts of California, Oregon, and Washington in 2001 and 2005 (Barlow 2003) (Forney 2007). The distribution of Pacific white-sided dolphins throughout this region is highly variable, apparently in response to oceanographic changes on both seasonal and interannual time scales (Forney and Barlow 1998). As oceanographic conditions vary, Pacific white-sided dolphins may spend time outside the EEZ, and therefore a multiyear average abundance estimate including California, Oregon and Washington is the most appropriate for management within U.S. waters. The 2001-2005 geometric mean abundance estimate for California, Oregon and Washington waters based on the two most recent ship surveys is 20,719 (CV = 0.22) Pacific white-sided dolphins” (Forney 2007).

The 2001 to 2005 average abundance estimate is 17.201 for the CA/OR/WA stock which is used as the minimum population estimate. The calculated PBR is 155 animals per year (Carretta, *et al.* 2008).

The mean annual serious injury and mortality in U.S. commercial fisheries for this stock is estimated to be 1.4 animals per year (CV = 0.86), based on data from 2000 to 2006. The primary commercial fishery that takes Pacific white-sided dolphins is the California/Oregon thresher shark/swordfish drift gillnet fishery, although overall cetacean entanglement rates in this fishery dropped considerably in recent years due to a take reduction plan, skipper education and required gear modification (Barlow and Cameron 2003). Low levels of mortality for Pacific white-sided dolphins have also been documented in the west coast groundfish trawl fisheries (Perez 2008; Perez and Loughlin 1991). Between 2000 and 2004, with 80 to 100 percent of the fishing effort observed, one Pacific white-sided dolphin was reported killed in the at-sea processing portion of the Pacific whiting trawl fishery. Fishery-related strandings of Pacific white-sided dolphins in California/Oregon/Washington between 2000 and 2004 totaled three animals. In 2001, two white-sided dolphins were stranded in southern California within a week, one animal had its flukes cut off; the second animal had yellow nylon line around the caudal peduncle and apparent bullet holes on each side of the head. A third animal stranded in 2004 with net-like markings. This California/Oregon/Washington stock of Pacific white-sided dolphins is not classified as strategic under the MMPA (Carretta, *et al.* 2005). The total fishery mortality and serious injury for this stock is lower than 10 percent of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate.

3.19.2 Seabird Species

The highly productive California Current System, an eastern boundary current that stretches from Baja California, Mexico, to southern British Columbia, Canada, supports more than two million breeding

seabirds and at least twice that number of migrant visitors. Tyler et al. (1993) reviewed seabird distribution and abundance in relation to oceanographic processes in the California Current System and found that more than 100 species have been recorded within the EEZ, including albatross, shearwaters, petrels, storm-petrels, cormorants, pelicans, gulls, terns, and alcids (murre, murrelets, guillemots, auklets, and puffins). In addition to these “classic” seabirds, millions of other birds are seasonally abundant in this oceanic habitat including waterfowl, waterbirds (loons and grebes), and shorebirds (phalaropes). Not surprisingly, there is considerable overlap of fishing areas and areas of high bird density in this highly productive upwelling system. The species composition and abundance of birds varies spatially and temporally. The greatest seabird biomass is found over the continental shelf, and bird density is greatest during the spring and fall when local breeding species and migrants predominate.

The U.S. Fish and Wildlife Service (USFWS) is the primary Federal agency responsible for seabird conservation and management. Three species occurring in the California Current Ecosystem are listed under the ESA, and one species is a candidate for ESA listing, as shown in Table 3-85. Brown pelican is currently undergoing the delisting process. In 2002, the FWS classified several seabird species that occur off the west coast as Bird of Conservation Concern (BCC), and these are also noted in Table 3-85. Short-tailed albatross (*Phoebastria albatrus*), Hawaiian petrel (*Pterodroma sandwichensis*), and Newell’s shearwater (*Puffinus auricularis Newell*) are ESA listed seabird species that primarily occur around Hawaii and the U.S. Pacific Islands.

Three species of albatross are known to occur within the west coast region. Short-tailed albatross, ranging from Japan to California, are listed as endangered. The black-footed albatross is the most abundant albatross off the west coast of Canada and the United States, ranging throughout the North Pacific between 20° N. latitude and 58° N. latitude, but more eastern in its at-sea distribution than the Laysan albatross (Cousins and Cooper 2008). The estimated number of black-footed albatross worldwide is approximately 290,000, of which 58,000 pairs (116,000 birds) bred in 2001-02 (USFWS 2005). The conservation status for black-footed albatross under the World Conservation Union (WCN) criteria for threatened species is “Vulnerable” due to an observed 20 percent or more population decrease over three generations (approximately 45 years). While the Laysan albatross is less common in the west coast EEZ, it is the most abundant albatross Pacific-wide, with an estimated 2,200,000 individuals (USFWS 2005), with centers of concentration in the WCPO (Cousins and Cooper 2008). Numbers of breeding Laysan albatross have declined over the last five years in the two largest colonies of this species (USFWS 2005). WCN status for the Laysan albatross is “Lower Risk-Least Concern.” Both the black-footed and Laysan albatross nest principally in the Hawaiian Islands, mate for life, and lay only one egg in a single season. The black-footed albatross occurs off the west coast primarily from spring through fall, but it can be found year-round; breeding birds begin returning to the Hawaiian Island chain in October. During egg-laying, incubation, and early chick feeding, which lasts from December through March, these birds are generally more concentrated near the breeding islands, although some may still travel considerable distances. The Laysan albatross also occurs uncommonly off the west coast year round, primarily in summer during the nonbreeding season.

The MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and Russia for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. In addition to the MBTA, an EO, Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186), directs Federal agencies to negotiate Memoranda of Understanding with the USFWS that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. The USFWS and NMFS are working on a Memorandum of Understanding concerning seabirds.

In February 2001, NMFS adopted a National Plan of Action (NPOA) to Reduce the Incidental Take of Seabirds in Longline Fisheries. This NPOA contains guidelines that are applicable to relevant groundfish fisheries and would require seabird incidental catch mitigation if a significant problem is

found to exist. During the first two years of NPOA implementation, NMFS regions were tasked with assessing the incidental take of seabirds in longline fisheries. In the LE groundfish longline fleet off the coasts of Washington, Oregon, and California during September 2001 to October 2002, there were no incidental seabird takes documented by west coast groundfish observers. During the assessment period, approximately 30 percent of landings by the LE fixed-gear fleet had observer coverage. The Northwest Region of NMFS, in partnership with Sea Grant, is implementing a seabird bycatch reduction program intended to reduce the seabird take in the longline groundfish fishery.

Table 3-85. Rare seabirds of the west coast.

ESA-listed Endangered
California brown pelican (<i>Pelecanus occidentales</i>)
California least tern (<i>Sterna antillarum browni</i>)
ESA-listed Threatened
Marbled murrelet (<i>Brachyramphus marmoratus</i>)
ESA Listing Candidate
Xantus's murrelet (<i>Synthliboramphus hypoleucus</i>)
USFWS Bird of Conservation Concern (BCC)
Ashy Storm-petrel (<i>Oceanodroma homochroa</i>)
Arctic tern (<i>Sterna paradisaea</i>)
Elegant tern (<i>Sterna elegans</i>)
Western gull-billed tern (<i>Sterna nilotica</i>)
Black skimmer (<i>Rynchops niger</i>)
Xantus's murrelet (<i>Synthliboramphus hypoleucus</i>)
Cassin's auklet (<i>Ptychoramphus aleuticus</i>)
Caspian tern (<i>Sterna caspia</i>)

Source: (USFWS 2005)

The following table shows seabird observed interaction with the different groundfish gear types.

Table 3-86. Seabird known/recent interaction with in west coast gear types.

	At-sea Whiting	LE Trawl	LE Fixed-gear Sablefish Endorsed	LE Fixed-gear Non endorsed
Bird UnID			X	
Black Foot Albatross			X	
Brandts Cormorant		X		
Brown Pelican				X
Auklet/Murrelet UnID				
Common Murre		X		
Cormorant UnID		X	X	X
Gull UnID		X		
Leachs Storm Petrel		X		
Northern Fulmar		X		
Shearwater UnID				
Seabird UnID				
Sooty Shearwater				
Storm Petrel UnID		X		
Western Gull			X	X

3.20 Habitat and Ecosystem

3.20.1 California Current Ecosystem

The term “ecosystem” is generally defined as a “functional unit of the environment” within which the basic processes of energy flow and cycling are identifiable and can be (relatively) localized. In this sense, marine ecosystems are extremely difficult to identify, as most are relatively open systems, with poorly defined boundaries and strong interactions across broad spatial scales. The California Current ecosystem, like other eastern boundary current ecosystems, is especially difficult to define, as they are characterized by tremendous fluctuations in physical conditions and productivity over multiple time scales (Mann and Lazier 1996; Parrish, *et al.* 1981). Food webs tend to be structured around CPS that exhibit boom-bust cycles over decadal time scales (Bakun 1996; Schwartzlose, *et al.* 1999). Similarly, the top trophic levels of such ecosystems are often dominated by HMS such as salmon, albacore tuna, sooty shearwaters, fur seals and baleen whales, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres.

The California Current is essentially the eastern limb of the Central Pacific Gyre. It begins where the west wind drift (or the North Pacific Current) reaches the North American Continent. This occurs near the northern end of Vancouver Island, roughly between 45° and 50° N. latitude and 130° to 150° W longitude (Ware and McFarlane 1989). A divergence in the prevailing wind patterns causes the west wind drift to split into two broad coastal currents, the California Current to the south and the Alaska Current to the north. As there are really several dominant currents in the region, all of which vary in geographical location, intensity, and direction with the seasons, this region is often referred to as the California Current System (Hickey 1979).

The California Current itself is a year-round feature consisting of a massive southward flow of the cool waters of the west wind drift. The current is best characterized as a shallow, wide, and slow-moving body of water, ranging from the shelf break to 1,000 km offshore, with the strongest flows at the sea surface, and in the summertime (Dodimead, *et al.* 1963; Hickey 1979; Lynn and Simpson 1987). This surface current is matched in the summer by the California Undercurrent, which moves water northward from the south in a deep yet narrow band of subtropical water typically found just off of the shelf break at depths of 100 to 300 m. The undercurrent flows from Baja California to Vancouver Island, transporting warmer, saltier southern water north along the coast (Hickey 1979). On average, the California Current flow volume reaches a maximum in spring and summer, when the flow moves inshore, closer to the shelf break. The California Undercurrent develops in late spring through early summer and persists into the fall. During late summer and fall, there is considerably more mesoscale variability in flow patterns, with fields of cyclonic and anticyclonic eddies and considerable mixing of water masses between shelf and offshore waters (Brink and Cowles 1991). Beginning in the fall, and through the winter, the northward flowing Davidson Current is the dominant feature over the shelf and beyond the shelf break (Hickey 1998).

Additional information on the physical and oceanographic features of the California Current ecosystem and the interannual and interdecadal climate forcing occurring there, please refer to the 2008 SAFE document published by the Council (PFMC 2008c).

Widely recognized biogeographic patterns of the California Current ecosystem are distinct zoogeographic provinces extending North and South of Point Conception, California, known as the Oregonian and San Diego Provinces. The Oregonian Province extends from the Strait of Juan de Fuca in the north to Point Conception in the south. The San Diego Province begins at Point Conception and runs south past the terminus of the EEZ (NMFS 2004a).

Patterns of adult groundfish distribution based on depth have been observed to occur between nearshore, continental shelf, and the continental slope and have been used to form discrete management units. Field and Ralston (2005) showed that 51 to 72 percent of the year-to-year variability in recruitment for three winter spawning rockfish (yellowtail, widow, and chilipepper) seems to be shared coastwide, over a spatial scale of 500 to 1,000 km. The major differences in recruitment strength seemed to be associated with Cape Blanco and/or Cape Mendocino, and some evidence suggests differences in relative year class strength north and south of Point Conception as well. With respect to genetic evidence for biogeographic boundaries, Hedgecock (1994) found that fish and invertebrates with planktonic larvae generally maintain low spatial genetic variance over large (500 to 2,000 km) regions in the California Current. Analysis of a range of *Sebastes* species also suggests little genetic differentiation within the California Current region (McGauley and Mulligan 1995; Rocha-Olivares and Vetter 1999; Wishard, *et al.* 1980), although some nearshore species may exhibit greater spatial patterns of population substructure, particularly north and south of Cape Mendocino (Cope 2004).

Williams and Ralston (2002) found that Cape Mendocino (and the Mendocino Escarpment) was one of the most noteworthy barriers to the latitudinal distribution of rockfish species diversity. Most stock assessments for groundfish tend to be either coastwide assessments, or are relative to the stocks north or south of Cape Mendocino (occasionally Cape Blanco). Both Cape Mendocino and Point Conception are key management boundaries for the Council. In general, evidence suggests wide to very wide dispersal of larvae and juveniles for most groundfish, with modest to limited movement of adults (general on the scale of thousands of kilometers for most species, with limited examples of small numbers of some populations moving in the hundreds of kilometers). There are strong seasonal inshore and offshore migrations for many species, particularly flatfish, and some evidence for ontogenetic movement in some species by both/either depth and latitude. Pacific hake are the only confirmed highly migratory groundfish species in the FMP, with a clear seasonal migration from southern spawning grounds off of northern Mexico and Southern California to northern foraging habitat off of Oregon, Washington, and British Columbia (Bailey, *et al.* 1982). There is an ontogenetic component to this migration, as juveniles tend to be found off of central and northern California, with larger, older fish tending to travel further north. Similarly, the distribution of hake tends to be more northerly in warm years (Dorn 1995; Swartman and Hickey 2003), reflecting interannual shifts in marine habitat conditions.

While the physical and bathymetric features associated with these general biogeographic boundaries are fixed in space, the physical characteristics of water masses and associated plankton communities are clearly highly dynamic in space and time. Fulton and LeBrasseur (1985) described a transport-driven shifting subarctic domain in the northern reaches of the California Current System, the margin of which was characterized by abrupt declines in zooplankton biomass south of the subarctic boundary. Although the physical dynamics are thought to be more complex than their model, it is clear that climate-driven changes in transport and ocean conditions dramatically alter both the species composition and productivity of zooplankton throughout the California Current to a considerably greater extent than static boundaries based on geography (Mackas, *et al.* 2005; McGowan, *et al.* 1998; Peterson, *et al.* 2002; Peterson and Schwing 2003).

For example, a subtropical species of copepod was more abundant through the 1980s and early 1990s, and were almost completely dominant during the 1997-98 El Niño, at which time standing biomass was near all time lows (Peterson, *et al.* 2002). Since 1999, a northern (colder water) copepod species has again dominated numerically during spring and summer, and the standing biomass of zooplankton off of Oregon has been roughly double that observed prior to 1999 (Peterson and Schwing 2003). This rapid transition from the 1997-98 El Niño event to the cool conditions of 1999 to 2002 was also associated with tremendous recruitment in virtually all west coast groundfish, as evidenced by the age and size composition data available in stock assessment models in both the 2005 and 2007 stock assessment cycles. For most stocks in which recruitment events are reasonably well specified by the data

(recruitment tends to be poorly specified over time, with slow growth rates and/or little age data), the 1999 recruitment was estimated to be as great or greater than any recruitment over the preceding 10 to 20 years; for example, the 1999 bocaccio year class was the largest since 1989, resulting in a near doubling of stock spawning biomass between 1999 and 2005; the 1999 Pacific hake year class was the largest since 1984, which effectively doubled the stock biomass between 2000 and 2003; and the 1999 and 2000 lingcod year classes were the second and third largest since the early 1970s, resulting in greater than a tripling in abundance between 1999 and 2005. While there are signs of reasonably strong year classes in 2003 for some stocks, recent indices of recruitment from midwater trawl surveys and other sources have tended to indicate poor recruitment for most stocks since 2003, with particularly low levels of juvenile rockfish abundance observed in 2005 through 2007, a year in which low secondary productivity, anomalous upwelling conditions, and widespread dieoffs of some seabirds reflected unusual and generally unfavorable ocean conditions for many elements of the ecosystem (Goericke, *et al.* 2007; Sydeman, *et al.* 2006). As the production of eggs and larvae for most west coast groundfish appears to be only modestly related to interannual changes in ocean conditions (Harvey 2005), the causes of these strong year classes are thought to be related to post-spawning (or post-parturition) survival of larval and juvenile life history stages, although the mechanism remains elusive.

EFH for groundfish is described as all waters from the high tide line (and parts of estuaries) to 3,500 meters (1,914 fathoms) in depth. HAPCs are a subset of EFH used to focus management and restoration efforts. The current HAPC types are estuaries, canopy kelp, seagrass, rocky reefs, and areas of interest (a variety of submarine features, such as banks, seamounts, and canyons, along with Washington State waters). In addition to identifying EFH and describing HAPCs, the Council also adopted mitigation measures directed at the adverse impacts of fishing on groundfish EFH. Principal among these are closed areas to protect sensitive habitats. There are three types of closed areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. The bottom trawl closed areas are closed to all types of bottom trawl fishing gear. The bottom trawl footprint closure closes areas in the EEZ between 1,280 m (700 fm) and 3,500 m (1,094 fm), which is the outer extent of groundfish EFH. The bottom contact closed areas are closed to all types of bottom contact gear intended to make contact with the bottom during fishing operations, which includes fixed-gear such as longline and pots. A more complete description of groundfish EFH is contained in the EFH EIS (NMFS 2005), which is incorporated herein by reference.

MPAs are a principal ecosystem management tool. In addition to the closed areas described above, there are marine MPAs distributed throughout the project area. The EIS for Pacific Coast Groundfish EFH (NMFS 2005) contains a complete analysis of these sites and is incorporated here by reference. Section 3.3.5.3 of this FEIS provides background on MPAs. The following is a brief summary of these areas.

3.20.2 Trophic Relationships and Other Potential Effects of Fishing on the Food Web

Although far from conclusive, the empirical evidence and theoretical considerations suggest some potential for top-down impacts or intraguild competition, as a result of declines in higher trophic level species such as cowcod, bocaccio, and yelloweye rockfish over small spatial scales. It is reasonable to expect that similar impacts could potentially be associated with fishery-induced declines in stocks of healthy species (those reduced from their equilibrium abundance, but not to levels below overfishing limits), such as sablefish, Pacific halibut, petrale sole, shortspine thornyhead, Pacific hake, and other piscivorous or higher trophic level species. Such impacts are often referred to as trophic cascades, in which declines of high trophic level species (keystone predators) have cascading impacts through food webs to the abundance, productivity, and species diversity of lower trophic levels. Empirical examples of trophic cascades tend to be more common for semi-enclosed ecosystems such as lakes, or highly structured (two dimensional) environments, such as intertidal or sub-tidal ecosystems (Paine 1966;

Simenstad, *et al.* 1978; Tegner and Dayton 2000). As one ventures further from these environments, the evidence for top-down control, or trophic cascades, becomes considerably spottier, although (Van der Elst 1979) reported a classic example of top-down control of a coastal ecosystem off of the Natal Coast in South Africa.

In coastal upwelling ecosystems such as the California Current, most evidence suggests that the primary forcing factor for ecosystem productivity and structure over the scale of the entire system tends to be either “bottom-up” (based on the amount and variability of primary or secondary production) or “middle-out.” For example, (Ware and Thomson 2005) proposed that the carrying capacity of north Pacific coastal ecosystems was primarily determined by bottom-up control, based on correlations between latitudinal variability in primary production and commercial fisheries yields. Alternatively, bottom-up control in these ecosystems could be a function of secondary production through variability in the productivity and species composition of the zooplankton community. The California Current seems to experience higher secondary production during periods of stronger southward transport and cooler sea surface temperatures. Zooplankton, particularly euphausiids, are the principal prey item for most of the mid-trophic level organisms in the California Current, including Pacific hake and most rockfish.

An alternative to bottom-up control is “middle-out” control, also referred to as “wasp-waist” control, in which a small number of key mid-trophic level species represent a bottleneck of energy flow between lower and higher trophic levels. It has long been noted that food webs in coastal upwelling ecosystems tend to be structured around CPS, such as krill, sardine, anchovy, and hake, that exhibit boom-bust cycles of abundance over decadal time scales (Bakun 1996; Parrish, *et al.* 1981; Schwartzlose, *et al.* 1999). Such dynamics have long been thought to be a consequence of the energetic and highly variable oceanographic processes that shape the physical environment and drive production throughout pelagic and benthic food webs in coastal upwelling ecosystems (such as the California Current system) over a range of time scales (Mann and Lazier 1996; Parrish, *et al.* 1981). The idea of wasp-waist control was first suggested by Rice (1995) and developed in greater detail in Cury *et al.* (2000). The premise is that the low species diversity often observed in the middle of many upwelling ecosystems results in a vast majority of the energy in the food web flowing through CPS such as sardine, anchovy, and mackerel. Many of these seem to feature weak links in their life cycles related to sensitivity to climate forcing, such that climate conditions determine the productivity of these stocks, and indirectly drive the dynamics of both higher and lower trophic levels.

Empirical evidence for any of these types of control is typically limited for large marine ecosystems (Hunt and McKinnell 2006). However, where trophic interactions among exploited species are documented or suspected, ecosystem modeling can provide a template to evaluate both the magnitude and consequences of removals of either predators or prey in the system of interest (Christensen and Walters 2004; Hollowed, *et al.* 2000). Although such models are unavoidably constrained by conceptual shortcomings and data limitations, most critical reviews of multispecies modeling approaches indicate that ecosystem models can augment contemporary single species models by confronting an array of interactions and dynamics that are more difficult to address with single-species models, such as competition, predation, and environmental variability (Fulton, *et al.* 2003; Hollowed, *et al.* 2000; Plagányi and Butterworth 2004).

Dynamic simulations of an ecosystem model of the Northern California Current were developed by Field *et al.* (2006a), who modeled the continental shelf and slope ecosystem between Cape Mendocino and Cape Flattery between 1960 and 2004. The results of the ecosystem model are consistent with what is known of the life histories for many of the rockfish, roundfish and longer-lived flatfish in the California Current where low mortality rates are indicative of low predation rates and presumably weakly coupled trophic interactions. In other words, species with a low natural mortality rate are unlikely to be a key prey species for higher trophic level predators and are, consequently, less likely to

affect significant bottom-up control in the energy flow or structure of the ecosystem. Therefore, the effects of severe declines in the overfished species that were explicitly included in this model (canary rockfish, widow rockfish, and Pacific ocean perch) relative to other elements of the ecosystem appear to be minimal. The model indicated considerably stronger interspecific interactions in species such as shrimp, salmon, and small flatfish where there is high turnover and high predation coupled with substantial changes in many of their key predators (such as hake, sablefish, marine mammals) over the last 40 years.

A comparable, but considerably more complex model, with greater population (demographic) structure, spatial complexity, and explicit physical forcing (Fulton, *et al.* 2004) is the Atlantis model for the California Current (Brand, *et al.* 2007; Kaplan and Levin 2007). Like the Field *et al.* (2006b) model, the Atlantis model suggests that the fisheries' removal of slow growing, low turnover species such as rockfish has not led to obvious changes in ecological structure or to strong changes in interspecific interactions; hake predation on shrimp appears to be one exception to this general lack of top-down control. However, recent modeling results do indicate a key role for forage species and the possibility of bottom-up effects. Future research will be required to identify how these effects play out across space.

CHAPTER 4 **EFFECTS OF THE ALTERNATIVES**

This chapter examines the environmental and socioeconomic impacts of the alternatives considered for rationalization of the west coast groundfish trawl fishery. The impacts of the alternatives are compared to the Alternative 1 (no action or status quo): the fishery without the implementation of a rationalization program.

The impacts described in this chapter are the best estimates of what is expected to occur under a rationalization program. We use analytical tools to describe what the affected environment is likely to look like under example rationalization programs that encompass the range of alternatives described in Chapter 2. These tools are based primarily on social and economic theory, known relationships between harvested species and other parts of the natural and human environment, and empirical data that show how affected stakeholders will respond to the incentives created by rationalization. This information is used to illustrate how the affected environment will be affected by rationalization and how those impacts differ between the alternatives.

This chapter begins by describing the framework used to analyze effects. This framework uses an additive approach to assess the cumulative effect of the alternatives. This additive model is best described as the sum of existing conditions, reasonably foreseeable actions, and the effect of the alternatives. The impacts of these categories on the affected environment are assessed independently, and the sum of these effects results in the overall, or cumulative, effect. The cumulative effect is not an independent impact in and of itself, but rather the combined effect of past and present conditions, reasonably foreseeable actions, and the alternatives. Therefore, the cumulative effect is assessed as a summary of the factors affecting each environmental component.

This chapter also describes a series of possible rationalization programs, or alternatives, that serve as the basis for estimating impacts. These alternatives were created to illustrate the effects of rationalization from a programmatic perspective and to show how the options under consideration will act in concert with one another when combined into a single rationalization program. We then describe some of the tools used to assess the effects of the alternatives. Finally, we estimate the effect of the alternatives on each portion of the affected environment described in Chapter 3.

- Description of the Analytical Framework and Timeline—Section 4.1
- Description of Analytical Tools used to Assess Impacts—Section 4.2
- Effects of Rationalization—Sections 4.3 to 4.20

4.1 Analytical Framework

4.1.1 Additive Model for Analyzing Effects, Including Cumulative Effects

CEQ regulations at 40 CFR 1508.25 identify three types of impacts that must be considered in an EIS: direct, indirect, and cumulative effects. Direct effects are directly related to the action (occurring at the same time and place); for indirect effects, there is some intermediate cause-and-effect between the proposed action and the actual effect being evaluated (occurring at a distance in time and/or place). The regulations also define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or nonfederal) or person undertakes such actions.” Although the regulations and guidance identify cumulative effects as a separate, third class of impacts, all effects can be viewed as cumulative to the extent that they are part of some causal chain that results in an ultimate effect on an environmental component. Using this concept of cumulative effects, this EIS frames the analysis in terms of an additive model. To arrive at the final, cumulative effect on an environmental component, the effects in a causal chain are traced out and measured qualitatively or quantitatively, in terms of the metrics that have been identified in this EIS. The components in this additive model include baseline conditions, RFFAs, the effect of the proposed action, and any mitigation that is proposed separately from the alternatives. Each is described below.

Table 4-1. Components included within the additive model for determining cumulative effects.

Components of Additive Model	Description
Baseline Conditions	These are past and present status of environmental components and the future status of those components under Alternative 1 management measures.
Reasonably Foreseeable Future Actions	These are actions that are anticipated to occur in the future and generally include proposals that are in the planning and development stage.
Effect of the Alternatives	This is the predicted impact of the alternatives being considered.
Mitigation	These are proposals separate from the alternatives that are designed to mitigate the effects of the alternatives. They are added to—or subtracted from—the baseline to arrive at the cumulative effect.

Within the framework of the EIS, this additive model is applied to the affected environment described in Chapter 3. The affected environment is, thus, a summary of current conditions and is described in terms of the same metrics used in Chapter 4. In addition, Section 4.1.3 catalogues RFFAs in terms of the metrics. This projects the affected environment, or environmental baseline, forward in time by considering the interaction of these foreseeable actions with natural phenomena.

Chapter 4 evaluates the impacts of the alternatives. In it, we describe how the alternatives affect the environmental components, and summarize these effects in combination with projected environmental conditions; this represents the cumulative impact assessment. The alternatives are also compared to the no action alternative (Alternative 1), which represents baseline conditions if the current management program remains in place. The next section summarizes baseline conditions described in Chapter 3, including baseline conditions; Section 4.1.3 describes RFFAs; and Sections 4.5 through 4.20 evaluate

the effects of the alternatives on various environmental components. These are all components of the additive model. An analytical timeline showing various aspects of groundfish fishery management and policy implementation from the present date through 2016 is shown in Table 4-1.

4.1.2 Baseline Conditions

The baseline used as the reference point for determining the incremental effect of each alternative on resource and stakeholder groups of interest is provided in Chapter 3. Chapter 3 of this document contains a comprehensive description of the human (physical, biological, and socioeconomic) environment potentially affected by the alternatives under consideration for each of the resource or stakeholder groups used to analyze the impacts of the alternatives. The baseline incorporates the past and present status of environmental components and the future status of those components under the existing management framework. In general, the baseline condition for this analysis is the expected future status of resource and stakeholder groups absent RFFAs or implementation of a rationalization program. The baseline conditions provide a benchmark against which the specific effects of each alternative, including Alternative 1, are compared.

The baseline does not necessarily represent a static snapshot of the resource and stakeholder groups. To the extent feasible, trends in the data from the description of historical conditions are used to depict baseline conditions more accurately (e.g., by incorporating variation over time) and to put those conditions into a broader perspective. The cumulative past and present effects of groundfish fishery activity, as well as effects external to the groundfish fishery, such as other human-induced impacts and climatic events influencing the resource and stakeholder groups, all contribute to the baseline condition.

The following list summarizes the assumptions made regarding trends in the affected environment that are expected to continue post-implementation and are considered part of the baseline:

- Human population increases in affected communities.
- Increased tourism and recreational opportunities in affected coastal communities.
- Increased demand for retirement destinations in affected coastal communities.
- Increased demand for seafood.
- Continued growth and scope of the aquaculture industry.
- Increased public awareness and scrutiny of the fishing industry.
- Increased demand for ecosystem-wide fishery management approaches.
- Widow rockfish stocks will be declared rebuilt in the short term and will be removed from overfished status.
- Fishery patterns from 2004 to 2006 are used for vessel and permit delivery patterns and vessel-processor relationships.
- Bocaccio (2023), darkblotched rockfish (2030), Pacific ocean perch (2011) will be rebuilt over the longer term (more than 10 years), but within the time-line of analysis.

The following bulleted list summarizes assumptions regarding past and present actions (regulations) that will continue in the foreseeable future and are considered part of the comparative baseline:

- RCAs and Essential Fish Habitat Conservation Areas will remain in place.
- Sector bycatch limits for overfished groundfish will continue to be used for the nontribal whiting fishery under Alternative 1 management.

- All other enforcement, monitoring, catch accounting, and observer coverage levels will be equivalent to those seen in 2007 under Alternative 1 management.
- ABCs and OYs in effect for 2007 and 2008 will be used for fishery analysis purposes. Projections of stock abundance will be based on the most recent assessments available at the end of 2007.
- The future OYs of rebuilding species will be assumed to be as constraining to Alternative 1 fishing activity as the OYs set during the 2007-08 management cycle.⁷⁰

While it would be more desirable to use the 2009-10 ABCs and OYs, the 2009-10 OYs may not be known in time to complete much of the analysis for decisionmaking. Therefore, 2007-08 OYs will be used and updated, where possible and relevant, to reflect 2009 and 2010 ABCs and OYs. Potential variations in groundfish species ABCs and OYs are also treated as a source of uncertainty, and the impacts of these variations are displayed.

4.1.3 Catalog of Reasonably Foreseeable Future Actions

Chapter 3 describes ongoing actions (Section 3.3) and trends in the baseline environment (Section 3.4). This section catalogs RFFA that have the greatest bearing on the effects of the proposed action. RFFAs will be implemented after the proposed action is implemented, although they are at different stages of development. Only future actions that can be reasonably expected to occur are included. In general, RFFAs are actions that have reached the proposal stage as defined in CEQ regulations at 40 CFR 1508.23.

The following list of RFFAs was developed based on Council workload priorities and the agenda topics for Council meetings through June 2009, as well as RFFAs that may be undertaken by entities unrelated to the Council. This list represents the assumed actions that will be put in place that are not part of Alternative 1 or baseline conditions:

- 1) Amendment 10 will be approved and implemented creating an at-sea monitoring system for the shore-based whiting fishery (currently this system is implemented through an EFP).
- 2) The Groundfish Essential Fish Habitat five-year review will occur and may add new closed areas or modify existing closed areas.
- 3) Amendment 21 (Intersector Allocation) will be approved and implemented creating sector-specific allocations of groundfish species.
- 4) Ongoing biennial harvest specifications will continue, including the 2010-11 specifications and beyond.
- 5) Amendment 15 to the groundfish FMP will be implemented, creating sector specific limitation in the three nontribal sectors of the Pacific whiting fishery.
- 6) Wave energy projects will be developed on the Pacific coast, creating conflicts over space and access to fishing grounds.

⁷⁰ The allowable catch levels (OYs) of rebuilding species constrain harvest activity of target species. In the 2007-08 biennial harvest specifications process, the Council selected various rebuilding species OYs that have varying levels of constraints on harvest activity. In general, the OY of canary rockfish predominately constrains harvest activities along the continental shelf and slope in areas off northern California, Oregon, and Washington. Yelloweye is expected to become equally, or more, constraining to trawl harvest activities in the near future as the OY for that species decreases. Darkblotched rockfish and Pacific ocean perch constrain harvest activities along the continental slope in the same general latitudinal area. In areas to the south off central and southern California, cowcod and bocaccio constrain harvest activities along the continental shelf.

- 7) The Groundfish FMP will be amended to authorize an AMP⁷¹ and CFAs⁷² as part of the trawl rationalization program. Although the AMP is described as part of the proposed action, trailing actions will occur to further define the program and implement it. For that reason, it may also be considered an RFFA.
- 8) The allowable harvest of Pacific halibut in area 2A will decline from current levels.
- 9) The Groundfish FMP will be amended to comply with the ACL provisions of the MSA.

4.1.4 Analytical Timeline

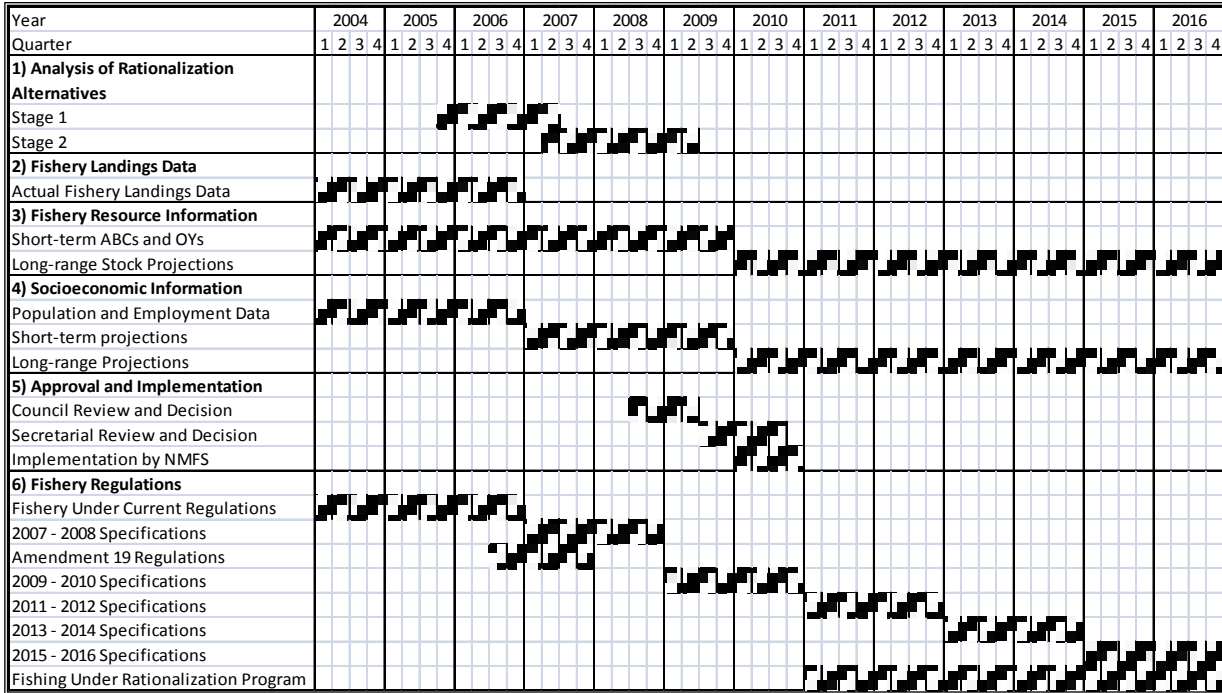
As in any analysis that tries to predict the effects of future actions, it is critical to examine the time periods covered by the available historic and current data, the period during which the analysis will occur, and the period over which the analysts must make projections. In general, there is a substantial time lag between the period during which the analysis is undertaken and the period in which the effects of a proposed action will occur. Specifically, the DEIS was scheduled to be released in the fall of 2009.⁷³ If approved, the effects of the proposed action are not expected to occur until 2011, because of the time needed for Secretarial approval, the development of necessary infrastructure and personnel, and the time needed for initial issuance and appeals. Those effects most likely will not be fully realized until some years later because of the time necessary for fishery participants to adjust and adapt to the new regime.

Figure 4-1 is a quarterly timeline for analysis and implementation of the trawl rationalization program from 2004 to 2016. The first section of the figure, labeled “Analysis of Rationalization Alternatives” indicates the timeframe over which the analysis of the trawl rationalization program takes place. Sections 2 through 4 show the availability of key data sets that will be necessary for the analysis. Section 5, Approval and Implementation, shows the timeframe for the Council and Secretarial decision process and implementation of the proposed program by NMFS. The last section of the figure, Fishery Regulations, indicates the timing of regulatory changes that are projected to occur during the first years of fishing under the program.

⁷¹ Alternative 4b (Council preferred) assumes that the AMP is put in place in year three of the trawl rationalization program and achieves the objectives outlined by the Council for the AMP. Alternative 4b assumes there is no AMP in the first two years of trawl rationalization.

⁷² For analytical purposes, it is assumed that Community Fishing Associations act in a manner that may impact communities, harvesters, processors, and new entrants, and that these associations are allowed to hold quota in excess of accumulation limits.

⁷³ The reauthorized MSA states that the Council shall submit a plan for rationalization of the west coast groundfish trawl fishery within two years of reenactment of the Act. An analysis prepared to support the Council's choice of a preferred alternative in November 2008, along with supplemental information on the preferred alternative, was submitted to Congress to comply with the MSA mandate.



Note: The fact that the timeline begins in 2004 does preclude using data from earlier periods in the analysis.

Figure 4-1. Trawl rationalization program analytical and implementation timeline.

As seen in the first section, Stage 1 of the analysis (development of the analytical framework and outline) runs slightly over one and a half years. The second stage of the trawl IFQ program analysis begins in the second quarter of 2007 and runs through the second quarter of 2009.

Section 2 of the figure shows the period over which actual fishery landings data will be available. By the time the Stage 2 analysis was underway, fishery data for 2006 were available. Information for earlier years will also be available and will be used to describe historical conditions of potentially affected resource and stakeholder groups, but it is not shown in the figure.

The figure’s third section describes the availability of stock assessment information. Under the current management regime, the groundfish stock specifications cover two-year periods, and Council recommendations are made at the end of the second quarter each even-numbered year. This means that ABC and OY specifications for 2009 and 2010 were not recommended by the Council until June of 2008, which is the same time that the preliminary draft analysis of trawl rationalization was scheduled to be completed. Therefore, actual ABC and OY specifications for the 2009 and 2010 fishery were not available early enough to inform much of the trawl rationalization analysis. Harvest specifications for 2007 and 2008 provide an indication of the stock levels and OYs for the near term and also provide long-range projections. As indicated in the figure, these long-range projections of stock sizes are likely to be generally available through 2016 for most species. In cases where new information on species stock status is available during the course of the analysis, it is used if appropriate.

The fourth section of the figure deals with available socioeconomic information. In general, population and employment estimates through 2006 were available at the community or county level by the time Stage 2 of the analysis was underway.

The Council received a preliminary draft analysis of the trawl rationalization program at the end of the second quarter in 2008 (June Council meeting), and another analysis described as a Decision Document at the November 2008 Council meeting, during which many decisions on trawl rationalization occurred. Additional analyses were completed between the November 2008 Council meeting and the June 2009 Council meeting which supported further Council decisions and clarifications in March, April, and June of 2009. At the November 2009 meeting, the Council made a further revision of its final preferred alternative by changing the initial allocation formula for canary rockfish, an overfished species. For this species alone, the Council introduced an equal sharing element based on the buyback permits' history. Following Council decisionmaking, the draft EIS was released to support Secretarial review. Secretarial review of the proposal, including proposed plan amendment language, Federal rulemaking (promulgating regulations), developing the necessary tracking and monitoring infrastructure, and allowing time for QS issuance and appeals is expected to take more than a year (from completion of Council decisionmaking in November 2009 and continuing through 2010 with a target implementation date of January 1, 2011).

The sixth and final section of the figure shows the major regulatory regimes under which the fishery will operate between 2004 and 2016. The current regulations are expected to remain in effect through 2008. In early 2009, new biennial groundfish stock and harvest specifications were implemented. Some additional regulations, such as Amendment 10 are presumed to also go into place. It is assumed that fishing would continue under those regulations through 2010. In 2011, it is anticipated that fishing under the trawl rationalization program would begin.

While not shown in the table, the analysis takes into account 20 years beyond the implementation of the rationalization program. The end of 2016 is used as the "end point" for the short-term period of analysis, while the long term is assumed to extend to the end of 2031. The time horizon of the analysis is more than a few years after implementation of an alternative management regime in order to include fleet consolidation and other possible effects.

4.1.5 Review of Alternatives

The six action alternatives described in Chapter 2 are briefly illustrated in Table 4-2 for reading convenience. These alternatives are referred to throughout Chapter 4 to illustrate the impact of a trawl rationalization program on the affected environment. Alternative 1 is not shown in the table, but is considered in the analysis and is referred to as Alternative 1, Status Quo, or No Action. Throughout Chapter 4, the alternatives other than Alternative 1 are often referred to as "rationalization alternatives" or "action alternatives." Either term is used to imply an alternative different from status quo.

Table 4-2. Overview of action alternatives.

ELEMENT	ALTERNATIVES					
	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b (Preferred Alt)
Catch Control Tool	IFQ for all Trawl Sectors	IFQ for all Trawl Sectors		IFQ for Nonwhiting Trawl	IFQ for SS Trawl	IFQ for SS Trawl (trip limits for nonIFQ species)
				Co-ops for Whiting Trawl	Co-ops for At-Sea Trawl	Co-ops for At-Sea Trawl
Initial Allocation and Qualification	Based on permit landing history	Based on permit landing history		Equal sharing of buyback history in Nonwhiting (all groundfish)	Equal sharing of buyback history in SS (all groundfish)	Equal sharing of buyback history in nonCP sectors (all nonoverfished spp. & canary rockfish)
				Rebuilding stocks allocated on a bycatch rate/pro rata (whiting)	Rebuilding stocks allocated on a bycatch rate/pro rata (whiting)	Rebuilding stocks and Pacific halibut allocated on a bycatch rate/pro rata
				CV co-op endorsement & allocation 97-03	CV(MS) endorsement & allocation 97-03	-CV(MS) endorsement & allocation based on 94-03 -MS permit: at least 1,000 mt in 2 years from 97 - 03
Accum. Limits	SS nonwhiting grnd: 3% ctrl & 6% per vessel	SS nonwhiting grnd: 3% ctrl & 6% per vessel		SS grnd: 1.5% ctrl & 3% per vessel	SS grnd: 2.2% ctrl & 4.4% per vessel	SS grnd: 2.7% ctrl & 3.2% per vessel
	SS whiting: 12% ctrl & 25% per vessel	SS whiting: 12% ctrl & 25% per vessel		CV(SS) whiting: 15%	SS whiting: 25% ctrl & 12% per vessel	SS whiting: 10% ctrl & 15% per vessel
	MS: 25% ctrl & 50% per vessel	MS: 25% ctrl & 50% per vessel		Mothership: 20% usage	Mothership: 30% usage	Mothership: Cannot process more than 45%
	CP: 60% ctrl & 75% per vessel	CP: 60% ctrl & 75% per vessel		CV(MS): 10% ctrl CP: none	CV(MS): 15% ctrl CP: none	CV(MS): 20% ctrl, 30% usage CP: none
Grandfather clause	Grandfather clause exists	Grandfather clause exists		None	Grandfather clause exists	None, but entities must divest overage QS at the end of year 4
Processor Initial Allocation / Co-op Affiliations	None	None	25% of groundfish, 50% whiting to SS and MS	100% Processor affiliations in MS and SS whiting sectors.	50% Processor affiliation in MS sector	<input type="checkbox"/> Annual mothership declaration requirement
				25% SS processor alloc of SS groundfish	50% SS processor allocation of SS whiting	20% SS processor allocation of SS whiting
					No processor allocation of SS groundfish	No processor allocation of nonwhiting
Species Covered	All groundfish and Pacific halibut	All groundfish and Pacific halibut		All groundfish in nonwhiting sector	All groundfish in SS sector	Select groundfish species and Pacific halibut in shoreside sectors.
				Select species at sea. Bycatch pools are common across all whiting sectors		Select species at sea. At-sea sector bycatch is allocated at co-op level
Number of Trawl Sectors	Three	Three	Three	Four	Three	Three
Adaptive Mngmnt	None	10% A.M. set aside	None	10% A.M. set aside for all sectors	10% A.M. set aside for SS	10% A.M. set aside for SS nonwhiting species
Area Mngmnt	None	None	None	Species split at 40 10 N lat	Species split at 40 10 N lat	None
Carry-over	Carry-over exists	Carry-over exists		No carry-over	Carry-over exists	Carry-over exists. Allowance decreases if OY declines

- 1) For analytical purposes, the adaptive management provision will be assumed to be used to A) mitigate against the effects of the program on adversely impacted communities, B) provide incentives to use habitat and bycatch friendly gear, and C) to mitigate against adverse effects of the program on processors (this is specific to Alternative 2b). For Alternative 4b, the Council's goals and objectives specified for AMP are used.
- 2) Under the Council's preferred alternative (Alternative 4b), control limits apply to quota shares, and vessel limits apply to quota pounds (though QS control limits may indirectly constrain transfers of QP in some situations).
- 3) Assumptions regarding the sector level allocations of groundfish species and Pacific halibut differ between Alternative 4b and other Alternatives. Alternative 4b uses the Council's Final Preferred Alternative for Intersector Allocation.

A general description of each alternative, its focus, and rationale is included below.

- **Alternative 1** is No Action.
- **Alternative 2a** is market-centric with a high level of individuality and individual accountability. This alternative is intended to illustrate the effect of market incentives on the program. Illustrating the effect of the market without special provisions serves as a benchmark to help inform other decisions, such as whether to include provisions to hedge against market influence. In other words, before considering special provisions, it is worthwhile to understand why they should or should not be incorporated.

In this alternative, a focus on market outcomes is achieved by issuing Qs to entities and by requiring that all groundfish species and Pacific halibut be covered with Qs. This means that market incentives apply to all groundfish catch and Pacific halibut. If species were not covered by Qs, the market would not have an effect on the catch, because they would not be directly managed by the rationalization system, which by definition is market-based. Issuing Qs (instead of establishing co-ops) is intended to isolate the effect of the market to individuals by holding them accountable for their own catch. Co-ops may result in a slightly different outcome because of their collective, community nature. This alternative also focuses on market outcomes by establishing three trawl sectors (versus four), allowing more market influence over the harvest strategies of fishing entities. This alternative does not include an AMP because such a provision would be designed to directly influence, or modify, outcomes that are driven by market incentives. A carry-over is included to provide flexibility in making harvesting choices across years, consistent with a market-driven approach. Accumulation limits are set at the high end of the range specified in the alternatives⁷⁴, and there is also a grandfather clause. These provisions would allow more consolidation in the fishery than other options.

Although as constructed, harvesters receive the entire initial allocation, this alternative would not preclude an allocation to processors. The harvester-only allocation illustrates the effect of the market on the program, while disentangling the harvester and processor initial allocation issue and the effects on the program caused by splitting the initial allocation between harvesters and processors. Since the current suite of alternatives has an option to allocate 100 percent to harvesters, but not an option to allocate 100 percent to processors, this alternative allocates 100 percent to harvesters to better isolate the influence of market incentives on the program.

The focus on individuality in this alternative is accomplished by issuing Qs (versus co-ops) for all sectors of the fishery. This creates a more individualistic perspective based on the notion that IQ tends to make participants focus on their personal perspective, whereas participants in a harvest cooperative act within a type of community.

- **Alternative 2b and 2c** are similar to Alternative 2a, but address the Council's request to compare and contrast two methods for responding to processor concerns. One method is to make an initial allocation of Qs to processors. The other method is to use an adaptive management system to assist processors that are adversely impacted by rationalization. These two mechanisms have substantially different philosophies—and presumably impacts—that are explored in the analysis. It is expected that the initial allocation of Qs to processors would leave many aspects of the outcome up to private industry and the market; whereas an AMP would allow the Council to mitigate some of the impacts of the program. The differences between these two approaches are explored in this alternative.

⁷⁴ The alternatives analyzed prior to the Council's adoption of a preferred alternative

- **Alternative 3** uses market-mitigating factors and harvest cooperatives (instead of issuing Qs) for the whiting fishery. This alternative places constraints and controls on market outcomes through sector divisions, not having a grandfather clause, an adaptive management mechanism, relatively small accumulation limits, and area management. This alternative gives more influence to processors by giving them relatively large IQ allocations and requiring that co-ops be linked to shore-based processors and motherships.

Imposing harvest cooperatives on three sectors of the fishery is expected to result in different outcomes than issuing Qs for all sectors. Harvest cooperatives are like a community where members collectively decide the allocation of fishing opportunities. The effect of this type of system is expected to be somewhat different than an IFQ system where harvesters may be more likely to engage in fishing opportunities independently.

In this alternative, the species covered in the whiting fishery are limited to whiting and bycatch species. This means that the market-based program does not directly influence how many of the species are caught that do not fall under the whiting or bycatch species category. This lessens the impact the market has on harvests and changes the degree of individual accountability associated with the harvest of groundfish species.

Overfished stocks are allocated based on either the bycatch rate allocation approach, or on a pro rata to the whiting allocation. The approach depends on the sector, but the intention is to establish a more equitable initial allocation than using catch history.

- **Alternative 4a** is intermediate to Alternatives 2 and 4 by allowing for more market-driven outcomes than Alternative 3. This alternative imposes harvest co-ops for the at-sea portion of the trawl fishery instead of all whiting sectors. Shoreside whiting and nonwhiting activity is covered through IQ on all species. A more moderate degree of market influence is achieved by allowing carry-over provisions, allowing for three trawl sectors, establishing accumulation limits that are between Alternative 2a and 4, and requiring that 50 percent of a vessel's catch history in a co-op program be linked to a mothership (instead of 100 percent of catch history).
- **Alternative 4b (Council Preferred)** is the Council's preferred alternative for rationalizing the west coast LE trawl fishery. The Council's preferred alternative establishes IFQs for both shoreside sectors of the trawl fishery and allows them to trade IFQs between one another, effectively combining both shoreside sectors into one. Under the preferred alternative, shoreside processors are allocated 20 percent of the shoreside IFQ for whiting. Under the preferred alternative, shoreside processors would not receive credit for nonwhiting species that have been landed with whiting. Furthermore, a subset of species is covered with IFQs in the shoreside fishery and with bycatch limits in the at-sea fishery, rather than all species in the Council's ABC/OY table for groundfish. Those species which are not covered with IFQs or bycatch limits are excluded because the incidental catch of those species is small relative to management targets and the inclusion of those species may have negative economic implications with little to not benefit to management.

The mothership sector is managed with harvest cooperatives, and each catcher vessel wanting to participate in a cooperative must declare a mothership to which it will deliver in the upcoming year. Unlike harvest cooperatives with linkages in the other alternatives, the cooperative declaration in the Council's preferred alternative allows vessels to freely switch motherships from year to year without penalty. However, catcher vessels cannot fish for more than one mothership within a year, unless it is participating in the noncooperative fishery. This

declaration element was adopted by the Council after hearing from NOAA General Counsel that a mothership linkage may raise some legal issues. The Council departed from the linkage provision adopted as part of the preliminary preferred alternative (in June 2008) and, instead, recommended a declaration provision as a method of providing some degree of certainty to foster business planning among motherships.

The catcher-processor sector is managed with a LE system designed to facilitate the continuation of the voluntary cooperative in that sector. In the event that the voluntary cooperative breaks apart, each permit is allocated an equal number of QSs, and the catcher-processor sector becomes an IFQ-based sector.

Other provisions of Alternative 4b include initial allocation that allocates bycatch species based on a bycatch rate (in the nonwhiting portion of the fishery) and on a pro rata distribution for the whiting portion of the fishery. The initial allocation of IFQ to the shoreside sectors divides the buyback portion of catch history equally and is based on the years 1994 to 2003, where the two worst years are dropped. This equal division only applies to non-overfished species and canary rockfish. The other overfished species would be allocated based on current permits' landing history alone. In the mothership sector, the best 8 out of 10 years are used between 1994 and 2003 for calculating catch history. Analytical Alternative 4b does not include a grandfather clause provision. An adaptive management provision does exist for nonwhiting species in the shoreside sector.

Unless otherwise specified, certain assumptions regarding each alternative include the following:

- Gear switching is allowed in all IFQ programs (gear conversion is assessed within Appendix A).
- All existing processors that participated during the allocation years qualify to receive QS under the IFQ alternatives except under Alternative 4b. Under Alternative 4b, a whiting processor will have had to receive 1 mt or more of deliveries from whiting trips in each of any two years from 1998 to 2004.
- Nonwhiting species are allocated to harvesters with whiting history on a pro rata basis, where the percentage of nonwhiting species received is equivalent to the percentage of whiting received.
- Under the shoreside whiting co-op, the processor linkage is based on 2000 to 2003 history.
- Under the mothership co-op, the processor linkage is based on the most recent year.
- The qualification for the catcher-processor endorsement is one delivery from 1997 to 2003.
- To qualify for the mothership permit the entity must have received more than 1,000 mt in any two years from 1997 to 2003.
- To qualify for the shoreside processor permit in the shoreside whiting coop alternative the entity must have received more than 1,000 mt in any two years from 1998 to 2003.
- In general, those eligible to own QS include anyone who is eligible to own a U.S. documented fishing vessel but there are some additional restrictions and allowances. All other potential elements of the program are analyzed in Appendix A or B.

4.1.6 Uncertainty in Predicting Outcomes

Given the complexity of the environment in which the west coast groundfish trawl fishery occurs, the impact of trawl rationalization is somewhat uncertain. To some degree, the areas and magnitude of uncertainty can be identified to enable discussion of the degree to which actual impacts deviate from estimated impacts.

Several sources of uncertainty affect the analysis, including the timeline (long-term versus short-term impacts). The impact of trawl rationalization over the long term is less certain due to changes in the biological status of stocks, the allowable trawl sector catch (OY/ACL), and the level of trawl sector allocations that were not decided under Amendment 21.

Sources of uncertainty are identified in advance in order to illustrate the potential range of impacts associated with uncertainty. Some of these sources can be quantified. In these cases, uncertainty is characterized with a sensitivity analysis that brackets the range of likely outcomes. Known sources of uncertainty with effects that can be reasonably well quantified include the following:

- Future ABC/OYs (ACLs) of groundfish species
- Trawl sector allocations of some groundfish species
- The ability of trawl vessels to successfully avoid overfished stocks

Sources of uncertainty that are known to exist but whose effects cannot necessarily be quantified include the following:

- The likelihood that a stock will become overfished
- The potential that an overfished stock is rebuilt
- Climate change and the associated effect on fishery resources

These factors are considered as part of the impact of the alternatives. In some cases, other areas of uncertainty may be pertinent to an individual environmental component. In such cases, these are addressed within the analysis.

4.2 Analytical Tools for Assessing the Impacts of Trawl Rationalization

Preliminary analysis and public scoping have indicated that rationalization could result in substantial impacts to various aspects of the social and natural environment. In addition, shifts in the location of fishing effort and changes in the amount of fishing-induced groundfish mortality are expected to impact groundfish stocks and the marine ecosystem. In this section, we describe the analytical approaches used to assess these and other impacts of trawl rationalization.

Due to changes in profit motivation and individual accountability, rationalization changes the way fishermen prosecute fishing activities. Effort (both spatial and in total magnitude), the volume and type of species harvested, and the number of vessels will all be affected. These changes have social and economic impacts, biological impacts, and ecosystem impacts. Table 4-3 summarizes these causal links.

Table 4-3. Causal linkages informing the analysis.

Drivers that Cause Changes under Rationalization	Factors Changing under Rationalization	Resulting State	Impact
<ul style="list-style-type: none"> • Defensibility of Harvest Privileges • Profit motivation • Total catch accountability • Ability to consolidate • Market conditions • Resource accessibility • Gear switching 	<ul style="list-style-type: none"> • Fishing Behavior • Overall Fishing Effort • Spatial Fishing Effort • Length of Fishing Season • Fleet Size • Processing Capital • Catch Disposition • Catch Quantity 	<ul style="list-style-type: none"> • Number of Vessels • Location of Vessels • Amount and Location of Processing Capital • Fish Population 	<ul style="list-style-type: none"> • Net Economic Impact <ul style="list-style-type: none"> ○ Impact to harvesters ○ Impact to processors • Community Impact <ul style="list-style-type: none"> ○ Economic ○ Social • Fish Abundance

Substantial impacts may be realized on the harvesting side via changes to the status of trawl catcher vessels, permit holders, captains, and crewmembers. Impacts may also be realized on the processing side via changes in the utilization of processing plants, processor access to groundfish landings, changes in the demand for processing labor, and impacts to the processing companies as a whole. Among other things, these changes occur as a result of changes in the quantity of catch, the type and quality of fish retained, and negotiations between harvesters and processors over ex-vessel prices. Impacts to harvesters and processors have a secondary effect on west coast fishing communities because of changes in the economic status of harvesters and processors, as well as the level, type, and location of employment in both sectors.

The individual accountability and market-based trading aspects of rationalization are expected to result in shifts in harvesting activity that will alter the quantity of fish caught and the location of fishing effort. These changes could impact the status of fish stocks as harvest rates change, and there is a resulting change in the removals of some species.⁷⁵ Changes in fishing effort and fishing-induced mortality may also alter the ecosystem because of trophic interactions and changes in the location and intensity of fishing effort, which can affect biogenic benthic marine habitat.

Models were developed or referenced to support the analysis of several issues, including the following:

- The impact of the initial allocation of IFQ
- The amount of fleet consolidation expected to occur
- The potential for shifts in the location of fishing effort
- The potential for changes in revenue and catch as a result of changes in bycatch rates
- The comparative advantage of ports and regions in a rationalized fishery
- The biological effect of groundfish stocks from changes in harvest
- The effect on the California current ecosystem resulting from changes in trawl activity

⁷⁵ ABC and OY levels are determined externally through the biennial harvest specifications process. The analysis assumes that overall harvest levels in a rationalized trawl fishery are bounded by the ABCs and OYs adopted in that process.

4.2.1 Tools for Estimating Impacts

4.2.1.1 Theory for Illustrating Negotiation Outcomes

Game theoretical⁷⁶ approaches for illustrating the concept of negotiation and bargaining power are used to illustrate the negotiations between harvesters and processors over ex-vessel prices. This information is useful for showing how the negotiation stance of each player changes as the initial allocation of quota is divided between harvesters and processors. The logic developed through this approach exposes the relative strength that harvesters and processors have in ex-vessel price negotiation based on the control each aspect of the industry has over harvesting privileges. We compare the different negotiation stance each industry has in the initial allocation alternatives to the Alternative 1 regime. While this tool does not result in a prediction, it is useful for illustrating the tradeoffs that exist between the potential allocation alternatives.

4.2.1.2 Information Collection and Existing Analyses

Lessons learned from other rationalization programs

The rationalization of the west coast trawl fishery can benefit from experience in other rationalization programs around the world. An in-depth literature review has been ongoing since 2004 to document the intended and unintended consequences of rationalization programs. This information has demonstrated impacts to communities, catcher vessels, fishery resources, and processors, and it can be used to show empirically how various policies have impacted portions of the affected environment.

Identification of community vulnerability and resilience

As part of the 2007-08 Annual Specifications and Amendment 16-4 Groundfish Rebuilding Plan EIS, an analysis of community vulnerability and resilience was conducted. The evaluation estimated dependence of west coast fishing communities on fishing activity and their resilience in dealing with change. This information is useful for analyzing community impacts due to changes in fishing activity. For example, a moderate change in fishing activity occurring in a vulnerable community may be considered a substantial impact, while a moderate change in a less vulnerable community may be relatively inconsequential.

Documentation of processor ownership, plant location, and port-to-plant product flow

This data collection exercise documented the location and ownership of trawl groundfish processing plants, the ports from which that those plants receive their groundfish, the number of trawl groundfish plants owned by seafood processing companies, and whether those plants process whiting and/or nonwhiting groundfish. This information is based on PacFIN data, as well as data provided by state port samplers, fisheries information specialists, and industry members. This information is used to show the geographic location of plants and product flow, which helps to illustrate impacts on processors resulting from a change in the location of landings. This information can also be used to evaluate regional and community impacts.

Table 4-4 illustrates a hypothetical example of the information collected in this exercise. This table shows the name of a plant, the company that owns the plant, the ports of landing from which the plant derives its catch, and whether the plant processes whiting and/or nonwhiting groundfish.

⁷⁶“Game theory” is defined as a theory of competition stated in terms of gains and losses among opposing players.

Table 4-4. Hypothetical example of processor plant information being collected.

Plant name	Location	Company	Source ports	Whiting port	Groundfish Port
A groundfish plant	Astoria, OR	A groundfish company	Astoria	Yes	Yes
			Westport	Yes	Yes
			Neah Bay	No	Yes

By documenting this information, it is possible to illustrate the relationships between processing plants and regional patterns of landings, between processing plants and individual seafood companies, and between whiting and nonwhiting harvest levels and individual processing plants. Second and third order effects can also be developed and described. This illustrates the effect on regions and communities that result from an impact on processing plants. For a more in-depth description of the information collected in this exercise, the reader is referred to Appendix C.

Documentation of fishing infrastructure and support business

The NWFSC is updating the community profiles that were published in 2006. This update shows the presence of fishing infrastructure and fishing support businesses, such as net manufacturers and vessel fabricators. This information is useful for showing the level of involvement of the fishing industry and for understanding the concept of “agglomeration economies,” where a large number of similar businesses in one place creates economic efficiencies through information sharing and a decrease in the cost of conducting day-to-day operations. A larger number of fishing businesses tends to represent agglomeration and provides an indicator of economic efficiencies that are present or lacking in fishing communities.

Tracking and monitoring program and cost development

This EIS discusses the major elements of a tracking and monitoring program. NMFS will continue to refining this program during the regulatory process that converts the Council’s preferred alternative into regulation. NMFS will seek recommendations from the industry on how to lower program costs. NMFS will also consult with the states to discuss state needs and how to integrate the elements of this program with existing state programs. Options are being researched to determine program costs that can be borne by industry versus those that have to be borne by government agencies. This information has implications for the profitability of participants in the rationalized fishery and implications for management agencies that lack adequate resources for enhanced tracking and monitoring systems.

Groundfish stock status under varying harvest levels

Available stock assessments were used to estimate possible changes in abundance of affected groundfish species due to changes in the amount of species caught in a rationalized fishery. Various potential alternatives were simulated with these assessments to indicate a range of possible stock status by species over time.

Impact on nonharvested species as a result of changes in mortality of harvested species

Information presented in Kaplan and Rothschild (2009) is used to illustrate how west coast marine species may be impacted indirectly due to changes in the mortality of species harvested in a rationalized fishery. This document estimates changes in nonharvested species due to predator prey interactions that are known to exist in the marine food web.

4.2.1.3 Models

This subsection describes the models being developed to understand impacts on the affected environment. The choice of models depends upon the amount and quality of information available. Some of the data issues complicating model development for this analysis are as follows:

- Cost and earnings data for individual harvesters are available only for a single year.
- Cost and earnings data for individual processors are unavailable.
- Comprehensive primary data on processed products and product prices are unavailable.
- Final market demand for groundfish products is not well known.
- Data showing the total catch (landings plus discard) of groundfish by individual vessels are unavailable.

Given the amount of data available, a comprehensive predictive model would not be feasible for development and use in the effects analysis. Instead, a set of models designed to focus on specific issues was developed, or are already available. These include the following:

- A model showing the effects of the initial allocation of QS in a trawl IFQ program
- A model assessing the expected amount of fleet consolidation
- A model illustrating the potential for geographic shifts in fishery patterns
- A model illustrating the potential to reduce the catch rate of overfished species and the associated potential for increased target species catch and revenue
- A qualitative comparative advantage model illustrating the potential for regions to be negatively or positively impacted by rationalization
- Available stock assessments showing stock abundance over time under various harvested quantities
- An ecosystem-based model describing the impact on the biological and ecosystem components of the environment resulting from changes in fishing behavior and catch

In addition to these models, available literature and theory are useful for identifying impacts that a model may not be able to predict, but that can be assessed qualitatively. These qualitative evaluations are based on the expertise of analysts and a review of available literature.

Model to assist in assessing the effects of the initial allocation of QS

The initial allocation of QS may have a large impact on the way trawl groundfish harvesters and processors prosecute the fishery, especially in the first few years under an IFQ program. An examination of how quota recipients fare under the initial allocation options relative to the Alternative 1 indicates the socioeconomic impacts resulting from the initial allocations. The initial allocation model is designed to calculate allocations under alternative formula options and to compare the value of those allocations with recent experience of both permits and processors. Key components of the model include the following:

- PacFIN fish ticket-level data on LE trawl landings by permit, year and species from 1994 to 2006. The model also includes data indicating the ex-vessel purchase of trawl groundfish by buyers or processors. Each trip is categorized by which IFQ “sector” to which it belongs. Compared with the original PacFIN file, the data are also transposed so that each species category is represented by two numeric data fields, one for round weight of the landing and one for ex-vessel revenue.

- Specific allocation rules included in the alternatives (e.g., relative pounds calculated annually from 1994 to 2003, dropping a certain number of years, and recent participation requirements). Allocation options currently on the table for permits include no recent participation requirement, dropping the three worst years from the calculation for nonwhiting fishery permits' QSs, and dropping two years from the whiting fisheries permits' QS calculation.
- Rules on alternative treatment of the buyback vessels' portion of total QSs. Current options include allocating the buyback portion equally among all permits receiving QSs, or allocating it in the same proportion as the permits' catch history-based QSs.

Results are generated for each permit and processor eligible to receive QSs under each allocation option. Results are rolled up to the business entity level in cases where owners control multiple buyer/processor codes and/or LE trawl permits. It is also possible to combine processor and permit allocations to show total QS amounts that would be allocated to entities with eligible history from both buying/processing activities and landings.

These results are used to assess QS concentration implications of the initial allocation and to compare the annual catch value of allocated QSs with the value of harvest and/or buying activity exhibited in recent years. Average 2004 to 2006 ex-vessel revenue is used for this comparison.

Model to assist in assessing the expected amount of fleet consolidation

Consolidation under the alternatives will be a key impact mechanism. This model provides projections of consolidation in the fishery and the effects of that consolidation. The model is based on work published by Weninger and Waters (2003).

Ex ante benefit estimates (estimates prior to the action) are obtained using a two-step methodology. The first step predicts the harvesting practices expected to prevail under an IFQ system. This first step will predict post-QS allocation equilibrium harvesting practices including the following:

- Groundfish harvest per vessel
- Number of vessels needed to harvest LE trawl groundfish catch
- Which vessels remain in the groundfish fishery and which vessels exit
- Nongroundfish harvest per vessel

A directional distance function model of a multiple output harvest technology is used for analysis. The directional distance function is well-suited for characterizing fishing practices under alternative regulatory systems. The model is being estimated using data collected in the recently completed West Coast Limited Entry Cost Earnings Survey.

In the second step, estimates of potential economic benefits are generated based on the predicted harvesting practices from the first step analysis. Because the west coast nonwhiting groundfish fishery is not a derby fishery, it is expected that economic benefits will come through cost reductions and increased access to target species that arise from modifications in fishing behavior (overfished species avoidance). The key output of the second step in the analysis is an estimate of post-rationalization equilibrium harvesting cost.

Changes in harvesting costs can arise from three sources. First, the total fixed costs incurred by the groundfish trawl fleet change as the size of the fleet changes. Since many LE trawlers incur annual fixed costs of at least \$100,000, reductions in fleet size can result in substantial cost savings. In other words, fewer vessels in the fishery will lead to decreased costs through a decrease in annual fixed costs.

Second, costs may change as fishery participation changes, and participants no longer incur diseconomies of scope (such as the costs of frequently switching gear for participating in multiple fisheries). Third, costs may change as vessels are able to buy and sell quota to take advantage of economies of scale and operate at the minimum point on their long-run average cost curve (i.e., the strategy that minimizes the cost of harvesting).

Using the model developed through this project, it is possible to compare the following:

- Harvesting costs under the current regulatory system
- Harvesting costs under an unconstrained IFQ system
- Harvesting costs under an IFQ system where fleet rationalization is constrained through program design features such as quota accumulation caps

This information can be used to help determine community impacts, revenue associated with fishing opportunities under a rationalization program, and the number of boats engaged in the fishery. A prediction of the number of vessels engaged in the fishery has repercussions for estimating the cost of monitoring the fishery.

A comparative advantage model illustrating the potential for regions to be made better or worse off by rationalization

Several variables determine the amount of fishing activity occurring in different ports, including access to fishing grounds, port infrastructure, and fish purchasing and processing. In a rationalized fishery, the incentives created by market-based management and individual accountability may impose additional forces that will alter the decision that vessel operators make regarding the location of fishing activity, the delivery location, and home-port location. Assuming profit is the motivating factor for commercial fishermen, the decision framework created by a rationalized fishery will tend to shift the location of fishing and delivery activity.

Under Alternative 1 management, vessels are not held individually accountable for the amount of fish they catch, provided their landings are within their cumulative landing limit. In addition, operators cannot choose to grant their cumulative limit to another, potentially more profitable, operator. Under a rationalized fishery, both alternatives change, fishermen are held individually accountable, and they can transfer their fishing privilege to another vessel. Individual accountability will put pressure on operators to fish in areas with lower encounter rates of constraining overfished species, and the ability to transfer catch privileges allows the fleet to consolidate to fewer, but more profitable, vessels as the market directs quota in a manner that is more economically efficient.

In a rationalization program, more economically efficient vessels are expected to remain in the fishery, while less efficient vessels are expected to drop out of the fishery. Economic efficiency is determined by several variables including the ability of the operator to generate gross revenues and the vessel's cost structure. Cost structure is determined by variable costs such as fuel, fixed costs, transfer costs, and the cost of day-to-day operations. Ports with a higher degree of fishing support businesses (agglomeration) tend to make it easier and more efficient for operators to conduct day-to-day activities, making the cost of running a fishing business, acquiring parts, and negotiating work relationships lower than in other ports.

Given these arguments, it is reasonable to expect that ports are at a disadvantage when compared to other regions if they have vessels that have a relatively long travel time to fishing grounds, relatively unsuccessful operators, relatively costly vessels, and relatively few support businesses. In addition, ports adjacent to fishing grounds with high constraining overfished species abundance would also tend

to be at a disadvantage because the presence of constraining overfished species would encourage operators to move to areas with lower abundance. Given enough disadvantaging (or advantaging) factors in a port, that port may find itself losing (or gaining) trawl groundfish activity after rationalization, absent some mitigation tool that the Council may elect to implement as part of the program.

We use available information to describe the comparative advantage of west coast ports in a rationalized fishery. Four variables are developed, and each port is scored based on the relative presence of those variables in those ports as shown in Table 4-5. For a more complete description of this model, see the appendix that describes the analytical tools.

Table 4-5. Hypothetical Example of Relative Comparative Advantage Information.

Hypothetical Port	Relative Bycatch Rate	Fishing Infrastructure	Economic Efficiency of Local Fleet	Initial Distribution of Quota
Hypothetical Washington port	-	-	+	+
Hypothetical Oregon port	+	-	+	-
Hypothetical California port	+	-	-	+

A sub-model illustrating the potential for geographic shifts in fishery patterns

The regional comparative advantage structure will also influence the geographic nature of fish harvesting activities. When the variables described above are combined, the comparative advantage of different ports will influence the level of fishing effort occurring in waters adjacent to those ports and regions.

The model indicating geographic shifts in fishing effort in the nonwhiting trawl fishery is constructed to show areas and regions that are more likely to experience less fishing effort and areas that are likely to experience more fishing effort. This model uses much of the same information as described in the above section.

The geographic shift in fishing effort in the mothership and shore-based sectors of the whiting fishery is more difficult, but can be informed—to some degree—by catch patterns that have been exhibited in the catcher-processor sector of the whiting fishery, which voluntarily formed the Pacific Whiting Conservation Cooperative. This association acts like a rationalized fishery, and clear differences in fishing patterns occurred after the cooperative was formed. Similar changes in fishing practices will occur in the mothership and shore-based sectors of the whiting fishery, though almost certainly not to the same degree.

A model illustrating the potential to reduce the catch rate of overfished species and the associated potential for increased target species catch and revenue

The reduction in bycatch of overfished species is expected to be a principal outcome of trawl rationalization. One major implication of reductions is the ability to access more target species and generate higher levels of revenue than under Alternative 1. In some cases, opportunities to catch species that have historically been targets of the trawl sector have been eliminated because of their high correlation with overfished species (yellowtail and chilipepper rockfish). In many cases, species that are not correlated with overfished species have also seen target opportunities reduced. For example, the

catch of sablefish (one of the main targets for the trawl sector) has been less than the total trawl allocation by several hundred tons in recent years, representing a substantial economic loss. Rationalization should encourage fishermen to avoid overfished species more than under the Alternative 1 regime due to the individual accountability aspect of rationalization and the fact that they are rewarded (by access to target species) for decreases in the bycatch rate. Harvesters may avoid bycatch by changing the location and time of fishing.

Nonwhiting fishery bycatch

Several sources of information show how the bycatch rate of overfished species can change in a rationalized fishery and the implications of that bycatch rate reduction. This information can be used to modify the NMFS/GMT trawl bycatch model,⁷⁷ which predicts overfished species catch, target species catch, and ex-vessel revenue given an estimated overfished species bycatch rate and a set of assumed ex-vessel prices. By modifying the bycatch rate, the model can be used to simulate potential changes in harvest outcomes that will occur in a rationalized fishery.

The Washington Arrowtooth Flounder EFP occurred over four years with requirements nearly identical to what would be expected under a rationalized fishery. In this EFP, vessels carried observers and were given an overall cap and individual vessel limits on overfished species. Vessels that could stay within their limits had access to arrowtooth flounder and petrale sole in excess of the normal two-month limits that were in place, as well as access to areas within the trawl RCA. When a vessel reached or exceeded the individual cap, it was no longer allowed to participate in the EFP and was required to fish under normal two-month limits and RCA restrictions while still carrying an EFP observer. In other words, observations were collected while fishing under the EFP and while the vessel was fishing under Alternative 1 regulations (the latter serves as the control in the experiment). In addition to information collected on overfished species and target species catch, information on nonmarketable discards was collected during the first year of the program. This information can be used to show order of magnitude estimates regarding the amount of regulatory discard occurring under Alternative 1 management and the increased amount of revenue that can be attributed to the fishery via an elimination of regulatory discards.

Figure 4-2 illustrates the recorded canary bycatch rates for vessels participating in the EFP by year. It shows the bycatch rate when those vessels were participating in the EFP and the rate when those vessels were fishing under normal (non-EFP) fishing conditions. As is shown from the figure, EFP activity resulted in a lower bycatch rate in all years. This information is described in more detail in Appendix C.

⁷⁷ The Trawl Bycatch Model was originally developed by staff at the Northwest Fisheries Science Center for use in setting regulations that manage the nonwhiting trawl fishery. This model was reviewed and endorsed by the SSC in 2003.

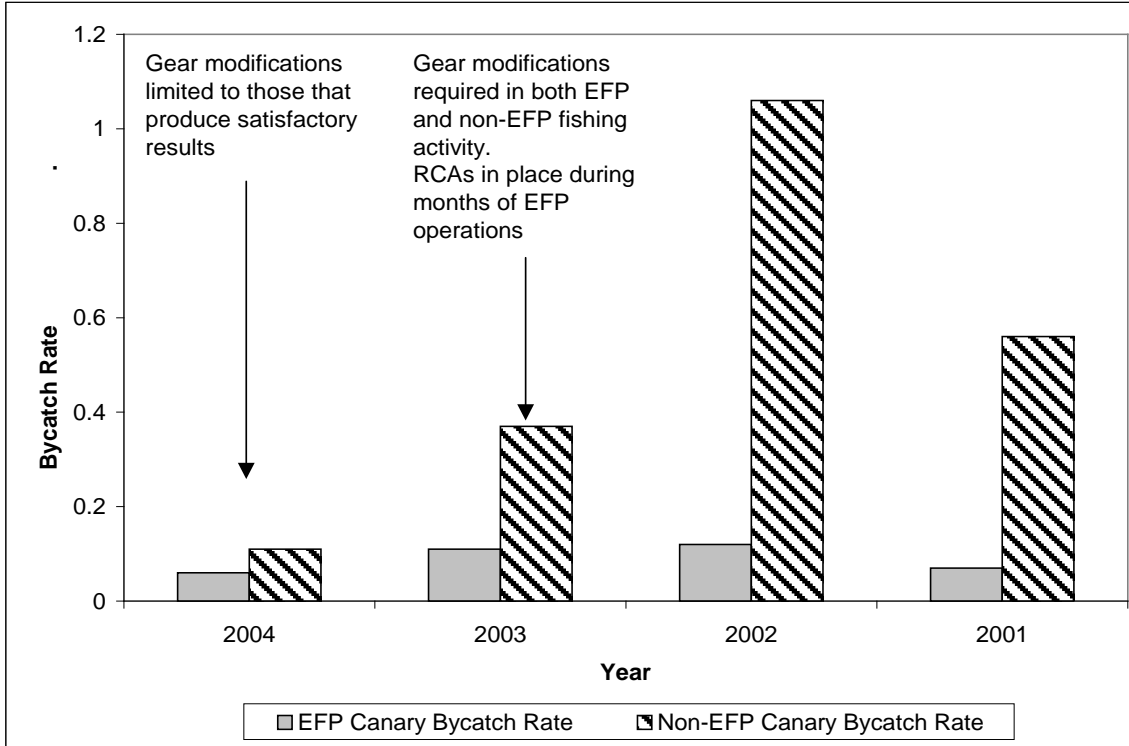


Figure 4-2. Observed canary bycatch rates in the Washington Arrowtooth EFP.

The data from the Arrowtooth EFP project are used to develop a set of overfished species bycatch rates that may occur in a rationalized fishery. These bycatch rates are used in the GMT/NMFS trawl bycatch model to simulate potential harvest outcomes in a rationalized fishery. For more information on this methodology, the reader is referred to the appendix describing the analytical tools (Appendix C).

Pacific whiting fishery bycatch

It is likely that overfished species bycatch rates will also change in the mothership and shore-based sectors of the whiting fishery because those fisheries are operating as an Olympic-style fishery under Alternative 1 management. The whiting fishery operates under bycatch limits that can close an individual sector and/or all sectors of the fishery if reached. Each sector has demonstrated a reduction in bycatch rates since bycatch limits were put in place; however, the catcher-processor sector has demonstrated a lower rate of bycatch in general. Examining trends in bycatch rates in the catcher-processor sector, we can infer whether changes in the bycatch rates in the mothership and shore-based sectors of the whiting fishery will occur if those sectors of the fishery are rationalized. It is not appropriate to assume that the mothership and shore-based sectors of the whiting fishery would have the same bycatch rates as the catcher-processor sector for a variety of reasons including vessel capacity, horsepower, and others.

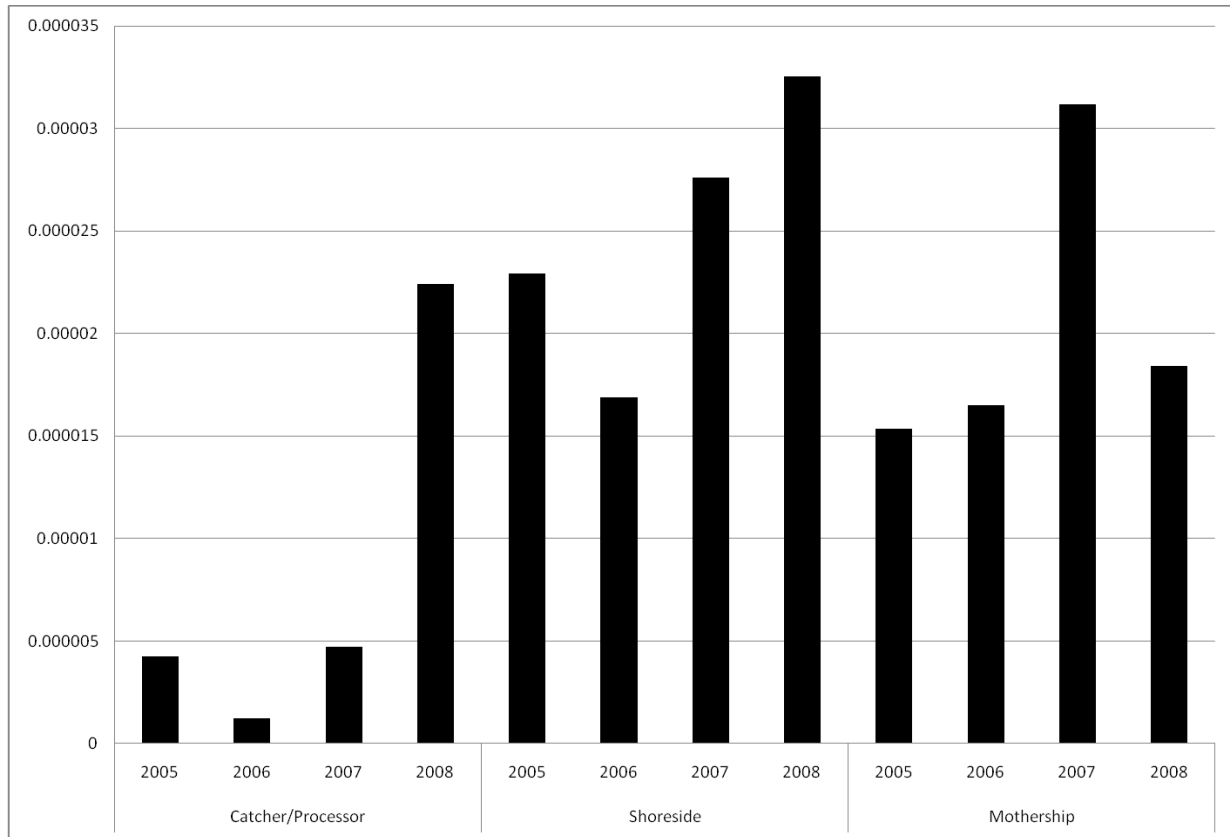


Figure 4-3. Canary bycatch rate by year and whiting sector.

Model to Measure the Regional Economic Impacts of Trawl Rationalization

Income impacts under trawl rationalization were estimated using the Council’s economic impact methodology, which is based on the FEAM. A detailed description of FEAM and the underlying methodology is found in Appendix D to the 2005-06 Groundfish Harvest Specifications (PFMC 2004a). A brief summary of that discussion highlighting features unique to this analysis is provided below.

The Council income impact model uses reported landings from recent PacFIN vessel summaries combined with regional economic response coefficients generated by FEAM. The model estimates local income impacts resulting from commercial fishing, seafood processing, and associated indirect and induced activities for a base year or alternative and then measures impacts resulting from a change in the distribution of landings under alternative fisheries management alternatives against this baseline. Key assumptions underlying the basic model include the following:

1. The impact model relies on response coefficients generalized from IMPLAN. IMPLAN is an economic modeling and data software package that uses local data and a set of econometric relationships to “regionalize” national average production coefficients to the local level. Impact coefficients in the current version of FEAM were derived using dollar flows from 1998 IMPLAN data for west coast states and coastal counties.
2. Average economic impacts from harvesting, primary processing, and associated activities are calculated per landed pound at the port level. Variability in types of harvesting and processing conducted along the coast is captured by the included mix of species, gear, and ex-vessel price

combinations observed in each port. The range of these combinations used in the current model was based on detailed PacFIN data from 2000.

3. It is assumed that everything landed in a port group is also processed there; that is, there is no cross hauling of raw product between ports.
4. Exprocessor sales prices are estimated using cost calculations from the FEAM model or using published sales price information for the product form sold in an area.
5. Marginal impacts are assumed to be a constant percentage of average impacts. To estimate marginal impacts per pound, the average impact results from the model are multiplied by 89 percent.

For this analysis, the model was updated using PacFIN landings and ex-vessel revenue data from 2007. Since the proposed action affects only the LE trawl fleet, it was assumed there would be no change in the level of income impacts generated by the nontrawl commercial fleet and recreational fishing sectors. Other key features of the analysis include the following:

1. Three catch alternatives were analyzed based on alternative assumptions regarding nonwhiting fishery participants' relative success at avoiding bycatch of constraining overfished species under trawl rationalization. Under the low bycatch avoidance scenario, bycatch rates are assumed to be 55 percent of currently observed levels. Under the moderate bycatch avoidance scenario, bycatch rates are assumed to be 30 percent of currently observed levels. Under the high bycatch avoidance scenario, bycatch rates are assumed to be 15 percent of currently observed levels. The better participants are at avoiding contact with constraining overfished species, the greater the expected harvested and utilization of available target species quota. Landings of target species are projected to be highest under the high bycatch avoidance scenario, somewhat lower under the moderate bycatch avoidance scenario, and lowest of the three, but still higher than status quo, under the low bycatch avoidance scenario. Although not modeled here, bycatch avoidance in the Pacific whiting fishery is also expected to occur. However, whiting is considered fully utilized. Thus bycatch avoidance in the whiting fishery is not expected to lead to higher whiting harvests per se.
2. Not shown in this analysis are the effects of shifts in the composition of harvesters' expenditures under a rationalized quota fishery. The rationalized fishery will likely have fewer operating vessels than the current fleet and, thus, should see a reduction in total expenditures associated with the fixed costs of mooring, insuring, and maintaining vessels. However, it is anticipated that increased (actual or implicit) payments to owners of the QS will offset much of the reduction in fixed costs. Total wages paid to crew may not change much under the rationalized fishery. While a smaller operating fleet will hire fewer crew members overall, average wages for the remaining crew will increase substantially.
3. Since this analysis cannot predict where the anticipated consolidation of the harvesting sector is likely to occur, the results are aggregated into two broad geographical regions for display purposes: north of 40°10' N. latitude, and south of 40°10' N. latitude. The former includes all west coast ports north of the Eureka area in California, while the latter includes all California ports from Eureka south to the Mexico border. The line at 40°10' N. latitude forms the boundary between the Eureka and Monterey Pacific fishery management areas and similarly defines the biological boundary for assessed stocks of several species of managed groundfish.

4.2.2 Utilization of Analytical Tools in Assessing the Effects of the Alternatives

Each of the analytical tools on described in the previous sections is used to illustrate the impact of the alternatives on portions of the affected environment. In some instances, these models can provide quantitative outputs that differ between each of the alternatives; in other cases, however, the models may provide a range of likely outputs that are not necessarily tied to a specific alternative. In this case, the relationship of the outputs to the alternatives is characterized based on a qualitative estimate of the likelihood of where each alternative may fall within that range.

Several analytical methods described here are closely related to one another. Some are related because one measures the direct effect of trawl rationalization, while another measures the indirect effect and, therefore, relies on the outputs of the model estimating the direct effect. For example, this occurs when rationalization changes the way catcher vessels prosecute the fishery, which has an indirect, or second-order, impact on the biological status of fish stocks and on the state of the California current ecosystem.

Table 4-6 illustrates the relationship of the analytical methods to the alternatives and their use in determining their respective impact on each of the environmental components.

Table 4-6. Data and models used to assess impacts.

Data Collection/ Model	Env. Component Informed by Data/Model	Utilization of Information in the Assessment of Alternatives
Processor Plant and Company Info	<ul style="list-style-type: none"> Processors Communities 	Primarily used as descriptive information and as supporting information within various analyses.
Community Infrastructure	<ul style="list-style-type: none"> Communities Catcher vessels 	Primarily used as descriptive information and as information within various analyses.
Lessons Learned	<ul style="list-style-type: none"> All environmental components 	Provides empirical examples of impacts where alternatives under consideration have been implemented in other areas.
Community Vulnerability	<ul style="list-style-type: none"> Communities 	Identifies communities that are vulnerable and dependent on fishing. Alternatives are assessed based on the likelihood of impacting communities and whether those communities are vulnerable or not vulnerable.
Tracking and Monitoring Program and Cost	<ul style="list-style-type: none"> Agencies Catcher Vessels 	Alternatives are assessed based on the amount of consolidation allowed or expected to occur and the associated cost of monitoring that fleet size.
Initial Allocation of IQ	<ul style="list-style-type: none"> Communities Processors Catcher Vessels 	Illustrates the distribution of initial allocation and the implications of doing so at the vessel, processor, and community level. Alternatives are assessed based on the initial allocation rules specified in those alternatives.
Fleet Consolidation	<ul style="list-style-type: none"> Communities Processors Catcher Vessels Agencies Captain and Crew Input Suppliers 	Fleet consolidation is illustrated based on model projections and the amount of accumulation limits that are specified as part of each alternative.
Geographic Fishing Patterns	<ul style="list-style-type: none"> Groundfish Resources Nontrawl Harvesters Ecosystem Groundfish resources Recreational harvesters 	Identification of geographic shifts in fishing patterns is assessed based on the incentives within each alternative for doing so.
Change in Bycatch Rate, Catch, and Revenue	<ul style="list-style-type: none"> Catcher Vessels Processors and Labor Captain and Crew Groundfish Resources California Current Ecosystem 	Changes in catch and revenue are portrayed as a likely range. Alternatives are analyzed based on the likelihood of whether each alternative would tend toward the lower or upper bound. The impacts on components of the environment are estimated through the impact of the upper and lower bound.
Regional Economic Impacts	<ul style="list-style-type: none"> Communities 	Income impacts estimated from the FEAM model are used to show the regional economic impact of rationalization. These effects do not appear to vary by alternative, except for a comparison between Alternative 1 and the action alternatives.
Regional Comparative Advantage	<ul style="list-style-type: none"> Communities Processors Ecosystem 	Elements within the alternatives may mitigate the comparative advantage of some regions. The mitigating factors in each alternative are used to characterize the outputs of this model in terms of the likelihood that comparative advantage will make a region better or worse off under rationalization.
Groundfish Stock Assessments	<ul style="list-style-type: none"> Groundfish Resources 	Changes in the mortality of groundfish stocks will influence their status. Possible catch alternatives are run through available stock assessments to provide indications for how the status of affected stocks may change under rationalization
Atlantis Ecosystem Model	<ul style="list-style-type: none"> West Coast Marine Ecosystem 	Information contained in Kaplan et al. (2009) is used to generally inform how changes in the quantity, mix, and location of groundfish catch due to rationalization will impact other species due to connections in the food web.

4.2.3 How the Analysis in this Chapter is Organized

The analysis in this EIS is organized according to several different tiers. This approach was taken because of the dynamic change that is expected to occur to the affected environment if one of the action alternatives is chosen. As a result of these expected dynamic effects, itemizing the analysis in different tiers was undertaken to assist the reader in understanding the effects of the alternatives in a linear fashion. This approach was discussed with the Council's Scientific and Statistical Committee, which stated that such an approach was necessary to make the analysis "meaningful and tractable."

The way in which this analysis is structured can be viewed in several different levels.

- The first level of analysis discusses how rationalization programs impact fisheries and what has occurred in other systems around the world. This is necessary to provide the reader with necessary background regarding the types of effects that occur when a fishery is rationalized.
- The second level of analysis describes the differences between the two types of systems being considered for the west coast trawl fishery (IFQs versus harvest cooperatives), when each of those systems may be appropriate, and how they tend to work under different conditions that may be present in west coast groundfish. This is necessary to provide the reader with the background of the different institutions conceptually and the reasons why one might be chosen over another. A similar level of analysis focuses on ex-vessel price bargaining dynamics between harvesters and processors and how those dynamics play out given different circumstances. This analysis was presented here due to the controversy surrounding the initial allocation of Qs and the fact that such controversy often centers around the initial allocation of Qs between harvesters and processors.
- Next we proceed with an assessment of each resource category, or each portion of the affected environment. Within the analysis of impacts to each environmental component, we begin with an assessment of how any of the action alternatives will tend to impact that environmental component. We call this section "broad level effects" and treat the discussion generally so that the reader is versed in the types of effects that can be expected as a result of moving from status quo conditions to a rationalized fishery.
- Following this general description of the impacts on each piece of the affected environment, we focus on elements of the alternatives and the impact of each alternative. In the alternatives analysis, we describe how the variations in the alternatives will cause effects that may begin to deviate from the general types of effects one may otherwise expect.
- Finally, included within Appendices A and B is a detailed analysis of each of the elements of the alternatives considered. The approach to these appendices is to examine each element largely independently, explain the rationale for each element, and describe how the elements will impact various portions of affected environment.

4.3 Description of Rationalization Programs and Implications for the West Coast Trawl Fishery

4.3.1 Overview

In this section, we draw heavily on available literature to describe the reasons for implementing rationalization programs in other fisheries, their effects, and the likely implications of rationalization for the west coast trawl fishery. Several sources were used in this review including *Sharing the Fish* and *The Drama of the Commons* by the National Research Council (NRC) (Dietz, *et al.* 2002; 1999), various EISs from the NMFS Alaska Regional Office, documents produced by the staff of the NPFMC, documents produced by the staff of the South Atlantic Fishery Management Council (SAFMC), and

informal discussions with experts familiar with programs in New Zealand, British Columbia, and Iceland.

Rationalization of a fishery creates harvest privileges that, in many cases, resemble the creation of a private property right. While the MSA clearly states that such privileges are not property rights, many rationalization programs rely on fishery participants operating as if their Qs are similar to property rights⁷⁸.

The definition of property rights includes the right of the owner to dispense with the property, the right to use or not use the property, the right to exclude others, and the right to transfer ownership. Arguably, three components responsible for many of the effects of rationalization are the aspects of exclusion, individual accountability, and transferability.

One principal assumption of a rationalization program is that fishery participants will act as if their behavior does not impact the behavior of other fishery participants, and vice versa. The belief that actions of one harvester cannot impact the actions of another will tend to change the behavior of fishery harvesters from one that is partially based on the actions of other fishery participants, to a set of actions that are largely independent of the actions of other fishery participants. When fish harvesters are acting in a mutually dependent fashion (that is, when what each harvester does affects the opportunities of another), the tendency is to engage in competition for catch. This tendency to compete leads to Olympic-style fisheries, economic inefficiency, and safety concerns. A fishery that operates in this manner is often called an irrational fishery, though participants are operating exactly as should be expected, given the incentives presented to them.

A system that administers fishing privileges that are defensible from the actions of others will tend to limit the impact of one individual harvester on another. Under this framework, harvesters will engage in behavior that is in their own economic interest, and they will adjust their behavior in a manner that generates a more optimal amount of net revenue. Empirical evidence has shown that this change in behavior on the part of individual harvesters results in less intensive fishing, an extension of harvest timing, and less capital involved in harvesting the stock. A fishery with harvesters operating in this manner is often called a rationalized fishery.

Two models for rationalization are being considered for the west coast trawl fishery: 1) IFQs and 2) harvest cooperatives. Both systems are intended to create conditions where harvesters believe the actions of others will have limited effects on them. Administration of IFQs will often rely on Federal monitoring and enforcement efforts. This protects the interests of individual parties involved in fish harvesting. Harvest cooperatives rely heavily on private/civil contracts between harvesters who establish agreements and policies for harvesting the available fish. The bylaws and agreements established in that private contract define the harvesting opportunities of individual vessels (and the penalties for exceeding those opportunities) and establish the conditions necessary for harvesters to act “rationally.” Enforcement of these bylaws and contracts is typically not enforced by the Federal executive.⁷⁹ NMFS’ role is largely limited to monitoring catch levels at an aggregate level (which may be the fishery, sector, or co-op level) and closing that portion of the fishery when an aggregate catch limit has been met.

Harvest cooperatives and IFQs have many similarities and are likely to affect the west coast trawl fishery in a similar manner. Arguably, the largest drivers for change are the incentives created through

⁷⁸ Though this is often done in practice, it is arguably not necessary to implement a system of harvest privileges that resemble property rights in order for a rationalization program to be successful.

⁷⁹ If disputes arise, cooperative contracts may be adjudicated in the courts.

the right of exclusion, the individual accountability for total catch, and transferability. These measures create flexibility, enhance rewards and penalties for individual actions, and establish new incentives for harvesters compared to Alternative 1, altering the socioeconomic environment and changing the manner in which fisheries are prosecuted. This change will have corollary impacts on the natural environment that can—in many instances—be anticipated. This section describes the broad-level effects expected to occur on various social and environmental components from rationalization.

4.3.2 A Review of Impacts in Other Rationalization Programs

Before considering the effects of rationalization on the west coast fishery, it is useful to review the type of effects of other rationalization programs. In many cases, the focus of rationalization has been on ending problems associated with Olympic (derby-style) fisheries. The NRC (NRC 1999) identified three general motivations for implementing rationalization programs: improving economic efficiency, improving conservation by creating incentives to reduce bycatch and lost gear, and improving safety.⁸⁰ The underlying problems are often the result of derby fisheries where the incentives focus on catch maximization and competition, which results in overcapitalization, gear loss, fishing in hazardous conditions, and fishing more intensively than necessary.

Rationalization programs have resulted in substantial changes in the structure of fisheries around the world. Many impacts of rationalization are based on fisheries that converted from a derby system to a rationalization system. A change of this magnitude dramatically alters the incentives faced by fishermen, and the outcomes are often driven by the fact that fishermen switch from the objective of catch maximization with little or no individual accountability for catch to an objective of profit maximization with a high level of individual accountability. Such changes often mean a reduction in the catch of nontarget, nonmarketable, or prohibited species (because sorting and discarding is time consuming and costly); a reduction in safety-related incidents (because fishermen no longer feel the need to compete and to fish in undesirable conditions); and an increased probability that overall allowable catch levels will not be exceeded (because fishermen have individual catch limits).

Several outcomes have been documented consistently in the literature, including a reduction in the number of vessels engaged in the fishery, increased probability of staying within allowable catch levels, an increase in the length of the fishing season, an increase in ex-vessel prices and revenue, and a decrease in harvest sector employment. Available literature indicates that other impacts have occurred, including a reduction in safety-related incidents and a change in bargaining power between harvesters and processors. While most of these outcomes are social and economic, biological and ecosystem impacts also occur, but typically as a second-order effect. Behavioral changes resulting from rationalization can change the level of fishing intensity, type and amount of gear used to harvest fish, and removals of fish species (either in quantity or in type). These changes can impact the ecosystem by way of habitat impacts (through changes in gear and effort) and trophic interactions (through changes in the quantity and type of fish removals). Biological impacts also occur via changes in the type of fish harvested and the quantity of fish mortality.

In addition to the fact that overfishing of fish stocks is typically eliminated under rationalization, some evidence supports the concept that environmental benefits of rationalization programs occur through the “stewardship effect.” The stewardship effect is an argument that has been made routinely as a mechanism for decreasing the environmental impact of fishing in a rationalized fishery. Through the granting of long-term privileges to harvest a share of fishery resources, fishermen will begin to act like share-holders of a company and be interested in the long-term sustainability of the fishery resource

⁸⁰ The Pacific Fishery Management Council has identified goals, objectives, and guiding principles for rationalization of the west coast trawl fishery that generally include these motivations as well as others.

because it is in their interest to do so. This results in voluntary measures that minimize the negative environmental impacts caused by fishing and increases the sustainability of the fishery.⁸¹ The NRC (NRC 1999) explicitly addressed this argument and makes reference to other incentives created by rationalization, including the incentive to high-grade (to target and retain large fecund fish while discarding small fish) and to misreport catches. If these incentives are greater for harvesters than the incentive to minimize environmental impacts, then the rationale for engaging in voluntary behavior to encourage sustainability may not exist. Effective monitoring and enforcement counters the incentive to misreport catches and to high-grade and discard. A high degree of scientific research and understanding would tend to discourage the targeting of large fecund fish if there are negative repercussions. In other words, if a rationalization program is constructed with long-term fishing privileges, adequate monitoring of catch, robust enforcement, and a high degree of scientific research and understanding, the stewardship effect might exist. The fundamental source of this effect is long-term economic self-interest. Aligning economic interests with desired environmental outcomes can be achieved, but several conditions for such an alignment appear to be implied, including that economic interests in the fishery be long term, that quota holders clearly understand the science, that quota holders be actively engaged in harvesting, and that quota holders be able to collectively agree on voluntary measures. On this latter point, if one quota holder elects not to fish an area where fecund rockfish are found, but another quota holder does fish that area, the first fisherman's voluntary effort is not likely to have any environmental effect. Only if both quota holders elect not to fish on fecund rockfish will there be an environmental benefit.

The perceived benefits of rationalization are often associated with negative effects. Fleet consolidation is an example. A reduction in the number of fishery participants often leads to fewer jobs for crewmembers, a reduction in demand for fishery support business and infrastructure, and a net loss of fishery-based economic activity in a community. These effects can be substantial in communities that rely heavily on fishing as a source of economic activity and community identity. In many cases, these implications are not homogeneous, meaning they may be more pronounced in some communities than others. These drawbacks have often led fishery managers to adopt provisions that limit consolidation, or otherwise mitigate the perceived negative implications of rationalization. In addition to community effects, other effects may be negative. In some fisheries, discards have increased as a result of rationalization due to high-grading; this can be explained in part because some programs have not held individuals accountable for discard. Systems based on total catch (landings and discard) with adequate monitoring have typically shown reductions in discard.

4.3.2.1 Case Studies and Lessons Learned

The 1999 NRC study (NRC 1999) reviewed economic and social outcomes of U.S. IFQ programs on communities.⁸² The IFQ programs and their effects on communities are summarized below. Unless otherwise noted, all data come from the NRC report; in addition, two general reviews of quota programs (GSGislason & Associates Ltd., 2008; Redstone Strategy Group and Environmental Defense 2007) are summarized last. Unfortunately, detailed data on community impacts is often missing; as the Government Accountability Office (GAO) noted (2004):

⁸¹ One important element of this hypothesis that relates to the west coast fishery is that future economic returns create the incentive for fishermen to behave as good stewards of the resource. In a mixed stock fishery such as the west coast groundfish fishery, nontarget species may not receive the same level of stewardship because they do not necessarily provide economic benefit (revenue). In other words, if the stewardship effect exists, it may be more relevant for target species rather than nontarget species.

⁸² IFQ, individual fishing quotas, are often referred to as ITQs, individual transferrable quotas, to emphasize transferability. For consistency, the acronym "IFQ" is used throughout this case study section, although, in other contexts, "ITQ" may be used to refer to the specific programs described.

Fishery managers have not conducted comprehensive evaluations of how IFQ programs protect communities or facilitate new entry, because few IFQ programs were designed with community protection or new entry as objectives. This lack of information, combined with the concerns about economic efficiency and fairness, makes it more difficult to decide which community protection and new entry methods to use. . . . Without collecting and analyzing data on the effectiveness of the approaches used, fishery councils will not know if the program is meeting its intended goals and if mid-course adjustments need to be made.

Surf clam/ocean quahog fishery

This mid-Atlantic surf clam and ocean quahog fishery was the first in the U.S. to be managed under IFQs, beginning in 1990. It is managed by the Mid-Atlantic Fishery Management Council (MAFMC). Prior to IFQs, the fishery was managed through size limits, annual and quarterly quotas, and (for surf clams) fishing time restrictions intended to even out product input to processors. A moratorium on new entrants into the fishery began in 1977, allowing 140 permitted vessels. The moratorium was considered a success, reducing overharvest of surf clams and fostering development of the quahog fishery. However, the regulatory system was costly and difficult to enforce, and the rules restricting fishing time led to unused fishing capacity and health and safety problems resulting from fishermen feeling they had to fish in bad weather. Cheating was alleged to have been rampant, and financial institutions were reluctant to support fishing ventures.

The IFQ program put in place in 1990 has two components: transferable QSs (a percentage of the TAC) and “allocation permits,” or cage tags, which are valid and can be transferred only within a calendar year. The initial allocation was to owners of permitted vessels that had harvested surf clams or ocean quahogs between 1970 and 1988. Different formulas were used in different regions, and, according to McCay et al. (1995), the initial allocation came close to Alternative 1, although some smaller holders found themselves with nonviable levels of quota. There is no accumulation limit or maximum holding; planners argued that U.S. antitrust laws could be invoked to constrain monopolies (McCay et al. 1995). Anyone qualified to own a fishing vessel under U.S. law may purchase IFQs.

McCay et al. (1995) notes two sources of conflict over the initial allocation. First, some fishery interests who were marginally involved in the fishery ended up with low allocations. Second, a small, distinct fishery for inshore ocean quahogs in the Gulf of Maine was “discovered” post-implementation. No one in the fishery had recorded individual landings and, thus, could not qualify for IFQs. Each vessel would, thus, have to purchase IFQ from others in the fishery. Managers resolved the situation temporarily by treating the Maine fishery as an experimental fishery.

TACs have not been exceeded since implementation of the IFQ program. As a result of the program, the MAFMC suspended the minimum size limit on surf clams, and discard of small clams has decreased. The number of vessels active in the surf clam fishery went from 128 in 1990 to 33 in 1997, a 74 percent reduction. In the ocean quahog fishery, active vessels went from 52 in 1990 to 31 in 1997, but the vessels involved are rarely used for any other fishery. McCay et al. (1995) estimated a one-third decline in labor in the Atlantic surf clam and ocean quahog fishery between 1990 (when rationalization was implemented) and 1992.

Economic efficiency in the fishery has increased, and excess harvest capacity has declined since the introduction of IFQs. Some small, resilient firms purchased more QSs, while many other small firms sold out in the first two years after implementation. Medium-sized firms were most likely to purchase more QSs, while the largest firms remained “essentially constant in their holdings” (NRC 1999). Many

participants stopped fishing and leased their QSs to other firms. For ocean quahogs, ownership became increasingly concentrated, but it did not change significantly for surf clams. Monopolization does not appear to have occurred in either fishery, but after implementation, a few buyer-processors became dominant, and the processing sector began moving to southern New England. There has also been a northward shift in landings, due in part to declining catch per unit of effort (CPUE) in the southern region and due to the shift in processing. Reliance on a single buyer increased the likelihood of exiting the fishery by the end of 1993.

In communities, employment in the clam industry declined due to the reduction in vessels and a decline in the bargaining power of crew and captains, “symbolized and to some degree exacerbated by changes in the share system of returns to owners and crew”(NRC 1999). No research on community impacts has been done. Although improved safety was a justification for the IFQ program, nine clam boats and fourteen lives were lost between 1990 and 1999, comparable to the 1980s. The role of IFQs in mitigating or enhancing the danger of the fishery is unknown.

Brandt (2005), studying the rationalization of this fishery, found that many small-scale fishermen transitioned to a new business model based on leasing IFQs to other harvesters. The firm-level analysis (as opposed to vessel-level analysis) showed “little evidence that the small-scale harvester was disadvantaged relative to the larger-scale harvester” (2005). In addition, Adelaja et al. (1998) , in a short-term study conducted in 1993 and 1994, found that monopolies did not develop in the surf clam and ocean quahog fishery.

South Atlantic wreckfish fishery

The fishery for wreckfish (*Polyprion americanus*) takes place in a small area of the South Atlantic region, in deep water, using specialized gear, and for a niche market. The fishery has less than 50 participants and was put under an IFQ program within five years of its inception.

The fishery began in 1987 under the SAFMC. Prior to implementation of the IFQ program in 1992, the fishery was managed through a TAC, trip limits, a permit system, a spawning closure, restricted offloading hours, and a bottom longline restriction. Most vessels participating in the fishery were larger than 50 feet and were used primarily in other fisheries.

Catch in the wreckfish fishery increased from 29,000 pounds in 1987 to more than four million pounds in 1990 (NRC 1999). Little was known about the biology of the stock. At the same time, the number of vessels increased from 2 in 1987 to 80 in 1991. This rapid growth and lack of information, coupled with the shortening of the season and derby nature of the fishery, were driving factors in developing an IFQ program.

The goals of the IFQ program were to create incentives for conservation and regulatory compliance by fishermen; to promote stability and facilitate long-range planning and investment; to allow the marketplace to drive harvest strategies and product forms; to minimize gear and area conflicts; to minimize overcapitalization in harvesting, processing, and distribution; and to allow fishermen to make adequate returns by controlling entry. The IFQ program is based on percentage shares in the TAC; initial allocation was restricted to permittees who had landed more than 5,000 pounds of wreckfish in 1989 or 1990. Fifty percent of shares were distributed in proportion to a permittee’s landings within a given period, and 50 percent were distributed equally to all eligible permittees. No single business entity could receive more than 10 percent of initial shares. However, there was no limit on accumulation.

Since the implementation of the IFQ program, landings have been significantly lower than TAC every year, primarily due to a reduction in fishing trips caused by low market prices. The number of

shareholders decreased from 49 in 1992 to 25 in 1996, only 8 of whom landed wreckfish in the 1996-97 season. Most shareholders are engaged in other fisheries. The small IFQ program is much easier to administer, enforce, and monitor than the system in place prior to IFQs.

The relatively small number of participants in the wreckfish fishery comes from dispersed communities throughout the South Atlantic region. No single community is significantly dependent on the fishery, so community impacts are difficult to discern. The NRC notes that “presumably some flexibility has been lost for other, nonIFQ fishermen who might wish to fish for the unused portion of the quota. The other perspective is that these fish are being ‘banked’ by quota holders and they or their offspring could be caught in later years” (1999).

Alaska halibut and sablefish fisheries

Fisheries for Pacific halibut and sablefish occur off the coast of the Pacific Northwest, British Columbia, and Alaska. The directed fishery for halibut uses longline gear. The directed fishery for sablefish uses longline and pot gear. Most vessels engaged in these fisheries are catcher vessels, but there are catcher-processors in both fisheries. Most vessels are based in the Pacific Northwest and Alaska.

Problems that led to consideration of an IFQ fishery included allocation conflicts, gear conflicts, ghost fishing (lost gear), bycatch loss in other fisheries, discard mortality, excess harvesting capacity, problems with product quality, safety issues, and a lack of economic stability in the fishery and communities. In the halibut fishery, the number of participating vessels grew from 1,000 in 1975 to approximately 3,700 in 1993, with a season length shrinking from 150 days in 1970 to 2 days in the mid-1980s (Knapp 2000). This predominantly small-boat fishery is based in rural, coastal communities. The extremely short season for halibut averaged two to three days per year from 1980 to 1994 in the areas where most of the fish were caught.

The NPFMC goals in developing the IFQ program were to end the derby-style fishery and costs associated with the race for fish, to develop a permanent solution to the problems in the fishery, and to reduce management costs. The Council began considering IFQs in 1988 and implemented the program in 1995. The halibut program applies to all commercial hook-and-line harvests in state and Federal waters off Alaska. The sablefish program is limited to longline and pot gear fisheries in Federal waters off Alaska. Halibut shares were allocated to 5,484 vessel owners and leaseholders with commercial landings in given years (crew and hired captains did not receive initial allocations). Specific allocations were based on the five best years of landings for each individual during a given time period. Sablefish shares were allocated to 1,094 owners and leaseholders, using a similar formula. In general, IFQ owners are required to be on board the vessel when the IFQ is being fished. Rules on accumulation and transfer are still evolving, but, in general, there are limits on both, with low accumulation caps (1 percent). Individuals whose initial allocation exceeded the ownership limit were not required to sell the excess quota, but they could not acquire more. Transferability is restricted across vessel sizes and categories.

In addition to accumulation caps and transfer limits, the allocation included an adjustment for implementing the CDQ program in the western Bering Sea region.

As a result of the IFQ program, season length has increased from 5 to 245 days per year for both species, and landings are broadly distributed throughout the season. It is unclear how costs and revenues have been affected. A lack of studies and data makes it impossible to determine the net economic impact of the program. The top five halibut ports and top sablefish ports have remained the same. The QS market has been active, with more than 3,800 transfers in the halibut fishery and 1,100 in the sablefish fishery. This has led to some consolidation, with the number of quota holders declining by 24 percent in

halibut and 18 percent in sablefish between 1995 and 1997. In both fisheries, most consolidation has taken place among smaller holders. There is anecdotal evidence that fishermen have reduced crew size and that shareholders are crewing for each other, but lack of data makes it difficult to determine effects on crew.

The NRC study offers little data about community impacts. Low prices for salmon have made halibut and sablefish catches more important for regional economies. There is some dissatisfaction about the exclusion of crew members and processors from the initial allocation; crew members and processors believed the initial allocation rewarded vessel owners and changed market power in favor of shareholders. There is also dissatisfaction about the delay between the qualifying years and the implementation of the program, which resulted in excluding some fishermen who were active immediately prior to implementation. In addition, there are ongoing concerns about enforcement and community impacts.

Knapp(1999) found that, in general, Alaska fishermen felt that the rationalization program had made fishing for halibut safer. However, in a 2000 study, he noted that fishermen were sharply divided in their attitudes about the program, but that attitudes are becoming more favorable over time, as those with negative attitudes are leaving the fishery. Not surprisingly, attitudes towards IFQ management were correlated with initial allocations of quota.

Iceland's IFQ program

The highly productive waters around Iceland have hosted a flourishing fishing industry for several hundred years. Iceland began an ambitious vessel construction program in the 1970s that rapidly expanded with the displacement of foreign fleets and the establishment of Iceland's EEZ. This was quickly followed by overcapacity of the fleet and overexploitation of Icelandic fish stocks, particularly cod. Beginning in 1977, attempts were made to limit the size of the fishing fleet, but the numbers continued to increase by 2.6 percent annually and the TAC for cod was consistently exceeded. A desire to improve conservation and efficiency while improving safety and simplifying administration led to the development of IFQ programs in the 1970s and 1980s. At first, the program was seen as a temporary emergency measure. In 1990, however, most stocks around Iceland were incorporated into a quota management system.

When cod was put under an IFQ program in 1984, access was given to those who were boat owners when the system was introduced, primarily based on their fishing record during the preceding three years (Palsson and Helgason 1995). Each fishing vessel over 10 tons was allotted a fixed proportion of future TACs of cod and five other demersal fish species. New vessels could only enter the fisheries if one or more existing vessels equivalent in size were eliminated in return.

Quota allocations are of indefinite duration and can be revoked at any time. To be eligible to hold quota, a person or company must have access to a vessel to which the quota is allocated. Qs can now be leased or permanently sold, but to retain their quota allocations, holders must fish at least half of their quotas every second year. Twenty percent of a year's groundfish quota can be shifted to the next year, and an overage of five percent is permitted in any year without penalty.

If a quota is leased or sold to a vessel operating from a different place, the consent of the municipal government and the local fishermen's union is required. However, trading of quotas is brisk.

The government set up a new agency to issue permits and Qs, to collect data, and to conduct monitoring and enforcement. Management of herring has been very successful, but management of cod has not, possibly due to an excessive TAC. Overruns of the cod TAC resulted because of fisheries that

were exempted from the quota program and possibly because of discards of small and immature fish. However, the IFQ program seems to have improved the profitability of the fishery considerably, with large increases in quota price. The total productivity of capital and labor in the fishing industry increased by 67 percent between 1973 and 1990, despite less plentiful fish stocks. In the herring fishery, the number of vessels decreased from more than 200 vessels in 1980 to 29 in 1996, while the total catch increased from 53,000 mt in 1980 to 140,000 mt in 1994-95. In general, there has been a trend toward fewer and larger vessels. The Icelandic government implemented a buyback program in 1994 to remove vessels from the fishery, suggesting the problem of overcapacity was not solved completely by rationalization.

The Icelandic economy depends heavily on fisheries; in 1996, approximately 73 percent of the value of goods exported from Iceland consisted of fish and fish products. In 1995, approximately 11 percent of the population was employed in fishing and fish processing. Fishing is a dominant industry in towns and villages throughout the island.

As of 1999, 24 large firms owned almost half the total quota, and the share of the largest quota holder was 6 percent. Some companies sold their quota to companies located elsewhere, and, when TACs are decreased, some quota holders sell out because their share is no longer viable. Palsson and Helgason (1995) found that “many of the smaller operators that still hold IFQs are increasingly entering into contracts with larger IFQ holders—‘fishing for others’—arrangements that are profitable for the lessors but entail a significant loss of profits for the lessee boat owners and a reduction in the wages of their crews.”

The increasing concentration of fishing quota in the hands of large companies has had devastating effects on small fishing communities, leading to unemployment and eroding the tax base. Small communities with fewer than 500 inhabitants have lost a much larger share of quota than larger communities. In some cases, they have tried to reduce the decline by buying or leasing quota or investing in local firms.

There is considerable dissatisfaction about the initial allocation of quota only to vessel owners. The NRC notes that “prior to the program, fishing was typically regarded as a ‘co-venture’ of vessel owners and crews and many crew members now feel disenfranchised” (1999). Fishermen are concerned about “the emergence of the relations of dependency associated with ‘fishing for others,’ prompting at least three strikes by fishermen in the past five years” (1999). Palsson and Helgason (1995) found that fishing rights were increasingly concentrated in the hands of the biggest companies and that “public discontent with the concentration of IFQs and the ensuing social repercussions of this process are increasingly articulated in terms of feudal metaphors, including ‘tenancy’ and ‘lords of the sea.’” In addition, there is concern about the concentration of IFQs in the hands of large vertically integrated companies and resistance to profit-oriented exchange of fishing rights. The bureaucracy associated with fishery management has not been significantly reduced, and there is concern about municipal bankruptcy in fishing villages that have lost most or all of their quota, with massive unemployment and dissolution of communities.

New Zealand’s IFQ program

New Zealand’s IFQ program began in 1986, in response to overcapitalization, decreasing productivity, declining economic performance and excessive management intervention. The aims of the IFQ program were to rebuild fish stocks; ensure that catches would be limited to sustainable levels; ensure that catches would be harvested efficiently, with maximum benefits to fishermen and the nation; allocate catches equitably; manage the fishery to allow security and flexibility; integrate the IFQ programs of the

deepwater and inshore fisheries; develop a regional management framework; restructure the harvesting sector; and enhance the recreational fishery.

Quota was allocated among fishermen based on catch history during a two-year qualifying period. Ten fishery management areas were set up, with TACs established for each area (Deweese 1998). Thirty species were covered. The initial allocation was made free of charge; IFQs were allocated in perpetuity and authorized holders to take specific quantities of each species annually in each quota area (as opposed to a percentage of the TAC). In 1990, this was changed to a proportional IFQ system to reduce the need for government intervention to adjust the TAC (Deweese 1998). Accumulation limits were set in the 20 to 35 percent range. IFQs may not be held by nonresidents of New Zealand or by companies with overseas control. They are transferable.

Several developments not directly related to rationalization took place in New Zealand during the same period, making this example difficult to compare to the current west coast process. For example, an extremely valuable snapper fishery underwent significant declines in TAC, and attempts were being made to allocate 40 percent of the commercial catch to the recreational sector. At the same time, there was a trend toward “New Zealandization” of the fishing industry, with more harvesting and processing taking place in New Zealand. Catches of some species increased by 40 percent during this period. In addition, settlement of native Maori claims reduced the quota holdings of several large vertically integrated companies. As of 1998, Maori interests owned or leased approximately 40 percent of the New Zealand quota (Deweese 1998).

Several conservation measures were included in the program. The ability to carry forward overages to the next year was abolished, and a more precautionary approach to setting TACs was adopted (Deweese 1998).

The IFQ program resulted in improved biological status of fish stocks and the development of an open, transparent stock assessment and TAC-setting process. The goals of reduced overcapitalization, increased flexibility, market orientation, greater industry responsibility, and increased efficiency and profitability were achieved. Deweese (1998) notes that “five of the six vertically integrated companies in the 1995 interviews had very positive responses to the IFQ system. These companies stated that their firms’ relatively secure fish supplies resulting from the IFQ system enabled them to do long-term planning and value-added product development. The small-scale quota owners interviewed had mixed feelings.” No details were available about impacts on communities.

British Columbia halibut quota program

Wilens and Casey (1997) reviewed impacts on crew from the B.C. halibut longline quota program. Prior to rationalization, the B.C. halibut fishery was a classic derby fishery with very short seasons (4 to 5 days), similar to the Alaska halibut fishery prior to rationalization. A LE program was adopted in 1979, restricting participation to 435 vessels, which subsequently became the core group of quota holders under the rationalization program. Rationalization was implemented in 1991.

The allocation formula was derived by the industry, based on prior catch records (70 percent) and vessel length (30 percent). An observer company was hired and funded with a self-imposed landings tax. During the first two years, quotas could not be transferred permanently or leased. In 1993, leasing was allowed, but consolidation was limited. Each vessel’s allocation could be split into two equal units, which quota holders could lease out. Quota holders could lease up to two units from others. This effectively constrained quota stacking, and Deweese (1998) notes that “this gradual transition to transferability also allowed fishery participants time to adjust to the new system and think through their participation decisions.”

The rationalization program resulted in some important changes in product handling and quality. The halibut season became longer (eight months), allowing halibut to be sold fresh, as opposed to frozen. During the first year, the percent of the harvest marketed fresh jumped from about 40 percent to 94 percent, generating 55 percent more in ex-vessel prices. The Department of Fisheries and Oceans instituted a hotline where fishermen could find out how many others were fishing, in order to time trips so that the fresh market was not periodically glutted. In addition, fishing was reduced during the Alaska halibut season.

Wilén and Casey (1997) found that some consolidation had taken place, but that it had been limited by the program's design. Dewees (1998) reported "a transfer of market share from large traditional processing firms to smaller firms specializing in halibut. The number of firms processing halibut increased from 57 to 69 and the locations of landings became less concentrated." Most vessels continued to fish for other species such as groundfish, salmon, and herring, and they did not fish substantially longer after rationalization than before. The rate of fishing slowed dramatically compared to the pre-rationalization derby fishery. The average number of days at sea per trip declined, but there was a slight increase in the number of trips per season.

At the same time, both the importance of the specialized skills that crew members contributed during the derby fishery, and the need for additional crew to reduce risk during the derby setting, declined. Crew size per vessel was reduced, usually by one person, among 44 percent of those surveyed. Wilén and Casey (1997) and Dewees (1998) estimated that the quota program reduced the total number of crewmembers employed by 32 percent, but that the total days of fishing had increased marginally. Of the 44 percent who reported reducing crew size, 59 percent reported that individual shares for the remaining crew went up. Wilén and Casey report (1997) that "remaining crew members are likely to be substantially better off than before even if the individual crew shares have been reduced."

Bering Sea crab rationalization

Bering Sea crab rationalization began during the 2005/2006 fishing season. Lowe and Knapp (2006) studied the impacts of rationalization on the three small Alaska communities of False Pass (population 40), King Cove (population 80), and Akutan (population 500). All three communities relied on both commercial and subsistence fisheries. False Pass and Akutan were designated CDQ communities, giving them economic protections lacking in King Cove. Both King Cove and Akutan had fish processing plants owned by major seafood companies.

Although these communities do not closely resemble the communities that will be affected by west coast trawl rationalization, it is worthwhile to note some of the impacts they experienced from crab rationalization. In the first year of rationalization, dramatic consolidation occurred. Vessel registration declined by about two-thirds for the Bristol Bay Red king crab fishery and about one-half for the Bering Sea snow crab fishery. A corresponding decline in the number of crab fishing jobs occurred, with a loss of about 900 King Crab jobs and 450 snow crab jobs. About 15 percent of this decline was due to a corresponding crab vessel buyback program. The remaining jobs changed, with employees generally working longer seasons and earning more total income. However, the share of ex-vessel value going to crew declined, because a portion of the ex-vessel value was used for royalty payments on leased quota. In other words, total crew earnings declined "because the increase in earnings per job has not been sufficient to offset the decline in the number of jobs" (Lowe and Knapp 2006).

Rationalization also decreased sales for some support businesses, such as pot storage, welding, marine supplies, hotels, and taxis. In general, "processors have benefited from greater certainty of supply but some face higher operating costs from extended operating seasons" (Lowe and Knapp 2006).

Lowe and Knapp note (2006) that “among the most important long-term effects may be changes in the options available to individuals and communities to participate in crab fisheries... The economic viability of the communities has depended upon the ability of residents to participate in multiple local fisheries and to switch between fisheries as resource and market conditions change. Crab rationalization has restricted the ability of residents of these communities to continue to do this in the future.” They note that the effects of crab rationalization will affect, and be affected by, what happens in other fisheries and their management.

Bering Sea Pollock—American Fisheries Act

The American Fisheries Act was signed into law in October of 1998. The purpose of the AFA was to tighten U.S. ownership standards that had been exploited under the Anti-reflagging Act and to provide the BSAI pollock fleet the opportunity to conduct their fishery in a more rational manner while protecting non-AFA participants in the other fisheries (NPFMC Staff 2002). The passage of the AFA resulted in the rationalization of the BSAI pollock fishery by establishing harvest cooperatives for various sectors of the pollock fishery. This cooperative structure was created with the intention that “both harvesters and processors benefited from rationalization” (Stevens and Gorton, 1999 in Matulich, *et al.* 2000). The result of the AFA was a reduction in bycatch, increased utilization, increased economic returns, and improved safety among others. Reports indicate other outcomes as a result of the cooperative structure created through the AFA. The flexibility provided by the cooperative structure allowed the AFA fleet the ability to spread their effort in time and space to accommodate Steller Sea Lion conservation measures, and shifted the monitoring and enforcement burden to the cooperatives and their members (NPFMC Staff 2002).

Several negative impacts of the AFA were reported. Those vessels that had recently moved into the fishery were excluded because their years of participation did not match those years necessary to qualify as an AFA vessel. Spill-over of AFA vessels into other fisheries was also reported as AFA vessels had improved opportunity to time operations and, therefore, participate in additional fisheries. Several fishery participants voiced concerns that being locked in to a particular fishery would reduce the flexibility necessary to adapt as the abundance of various fish species increases and declines over time.

Community effects appear to have varied. Community members directly engaged in the pollock fishery generally benefited through the implementation of the AFA, but some evidence supports the notion that less shoreside infrastructure and support business was utilized in some communities and fishing-related activity became more concentrated in certain ports and less concentrated in others. One particular benefit of the AFA as it relates to small and vulnerable communities is that CDQ programs invested in various seafood companies engaged in the pollock fishery. The CDQ program allocated a percentage of BSAI species to certain eligible communities in western Alaska. The purpose of the CDQ program was to provide villages the opportunity to participate and invest in fisheries, to support economic development, to alleviate poverty and provide economic and social benefits, and to achieve sustainable and diversified economies in western Alaska. Following the passage of the American Fisheries Act, CDQ groups bought in to various seafood companies engaged in pollock. The accumulation of assets can lead to self-sustaining fishing economies in those CDQ communities.

Summary study of Canadian IFQ programs

In a report prepared for Canada Fisheries and Oceans, GSGislason & Associates (2008) reviewed five Canadian Pacific IFQ fisheries: the halibut longline fishery, the sablefish longline and trap fishery, the groundfish trawl fishery, the geoduck dive fishery, and the red sea urchin dive fishery. They developed

ten “lessons learned” that echo many of the more positive lessons presented in the previous case studies (2008:iv-v), summarized here:

1. The situation in many fisheries prior to introducing IFQs was untenable. Change was mandated by poor conservation, business, and people practices.
2. Changes in the economy usually involve the substitution of capital for labor. This is what happened in IFQ fisheries, where each active vessel/operating unit caught more fish—but each IFQ crew member worked much longer and generally earned more money over the season.
3. IFQs create an incentive for fishermen, processors, and buyers to cooperate in identifying market needs and ensuring appropriate catch timing/handling to meet those needs.
4. IFQs allow the production of high value products, building a demand niche that is more insulated from broad supply and demand trends.
5. IFQs have led to better monitoring of port offloads and at-sea activities. IFQs have also led to much better science in most fisheries considered, science for which industry has paid.
6. The long-term benefits of IFQs are generally greater than the short-term benefits, e.g., it takes time for the fleet to consolidate to an economic size, and time for the market to accept new products.
7. IFQs shift the balance of power between the license/vessel owner and the vessel crew and the processor-buyer. The license/vessel owner appropriates a greater share of the increase in “industry value” than does the processor or crew. “We argue, nevertheless, and this study substantiates this, both crew and processor interests are better off in total under IFQs” (2008:v).
8. Certainty of access is a necessary condition to the success of an IFQ program.
9. Commercial fishing licenses under IFQ fisheries management do not necessarily gravitate to interests in large urban centers at the expense of rural interests.
10. It is difficult to analyze the employment, wage, and community impacts of IFQs in isolation of resource conservation, fisheries management, market/revenue, and cost impacts. Future analysis of the employment impacts of IFQ fisheries should be one component in a more broad based review of IFQ programs.

Summary study of U.S. and British Columbia programs

A summary report of U.S. and B.C. LAPPs (Redstone Strategy Group and Environmental Defense 2007) looked at the impacts of the Mid-Atlantic surf clam/ocean quahog program; B.C. sablefish, halibut, and groundfish trawl programs; South Atlantic wreckfish program; Alaska halibut, sablefish, pollock, and king crab programs; and the Pacific whiting co-op program. The study presented five major conclusions:

1. In these fisheries, LAPPs were usually implemented after traditional management had failed.
2. Overall, the fisheries experienced major economic improvements, clear environmental gains, and a mixture of social changes.
3. Compliance with TAC increased, discards decreased, and habitat destruction decreased across the board.
4. Improved fishing practices allowed better management of biomass, ecosystem health, and commercial landings.
5. There were positive and negative social effects.

In regard to community and social impacts, the study found (2007) that “positive effects included increased safety and a higher percentage of fishermen employed full time. Negative effects included community, processor, and job losses; private economic gains at public expense; and in some cases increased ownership concentration and consolidation. Generally newer LAPPs addressed these concerns through improved LAPP design.” The study further notes (2007): “Overall, concentration was often

focused in fisheries with significant economies of scale (for example, those requiring large capital investments in vessels or equipment). Nevertheless, it appears that statutory concentration limits have significantly limited fisheries' ownership concentration in fisheries. . . . However, these limits may have also limited the economic potential of consolidation.”

4.3.3 A Comparison of Harvest Cooperatives and Individual Fishing Quota Systems and Their Appropriateness to Fishery Characteristics

As discussed above, the Council considered the implementation of harvest cooperatives and IFQs as tools for rationalizing the west coast trawl fishery. Because the Council considered both cooperatives and IFQs, it is useful to understand the differences and similarities between the two types of programs. Understanding these differences is necessary in order to understand the effects of the alternatives.

Individual fishing quotas and harvest cooperatives have many similarities, but they also have many differences that make one system appropriate for certain fisheries and the other system appropriate for others. To determine the appropriate application, it is important to understand these differences.

While harvest co-ops and IFQ systems both explicitly or implicitly create fishing privileges in the form of the opportunity to catch a share of the allowable catch, their approach for managing the prosecution of fishery resources between the two programs can be quite different. An IFQ system often requires that an agency track and monitor each vessel's catch, execute quota transfers between vessels or permits, and enforce the allowable catch levels of individual vessels. In contrast, harvest cooperatives are essentially a hands-off approach on the part of the agency, except that NMFS monitors the catch that occurs, compliance with accumulation limits, and fishing activities. The enforcement of those activities is primarily done through private contracts within and across the harvest cooperatives themselves. In other words, NMFS generally limits its scope of interaction to cooperative organizations in a cooperative system, while NMFS may interact with individuals in an IFQ system.

Harvest cooperatives are organizations made up of vessels that work together to harvest a fishery resource. These organizations are sometimes made up of several vessels that negotiate catch sharing arrangements among themselves without needing agency involvement. In other cases, harvest cooperatives are created by several vessels with catch history assignments that each vessel brings to the cooperative. The vessels typically have the privilege to harvest that share, but can lease all or a portion of that share to another vessel through a private agreement without needing agency involvement. The administration and enforcement of harvest activities among member vessels is primarily done through the cooperative organizations and through private contracts. The regulatory activities of the agency are generally limited to monitoring for sector or co-op catch levels, monitoring compliance with accumulation limits, and closing when a sector or co-op reaches the allocation or OY.

An example of a harvest cooperative already exists on the west coast. The Pacific Whiting Conservation Cooperative is a voluntary association of catcher-processors who have negotiated catch sharing arrangements among themselves without agency and Council involvement. The necessary ingredient for this cooperative to form is an allocation of whiting to the sector and a barrier to entry by other catcher-processors who are not part of the arrangement. The mothership and shore-based cooperative proposals are similar to the second example described above. In the mothership proposal, each mothership catcher vessel permit would have a share of the sector allocation based on catch history, and those holding permits for catcher vessels would form cooperative arrangements with other such permit holders. The cooperative organization would coordinate harvest activities of its member vessels, and these activities would include leasing of shares between members without agency involvement.

An IFQ program creates privileges to harvest fishery resources in the form of a percentage of the allowable catch. These shares may be gifted or auctioned to individual entities and are privileges to harvest a portion of fishery resources. Quota can be made transferable, allowing them to be bought and sold, and enforcement and monitoring of individual harvest levels and quota trading is typically done by the management agency.

Arguably the principal difference between the two programs is the coordination of harvest activity and the level at which NMFS is involved. Often vessels in an IFQ program do not coordinate their harvest activity. In a co-op program harvest coordination occurs among members of industry; the government is often not involved to the same degree. This coordination occurs because of the collective nature of the co-op and the collective burden placed upon the co-op to constrain catch by members to the co-op's allocation of the allowable catch. If one vessel acts irresponsibly, the entire cooperative may suffer, and this collective burden fosters communication to enhance the success of harvesting.

Co-op programs can take on many characteristics of IFQ programs and vice versa. The justification for the selection of the type and specific design of the program can depend, in large part, on the characteristics of the fishery and fishery participants. In general, the level of similarity among vessels in the fishery, the level of similarity among markets for participants in the fishery, and the number of vessels in a fishery may help determine the appropriate mix of cooperation and independence for a rationalization program. The purest form of a cooperative (one where the government makes no vessel or permit-specific allocations) will most likely have vessels with similar objectives, similar catch histories, similar constraints on their harvesting activity, and a barrier to entry (the catcher-processor sector is one example of this arrangement). Alternatively, the purest form of an IFQ program may have many participants with a wide array of vessel characteristics, markets, catch histories, and regions. As participants in an IFQ program acquire similar objectives, constraints, markets, etc., that fishery may very well take on characteristics that are similar to co-op-type rationalization programs. Alternatively, as participants in a co-op program acquire dissimilar markets, and have variation in the opportunities available, that fishery may very well take on characteristics that are similar to IFQ-type rationalization programs with more numerous and diverse co-ops. In the end, choosing the most appropriate program depends on the characteristics of the fishery and fishery participants.

The appropriate institution (whether it be individually focused through IFQs or collectively focused through co-ops) depends in large part on conditions present in the fishery, whether those conditions foster or hinder cooperative behavior, and to what degree. Nine variables have been identified which influence cooperation in commons dilemmas: social motives, gender, payoff structure, uncertainty, power and status, group size, communication, causes, and frames (NRC 2002). Because of the characteristics of the groundfish fishery and the alternatives under consideration, the variables most applicable in this case are social motives, payoff structure, power and status, group size, and communication.

In theory, social motives are categorized in four orientations: individualism—the motivation to maximize one's own gains; competition—the motivation to maximize relative gains; cooperation—the motivation to maximize joint gain; and altruism—the motivation to maximize other parties' gains. These theories can be categorized into prosself motives (individualism and competition) and prosocial motives (cooperation and altruism) (NRC 2002). Social and psychological research has shown that individuals exhibit different behaviors and preferences depending on which of the two categories they fall into. Prosself individuals tend to harvest more of a common pool resource, while prosocial individuals tend to act in a way that achieves a more collective and equitable outcome. Both types of individuals can be said to be behaving rationally when engaging in these activities, but their objectives are different. Prosself and prosocial perspectives are important when considering whether to implement

harvest cooperatives or IFQs in a fishery. Proself fishermen may be less likely to operate successfully in a harvest cooperative system than in an IFQ system. In addition, the fact that harvest cooperatives rely on the presence of a non-co-op fishery (a derby fishery for participants who are not in a co-op), the successful prosecution of the fishery may depend on non-co-op participants being prosocial so that they do not close the co-op portion of the fishery, through a disaster tow⁸³ for example.

In cases where there are likely to be collective problems in an IFQ program (such as those problems created by disaster tows of low OY species), successful prosecution of the fishery may require some collective effort on the part of fishery participants. A fishery composed of prosocial individuals is likely to form voluntary arrangements to solve those problems in an IFQ fishery relatively easily, while a fishery composed of proself individuals may face difficulties in developing a voluntary collective management program. Such characteristics speak to the appropriateness of establishing mandatory co-ops, or of establishing a program where cooperative institutions may form voluntarily. For sectors where it appears that collective problems may be present and there is a relatively high likelihood of voluntary cooperative arrangements forming to deal with such problems, establishing a simple LE program, may be sufficient for those sectors to develop voluntary cooperative agreements. Alternatively, in sectors where collective problems may be present and participants tend to be either prosocial or proself individuals, depending on circumstance, there may be cases where mandatory cooperatives are appropriate. In cases where participants are extremely proself individuals, a cooperative arrangement (either voluntary or mandatory) may not be successful, because those participants may face extreme difficulties in working collaboratively. In such cases, implementing IFQs instead may be the best decision; however, multiple other considerations play into the appropriateness of co-ops or IFQs.

Another variable influencing social motives is culture. Individuals from a prosocial culture will tend to behave cooperatively with members in their own group while competing with members from another group. Individuals from a proself culture will tend to focus on their individual objectives and consider the impact on others very little.

The payoff structure can be described as rewards or penalties of acting cooperatively, or of not acting cooperatively, in a commons problem. Payoffs can be financial and social. A social payoff structure is one where an individual receives approval from their counterparts for various activities. Psychological research suggests that individuals who have an opportunity to meet their counterparts ahead of time, and remain in contact with their counterparts during activity, were more likely to engage in cooperative behavior than individuals who did not previously meet their counterparts, or who did not stay in contact. The potential social payoff structure is linked to the culture variable described above. When considering whether to implement IFQs or harvest co-ops in a fishery, it may be worthwhile to consider whether the fishery sector has a culture where participants know each other ahead of time and are likely to continue to stay in contact while engaged in harvesting.

Power and status imbalances within groups make it difficult for individuals to reach cooperative agreements. Individuals in a group with power and status imbalances tend to focus more on their own well-being. Research has shown that collective groups with power imbalances tend to make less efficient use of available resources, are more likely to begin the exercise distributing resources to a subset of the group, include fewer people in resource utilization across multiple rounds, and exert more effort to reach agreements on resource distributions (NRC 2002). In the context of west coast groundfish trawl rationalization, power and stature are closely related to the initial allocation of QS and

⁸³ A disaster tow is generally described as an unexpected catch event of a large magnitude. This term is often used to describe cases where the catch event is so large that it may put the fishing opportunities of an entire sector or fishery at risk.

catch history. In groups where there are wide differences between catch history and status, the likelihood of cooperation is lower than in groups where catch history and stature are more similar. Mannix's (1991) finding that power imbalances in a group make it more difficult to reach agreements on resource distributions can be solved by making resource distribution decisions for them. In a fishery, this can be done by assigning an initial allocation of Qs—or catch history as may be the case in cooperatives—to individuals instead of relying on the organization to arrive at a resource distribution decision. When considering the implementation of IFQs or harvest co-ops, the difference in power and status among participants in the fishery may be a useful consideration because those sectors with power and status imbalances may face challenges when trying to form cooperative arrangements.

Group size theoretically influences the likelihood of successful collaboration in groups. Theory has suggested that the smaller the number of individuals in a group, the more likely it is that group will form cooperative relationships. This logic is consistent with the theories put forth by Nash (1950). One hypothesis is that individuals in smaller groups believe that their contributions are more effective; therefore, they feel rewarded because of self efficacy. Empirical studies have both challenged and supported this hypothesis. One study indicated that larger groups achieve outcomes more optimally than smaller groups, while another study indicated that a reduction in the number of common resource consumers actually increased the consumption of that common resource (Isaac, *et al.* 1994; NRC 2002). However, Rose (2002) finds that factors such as group size influence the ability of group members to monitor one another (NRC 2002). Specifically, smaller group size enhances the ability of individuals to monitor one another at relatively low costs. Given the envisioned structure of harvest co-ops under the existing alternatives, this point is particularly relevant because it is envisioned that agencies will monitor overall harvest levels (either at the fishery, sector, or co-op level). In addition, participants in harvest co-ops would self-monitor the catch of each harvester to ensure adherence to catch-sharing agreements. This information is applicable to rationalization of the fishery because the number of individuals in a group may affect the outcome and success of an IFQ or co-op system, and the number of vessels that will continue to operate because of accumulation limits will impact group size.

Among the most consistent findings in the experimental social dilemma literature is that a period of discussion among participants yields positive cooperative effects (NRC 2002). Social research suggests one reason discussion yields positive effects is that discussion leads to commitments, and these commitments are largely held by individuals. Another study found that discussion can lead to consensus (collective commitments), and this creates cooperative behavior. One additional reason discussion may yield these positive effects is that discussion leads to a positive sense of group identification, though this effect arguably is not sufficient for cooperation. Associated with this concept is the question of whether information flow will help foster cooperation. Bohnet and Frey (1999) addressed this question and found that two-way communication had positive effects on behavior. This may suggest that fostering communication among harvesters of a common resource may improve the likelihood of cooperation. These findings have implications for rationalization of the west coast trawl fishery because they suggest that communication must occur between participants if they are to operate in a harvest cooperative, and information sharing (sharing of catch data for example) should occur among participants to foster cooperative behavior.

This information still begs the question of which system is the most appropriate for the west coast groundfish trawl fishery. We address issues that may help decision makers answer this question. To begin with, we identify some known characteristics of the LE trawl fishery and relate that information to the paragraphs above. We show that each sub-sector of the trawl fishery has different characteristics that may suggest the appropriateness of an IFQ or a harvest cooperative program for each of those sectors. Second, we review available literature in an attempt at outlining the various characteristics exhibited by collective environmental management systems and individual transferable quota-based environmental management systems. We find that there are some differences between the two

institutions that have relevance to the west coast groundfish trawl fishery. In particular, the two institutions display differences on the following issues: large versus small markets and environmental issues; the complexity of the resource and management system; the economic practices fostered by each institution; the social structure of each institution; and the adaptability of each institution to shifts in environmental or social conditions. There are other differences, such as the response to particular aspects of commerce; however, they do not appear relevant to the alternatives under consideration or to the west coast groundfish fishery.

The sub-sectors of the trawl fishery differ in terms of their fleet size, species targeted, historic participation in the fishery, and some information that hints at the willingness to collaborate over common problems.

- Fleet size is smallest in the catcher-processor sector, followed by the mothership sector, the shoreside whiting sector, and the shoreside nonwhiting sector, respectively. Since the literature suggests that group size influences the success of collaboration in groups, this information suggests that collaboration may be fairly pronounced across the entire catcher-processor sector. Collaboration may also occur across the other sectors, but it is more likely that there will be multiple collaborative groups within each of the other sectors.
- The species targeted in the three whiting sectors are largely the same across each participant in those sectors, but the species targeted in the nonwhiting sector can differ substantially across vessels. For instance, some vessels may specialize in shelf flatfish opportunities, while others may specialize in deepwater slope species. This suggests that the objectives of participants in the nonwhiting sector may differ substantially, while the objectives in the whiting sectors may be more similar.
- Historic participation varies depending on the sector. In the catcher-processor sector, historic participation is quite similar, and participants in this sector have stated that this is one of the reasons for the successful formation of the voluntary cooperative (because decisions over resource sharing were relatively easy). In the mothership and shoreside whiting sector, historic participation is more diverse and likely provides some of the justification for the catch history assignments found in the mothership and shoreside whiting sector cooperative alternative. Finally, in the shoreside nonwhiting sector, historic participation is substantially different across participants. This is because of the number of species targeted in the fishery and also because of the relative difference in the historic timeline of participation in the fishery by existing participants.
- The willingness of each sector to collaborate over common problems can be informed, to some degree, by past actions. In the catcher-processor sector, the voluntary cooperative has taken action on its own accord to avoid overfished stocks and, at times, has elected to stop fishing to halt the catch of those stocks. The mothership and shore-based sectors of the whiting fishery have also taken some voluntary actions to avoid overfished stocks, but the actions appear to be less stable and may have lasted for a shorter time. This could be because such actions are not part of a contract that would presumably exist in a voluntary cooperative. Limited information exists to suggest the level of willingness of nonwhiting fishery participants to collaborate over common problems. Anecdotal information suggests that some participants in the nonwhiting sector are avoiding areas of known overfished species abundance because catch of those stocks is a collective problem, but this information has not been verified.

In addition to the different characteristics of participants in each sector, the characteristics of each of the potential programs can differ quite substantially. Table 4-7 was partially adapted from Rose (NRC 2002; 2002) and summarizes the different characteristics of IFQ and cooperative programs that may be

worthwhile when considering a system of IFQs or harvest cooperatives. These characteristics are explained in more detail in the paragraphs below.

Table 4-7. Characteristics of IFQ and co-op programs.

	IFQ Characteristic and Compatibility	Co-op Characteristic and Compatibility
Scale of market and fishery management issue	Better in larger, thick markets and large environmental management issues	Better at dealing with thin market situations and smaller management issues
Resource and management complexity	Better in simple systems	More adept at dealing with—and evolving into—complex systems
Economic practices	Participant focus on profitability and innovation	Participants with more perspective on long-term stability and risk sharing
Social structure	Loose and stranger relations among participants	Close-knit relations among participants
Ability to deal with new entrants	Better able to deal with new entrants	Not as adept at dealing with new entrants

IFQs and collective management institutions are used to handle different sized scenarios. IFQ-based institutions are typically used to handle large-scale environmental management issues, while collective management institutions are used to handle smaller scale environmental management issues. These systems are also more or less adept at dealing with large and thick markets versus small and thin markets. Defining what are large and small issues is somewhat subjective; however, the literature suggests that large-scale management issues (in this context) are those where the overall objective is determined by a government, and standards are imposed on individuals so that the collective whole achieves the overall objective. A small issue is one where a group can determine an objective and take collective action to achieve that objective. An example of a large-scale environmental management issue is air pollution. A community may decide to undertake actions to reduce air pollution, but that community cannot independently solve air pollution problems if others contribute to the problem. Solving that problem is likely to require government intervention. IFQs and collective management institutions also deal with large and small markets differently. IFQ systems work effectively in markets that are thick; i.e., where there are enough potential transactions available at any time so that individuals cannot hold out or engage in strategic bargaining. Collective management institutions do not necessarily rely on price signals and individual ownership, so they do not present opportunities for holdouts and strategic bargaining alternatives. Therefore, collective institutions may be better suited for dealing with thin market conditions; i.e., when allocations of some groundfish species are so small that there is a very limited number of suppliers and a very limited number of transactions occurring on the market. This concept may be particularly relevant to issues facing the west coast groundfish trawl fishery where the trawl allocation of some species may potentially create thin markets in an IFQ system.

IFQs and collective management institutions also differ in the way they deal with resource and management complexity. Individual transferable privileges rely on price signals to influence outcomes. Price signals and efficient setting of prices are most effective in systems that are relatively simple and in which expectations can be reasonably well established and met. Collective management institutions do not necessarily rely on price signals and may instead rely on a series of social and community-based rewards and standards. These collective institutions tend to develop into—and be more adept at dealing with—complex and interactive systems.

The types of economic practices that tend to be encouraged by both systems also differ. IFQ-based systems tend to promote profitability and innovation, while collective systems tend to promote long-term stability and risk-sharing. However, it is important to note that the literature contrasts IFQs and

community-based management institutions on this topic. While harvest cooperatives can be loosely described as a type of community, the literature generally refers to community-based management systems as those tied to a geographic place, or town. Members of a harvest cooperative do not cooperate in marketing aspects, only in harvesting. Therefore, it may be reasonable to state that harvest cooperatives also act in a way that promotes profitability, like IFQ systems, because of the competition that exists in the marketplace. This being said, it is almost certainly the case that harvest co-op systems foster risk sharing. Such risk sharing may have an influence on innovation.

The social structure of IFQ and collective systems is fairly different. IFQ systems tend to be made up of individuals with looser and less familiar relations than collective institutions. Collective institutions tend to be more close-knit. This concept is related to the degree of complexity in the system and the ease of entry and exit. Since collective institutions tend to develop into more complex arrangements, those institutions must be close-knit to foster relationships, communication, and understanding. In addition, collective institutions rely on there being a slow turnover of individuals, or barriers to entry and exit, because this enhances the connectivity of individuals in that collective organization. Because individuals in a collective system typically are stuck with one another, they have more opportunities to engage on multiple fronts and deal with complex issues. In order to develop and sustain the relationships necessary to deal with these complex issues, it may be necessary to ensure that individuals do not have opportunities for easy entry and exit. Based on this information, when considering whether cooperatives are appropriate for a fishery sector, it would be worthwhile to consider the culture of participants in the sector and determine whether that culture has relationships that appear necessary for collective management. In addition, since relationships appear necessary to sustain collective institutions, it may be necessary to impose rules that make entry and exit difficult. Such rules may include not making catch history divisible in a co-op program. This issue may also be relevant to the question of whether to establish linkages between harvesting and processing entities if the relationships between the two entity types are necessary for the success of the collaborative institution.

The literature also suggests that IFQs and co-ops differ in their adaptability to social and environmental conditions. IFQs tend to be more adept at dealing with social change (primarily demand conditions), whereas collective-based systems tend to be more adept at dealing with environmental change (shifts in resource abundance). These findings may not be entirely applicable to the alternatives being considered for rationalization (especially the response to environmental conditions) because such standards (allowable catch levels) are set by the government regardless of whether IFQs or harvest co-ops are put in place. However, one finding in the literature is that IFQ systems are better able to deal with social change that comes in the form of new entrants. This is because such a system can afford to deal with new entrants and does not rely on the same level and type of social relationship that is necessary for the successful operation of collective management institutions, like harvest co-ops. A collective institution may rely on stronger relationships and closer ties, which may be difficult to establish and maintain with new entrants.⁸⁴

4.3.3.1 Harvest Cooperatives and Individual Fishing Quota Systems in Weak Stock Management Conditions

In this section, we consider the difference between the co-op and IFQ institutions under weak stock management conditions. In particular, we consider weak stock management issues that have been discussed in the Council arena, which some believe may generate Olympic-style competition among trawl harvesters. This belief is contrary to the traditionally expected outcome of no competition;

⁸⁴ While it may prove difficult for new owner-operators to enter the fishery in a harvest co-op system, new employees may join a company that comprises a portion of the cooperative organization and work their way up the ranks to a skipper and/or shareholder, thus becoming a “new entrant” into the fishery.

nevertheless, conditions and alternatives may exist that may create Olympic fishery conditions. Some argue that an Olympic fishery could develop under IFQs or co-op management because of species with low OYs or low trawl allocations and the way they would be managed under the two programs. In the case of harvest cooperatives, the existing alternatives call for setting bycatch limits that would close the fishery, the sector, or the co-op when a bycatch limit is met. One fear is that, since the non-co-op portion of the fishery is constructed to be a competitive fishery, participants in that fishery could fish irrationally. Because of this irrational behavior, there is a risk of a disaster tow, which could take a substantial portion of the sector or fishery allocation of a constraining bycatch limit species. In this event, the fear is that the entire fishery would turn into an Olympic fishery via a race for bycatch. To address the likelihood of this alternative, we consider the likely response of the co-op fishery in the event of a non-co-op fishery disaster tow and assess whether the most likely response from the co-ops is to continue fishing collaboratively, or whether the most likely response is to engage in an Olympic fishery.⁸⁵

Theoretically, one could address this question in a manner that is similar to a prisoner's dilemma where the potential reward that one individual faces depends on the actions of another. However, in order to construct that framework, the outcomes of making each decision must be known. In this case, we do not know the outcome associated with making the decision to engage in an Olympic fishery or to fish collaboratively. Therefore, we cannot construct a model to show whether a race-for-fish would ensue or whether co-ops would work collaboratively in the event of a non-co-op fishery disaster tow. However, we do have some empirical information from the Pacific whiting fisheries that suggests a certain response to these conditions.

During the 2005 fishery, there was a disaster tow of canary rockfish in the whiting fishery that put Pacific whiting fishing opportunities at risk for the remainder of the year. The response of the whiting fishery was to attempt fishing in a way that reduced bycatch so that the whiting OY could be attained. The catcher-processor cooperative was maintained, and the whiting fishery continued throughout the year with the three sectors taking all, or the majority of, their whiting allocation. This suggests that collaborative behavior can occur within the whiting fishery under conditions similar to a potential disaster tow in a non-co-op fishery. Furthermore, since the mothership and shore-based sectors of the whiting fishery are competitive fisheries under Alternative 1 conditions (as would be the case in a non-co-op fishery), this suggests that participants in a non-co-op fishery may also work collaboratively to avoid bycatch, even though they will be in competition among themselves for the whiting resource. On the other hand, experience in the 2007 fishery suggests that under conditions that are too constraining, fishermen will begin fishing in an Olympic manner because of the race for bycatch. This empirical information suggests that the likelihood of an Olympic fishery occurring because of a disaster tow in the non-co-op fishery depends on the magnitude of the disaster tow relative to the bycatch cap. If the disaster tow is relatively large, fishermen may not believe that collaborative behavior will be successful in avoiding those species and may, therefore, engage in behavior that is similar to a race for fish. However, if the disaster tow is not large relative to the overall bycatch cap, then fishermen may continue fishing collaboratively.

In an IFQ fishery, some have hypothesized that a race for fish via a race for bycatch could ensue as well. The argument is that because of the low availability of quota for low OY species, fishermen may not be able to find or afford to purchase QPs if they have a disaster tow that puts them into a deficit. If fishermen do not cover their deficit, yet NMFS closes all or a portion of the fishery upon attainment of

⁸⁵ Another issue that may generate Olympic fishery conditions is the level at which bycatch is managed in the whiting sectors—either at the fishery, sector, or co-op level. This issue is closely related to the size-of-group issue discussed in previous sections and whether collaboration can be successful if groups become too large. We address this issue in the Alternatives instead of addressing it here.

the allocation, then this would essentially short-change or preempt someone. Under these conditions, the actions of one harvester can impact another harvester, and this begins to break down one of the necessary conditions for harvesters to fish rationally. Under this condition, the response of harvesters could be to fish earlier in the year to minimize the risk of being preempted by such an event. Under the most extreme example, this could turn into an Olympic fishery because of the fear of preemption over bycatch. Unfortunately, empirical information does not exist in the nonwhiting fishery that would suggest one response over the other; however, in this example, the response is likely to depend on the ability of harvesters to work collaboratively.

In summary, some empirical evidence suggests that harvesters in the whiting fishery will continue to work collaboratively among themselves (i.e., fish rationally) even if a disaster tow occurs in a fishery with a collective bycatch limit. Furthermore, experience in the fishery suggests that non-co-op fishermen may collaborate with other harvesters to successfully avoid bycatch, even though they are fishing competitively for whiting. At some level, however, harvesters may not believe that such collaborative behavior will be successful in avoiding and managing bycatch, and, under this alternative, harvesters may begin to act competitively. Unfortunately, information does not exist in the nonwhiting fishery that would help inform the likely reaction that harvesters in this sector would have disaster tow events. Furthermore, it is uncertain whether empirical evidence from the whiting fishery can be extended to the nonwhiting fishery, because many have argued that substantial differences exist between the two fisheries, and, therefore, substantial differences likely exist between the culture of the two sectors and the relationships that harvesters in each sector have between themselves. Regardless, since a disaster tow in the nonwhiting fishery will create a fishery-wide concern, the likely success of harvesters in the nonwhiting fishery continuing to fish rationally in such an event is likely to require collaboration in some fashion.

4.3.3.2 Summary Comparison of Harvest Cooperatives and Individual Fishing Quota Systems in the West Coast Trawl Rationalization Process

Figure 4-4 illustrates a spectrum outlining some of the various factors determining whether a harvest cooperative system may be appropriate for a fishery, or whether an IFQ system may be appropriate for a fishery.

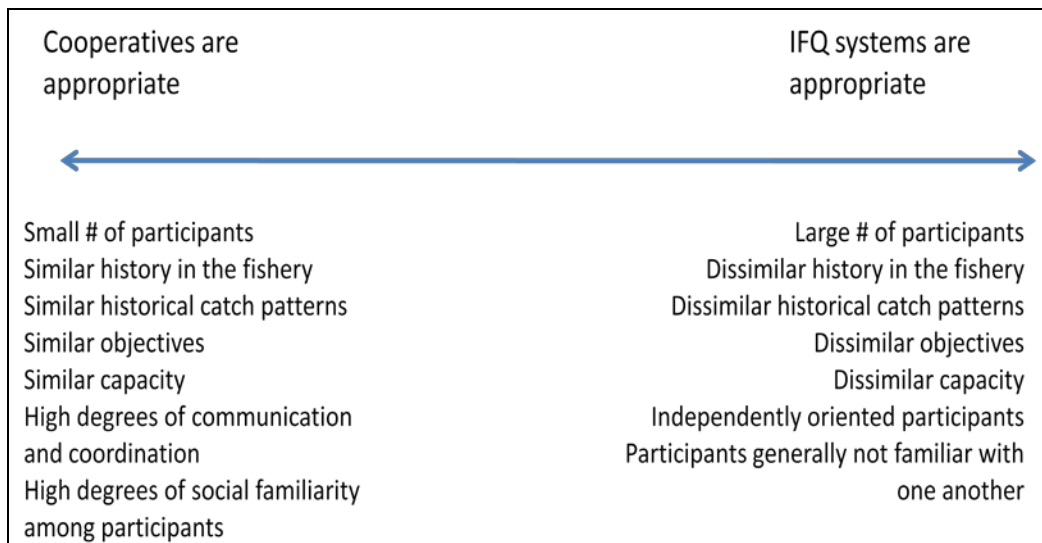


Figure 4-4. Comparison of factors favoring co-ops versus IFQs.

The alternatives for the various sectors of the west coast trawl fishery fall at different places in the spectrum described above, as illustrated in Figure 4-5. The cooperative alternative for the catcher-processor portion of the fishery can be described as a relatively pure cooperative model. In the catcher-processor cooperative alternative, the sector allocation is maintained, and the only tool put in place is a LE permit for the catcher-processor sector (which is an extension of measures put in place through Amendment 15). The mothership sector cooperative alternative is somewhat of a hybrid between a cooperative and an IFQ system. In the mothership sector cooperative alternative, MS(CV) permits are allocated a portion of the mothership sector allocation. This was done as it is largely believed that the catcher vessels in the mothership sector would not be able to arrive at a resource sharing arrangement on their own. In order to foster the creation of cooperatives, the mothership sector cooperative alternative calls for the Council to solve the resource sharing dispute and allocate portions of the mothership sector allocation to MS(CV) permits. The shoreside IFQ alternatives are close to what may be considered to be a pure IFQ program. In this alternative, shoreside permit holders are allocated highly divisible shares of the shoreside trawl groundfish allocation. These permit holders are expected to operate largely independently of one another and are expected to rely heavily on market-based mechanisms to transfer Qs. However, harvesters in this fishery are likely to have to engage in some types of collective-minded behavior to solve weak stock management issues. Therefore, while the shoreside IFQ alternative is close to a pure IFQ model, the fact that some collective actions may be necessary in this fishery makes it not quite so.

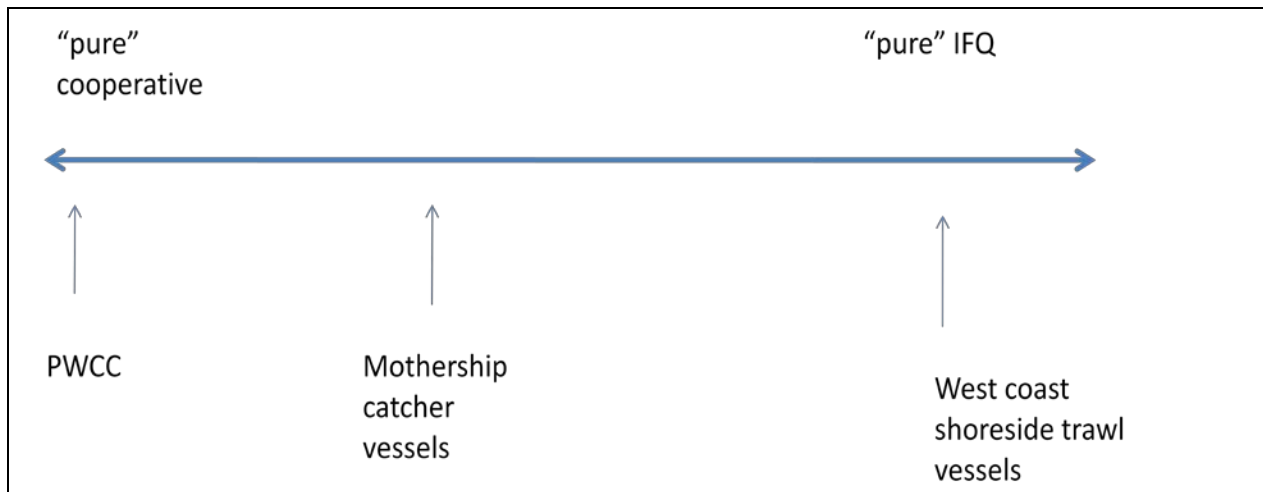


Figure 4-5. West coast trawl fisheries on co-op/IFQ continuum.

4.4 Ex-vessel Price Negotiations in a Rationalized Trawl Fishery

Through the implementation of a system of harvest privileges, it is argued that profits will accrue, or be enhanced, for participants in a fishery. Several reasons for such profitability exist, including consolidation of harvesting activity and improvements in the quality of harvested fish. Such changes reduce the cost of engaging in fishery activities and increase the value of harvested fish. Despite its advantages, relatively few fisheries have implemented IFQs or similar rights-based management systems. Among the most important reasons are concerns over how profits in the fishery that accrue because of the implementation of IFQs are shared among participants in the fishery. One focus of such concerns deals with ex-vessel prices and the ability of harvesters or processors to set prices in their respective favor, thus acquiring much of the profit that accrues as a result of implementation of a rationalization program. The possibility of significant changes in bargaining power between harvesters

and processors over ex-vessel prices has been one focus of several recent studies, including Matulich et al. (1996), Matulich and Sever (1999), and Wilen (2007).

The effect of rationalization on ex-vessel price negotiations between harvesters and processors ultimately impacts the profitability of harvesting and processing operations. The degree of profitability associated with processing and harvesting operations will directly influence the value of capital assets associated with fishing and processing. In other words, the value of a capital asset is a function of the profit generated by that asset. Therefore, when considering the influence of rationalization on ex-vessel prices paid by processors and received by harvesters, it is appropriate to consider the secondary effects those changes have on the value of fishing and processing assets.

Implied in this section is that either harvesters or processors hold the Qs necessary for prosecuting fishery activities and that they are negotiating with one another over ex-vessel prices⁸⁶ as a means of securing revenue from the fishery. On one hand, processors view ex-vessel prices as a cost that, if lowered, could improve the revenue they generate from processing activity. On the other hand, harvesters see ex-vessel prices as benefits that, if raised, could improve revenue generated from harvesting activity. If a third party held the Qs, both harvesters and processors may be negotiating with that third party, and the outcome on profits to harvesters and processors may be vastly different from the outcome described in this section.

The expectation is that this program will lead to increased profits in the harvesting and processing components of this fishery. Whether harvesters, processors, or both will accrue these profits will depend, among other things, on how ex-vessel prices are determined. Ex-vessel prices are determined by the relative “bargaining” power of the two groups. In competitive circumstances, harvesters seek to sell to those processors who offer the highest prices, while processors seek to buy from harvesters who are willing to receive the lowest prices.

Based on these and other factors, this process will generate some equilibrium market price based on the relative bargaining strength of harvesters and processors. This equilibrium is strongly influenced by the cost structures of harvesters and processors, the number of harvesters and processors, the ability of these groups to act collectively or in concert, the overall demand for fish, and the total amount of fish that can be caught—the OYs and the trip limits designed to keep harvests below or at these OYs and encourage a year-round fishery. With the imposition of Qs, this equilibrium changes as new factors are being added to the profit equations of the harvesters and processors—the costs and revenues associated with obtaining the right to harvest the fish associated with the quota shares. In this system, to harvest the fish, participants must own, lease, or buy Qs rather than simply obtain a limited entry permit, trawl under the trip limits. Participants must also find a processor or buyer for the harvested fish. The holder of Qs can now put up a specific amount of fish for bid and, thus, determine when and who harvests the fish (and possibly where and how).

Economic theory suggests that the holder of Qs should be able to realize all or a large proportion of the profits associated with harvesting and processing activities because the participant will be seeking the highest bidder for his Qs, unless it makes more financial sense to harvest his own Qs. Qs owners will undertake short-term and long-term analyses of their options that will take into account estimated profit levels of current and future buyers of the quota shares, just as happens with other financial assets like real estate or shares of company stocks. The initial receivers of these Qs may reap most of the benefits of this program as they did not have to pay for the Qs. Once the Qs are allocated, other factors may influence the resulting prices. For example, if harvesters were to hold all the Qs, they could bid up ex-vessel prices because their bargaining position relative to processors has now been strengthened.

⁸⁶ Ex-vessel prices are the prices paid by processors to harvesters for a pound of fish at the dock.

However, harvesters would not be able to bid up ex-vessel prices beyond the point that cost of purchasing fish exceeds the costs of the processor's costs of operations, as the processor would be operating at a loss.

If processors receive some Qs, the harvesters' bargaining position would be weakened, as now processors have some say in who harvests the fish and when the fish is harvested. For example, rather than purchase fish from an independent harvester, the processor may choose to have his quota shares harvested by a company vessel, thus strengthening the processor's bargaining power with the independent harvesters. Because quantifying the current levels of bargaining power between processors and harvesters is not possible, it is unclear how to allocate quota shares to these groups in ways to create balanced negotiation power between harvesters and processors.

Harvest cooperatives with processor linkages have the effect of creating two powerful entities involved in negotiation. Literature has described this relationship as a "bilateral monopoly" as it relates to bargaining between the harvester and processor tied to one another through the linkage provision. Neither the harvester nor the processor can walk away from the negotiations and act independently in the short term. The harvester cannot prosecute fishing activities without a simultaneous action on the part of the processor. Inversely, the processor cannot engage in processing activities without a simultaneous action on the part of the harvester. In this case, both entities are in a strong position in the negotiation, and profits become shared between both entities. It is not clear whether profits would be shared equally.

In order for harvesters to be able to acquire all profits from processors, harvesters must have a clear advantage in negotiations over processors after the fishery is rationalized. During public scoping and public testimony, several comments were made stating the belief that processors may retain negotiation power over ex-vessel prices even if harvesters receive all of the Qs. In order for harvesters to be able to leverage all profits from processors, several conditions would be necessary, including the presence of a large number of buyers, and a cost of new entry into the processing sector that is minimal, or close to zero. Clearly many industries do not meet these conditions, and information is available that indicates the processing sector on the west coast may be no exception. Several factors indicate this point including 1) a limited number of buyers, 2) large costs of entering into the processing aspect of the industry, and 3) a relative concentration of production into a small number of processors. Based on this information, we assess the likelihood and degree of relative negotiation power between harvesters and processors in a rationalized fishery based on empirical evidence as it pertains to the harvesting and processing sectors on the west coast.

The information and analysis in this section is based on an assessment of the structure of the existing harvesting and processing sector, empirical evidence of competition in the harvesting and processing sectors, and application of economic theory.

4.4.1 Pacific Whiting Trawl Industry

The Pacific whiting resource competes in a global whitefish market and with other similar products such as Alaska pollock and blue whiting. In this market, whiting producers can be considered "price takers," meaning they generally do not have influence over the price they receive for final products. Pacific whiting is often converted to surimi where it is used to form products such as imitation crab. Increasingly, however, Pacific whiting is sold in headed and gutted or fillet product forms to places like eastern Europe and India. Many harvesters in the Pacific whiting fishery also participate in the Alaska pollock fishery. These vessels can be described as being relatively large trawl catcher vessels with an average capacity that exceeds the capacity of those vessels engaged in nonwhiting activities. Several

vessels in this fishery have reported hold capacities that range from 350,000 to 500,000 lb. Harvesters in this sector use midwater trawl gear and harvest relatively large volumes of whiting in a trip. Such volume is necessary to justify harvest activity because whiting have a relatively low price per pound (less than \$0.10 in recent years).

Participation in the harvesting portion of this fishery recently increased, leading to the Council's action to implement Amendment 15 to the groundfish FMP, which effectively established LE for the Pacific whiting fishery. The harvesting of Pacific whiting occurs in an Olympic fishery. Although capacity has been limited by the implementation of Amendment 15, harvesters in this sector still compete with one another for a common quota. While harvesters can legally coordinate their bargaining activities over ex-vessel prices through the Fishermen's Collective Marketing Act, forming and maintaining such relationships are difficult in a competitive, Olympic-style fishery. In such a structure, one harvester can "cheat" and go fishing; when this occurs, that harvester is having a direct effect on the harvest available to other vessels in that fishery. Such a possibility makes it very difficult to maintain relationships intended to enable negotiation with processors over ex-vessel prices. This inherently makes the harvesting portion of this fishery a highly competitive sector, and such competition would tend to lead to lower ex-vessel prices for harvesters than would be the case if harvesters collectively negotiated higher prices. Anecdotal information suggests that ex-vessel price negotiations in the mothership portion of the whiting fishery are influenced by activities in the Bering Sea pollock fishery. Those harvesters who participate in the mothership portion of the Pacific whiting fishery often maintain relationships that exist in the Bering Sea pollock fishery. Revenue generated through mothership fishing operations is often subject to profit-sharing arrangements between the mothership and harvester entity, though at other times price contracts are specified prior to the start of the season (B. Paine, pers. comm., Executive Director United Catcher Boats, May 2008).

Shoreside processors of Pacific whiting utilize equipment that can be described as relatively specialized. The processing of Pacific whiting is highly mechanized in order to handle large volumes, and such mechanization is possible because the whiting fishery targets a single species which is relatively uniform in size and shape compared to harvest in the nonwhiting fishery. Pacific whiting processing can involve many steps that require several pieces of mechanized equipment: head and gut machines, fillet machines, de-boning machines, large tanks for leaching, and freezing equipment, among others. From a Pacific coast perspective, the Pacific whiting fishery has grown in importance in recent years. The price per pound of whiting has improved, and, as a result, an increasing interest has developed among harvesters and processors alike. In the processing sector, interest has grown as evidenced by continued development of Pacific whiting processing capacity in ports like Westport, Washington, and Astoria, Oregon.

Several companies process shoreside whiting, though five companies have handled most the volume harvested between 2003 and 2007. Two companies (Ocean Gold and Pacific) identify themselves as "strategic partners," though it is not immediately clear what this identified relationship entails.⁸⁷ Three other companies (Trident, Jessie's of Ilwaco, and Ocean Beauty) round out the remaining top five companies by volume in recent years. Three of these companies (Ocean Beauty, Pacific Seafood, and Trident) also participate in North Pacific fisheries such as Alaska pollock, Pacific halibut, and salmon. Entry by other companies has occurred in recent years, but that entry has been somewhat sporadic with companies like Da Yang, Del Mar, and Bornstein's handling whiting in a few of the last several years, with much of that new interest beginning recently in 2006. This information suggests that entry into the Pacific whiting processing sector is possible and does indeed occur. The possibility of new entry would tend to make a sector competitive. In a competitive structure where processing companies compete with one another for harvest, the company bidding the highest ex-vessel price would theoretically receive all,

⁸⁷ Ocean Gold's website lists Pacific Seafood as a strategic partner.

or the majority, of the harvested resource. Empirically speaking, capacity will restrict the processing ability of a company; nevertheless, the shoreside whiting processing industry appears to have aspects of competition in the purchasing of fish from harvesters. This is verified to some degree by the following figure that illustrates variation in export price and ex-vessel price. The fact that there appears to be a relationship between the two—in particular that increases in export price are paralleled by an increase in ex-vessel price—suggests that harvesters are able to realize benefits from improvements in the wholesale market for Pacific whiting. In other words, this information suggests that competition exists between processors for deliveries from harvesters. If competition among processors did not exist, it is reasonable to expect that export price may increase while ex-vessel prices remains flat. Identifying these ex-vessel and export price relationships in the mothership and nonwhiting portions of the fishery is not possible due to data limitations.

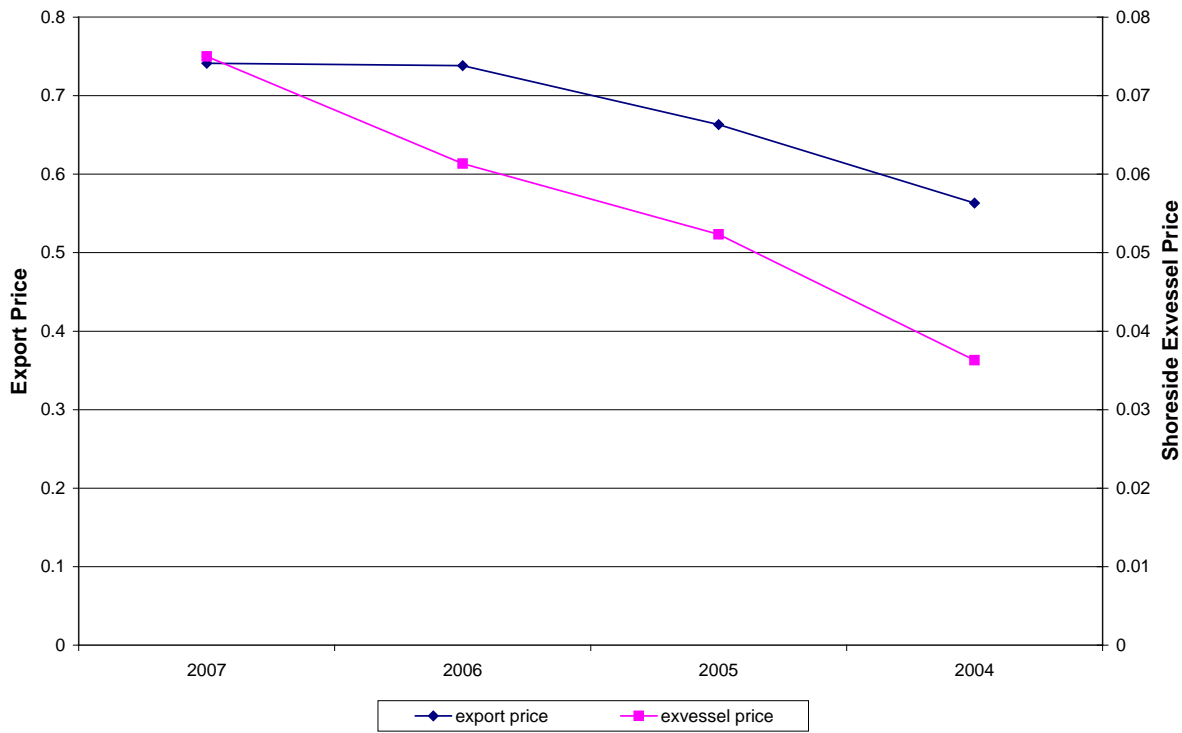


Figure 4-6. Variation in hake export price and ex-vessel price.

Table 4-8 is intended to be a representative set of information describing the companies that process shoreside whiting, the location where those companies process shoreside whiting, and the ports from which whiting is purchased.

Table 4-8. Shoreside whiting processors.

Processing Company	Processed City	Buyer City
Bornsteins	Astoria/Warrenton	Astoria
Da Yang	Astoria/Warrenton	Astoria
Del Mar/Olde Port	Astoria/Warrenton	Astoria
Jessies Of Ilwaco	Ilwaco	Ilwaco Westport Crescent City
Ocean Beauty	Newport	Newport
Ocean Gold	Westport	Westport
Oregon Brand	Charleston (Coos Bay)	Charleston (Coos Bay)
Pacific Seafood	Astoria/Warrenton	Astoria
	Charleston (Coos Bay)	Charleston (Coos Bay)
	Eureka	Eureka
	Newport	Charleston (Coos Bay)
		Newport
Trident	Newport	Newport
W F Alber	San Francisco/Ilwaco	Crescent City

Vertical integration in the shoreside whiting fishery is somewhat less than in the mothership and nonwhiting sectors. Three processing companies currently (as of January 2008) hold permits that participate in the whiting fishery; however, rationalization may have the effect of lessening the degree of vertical integration in the shoreside whiting sector. Only one permit held by shoreside processing companies would stand to receive whiting quota that could be described as sufficient for engaging in directed whiting activity. Over time, processing companies may acquire additional shoreside whiting quota depending on the accumulation limits. Vertical integration is important for determining the effect on price negotiation, because it essentially acts as an allocation to processors, though it is specific to certain processors that have vertically integrated.

The mothership portion of the whiting fishery is characterized by a handful of firms that operate motherships. Three of the four largest firms have participated in mothership operations in every year since 1995. Other firms have participated sporadically during the 1995 to 2007 period. The number of motherships in the sector has ranged from eight to four depending on the year. Following the implementation of differential management between CPs and motherships in the at-sea fishery, the number of motherships has not exceeded six. The lowest years of participation occurred during the 2002 to 2004 period, which experienced relatively low prices for whiting. Table 4-9 illustrates the mothership company and associated vessel operating during specific years.

Table 4-9. Mothership processors' company name, vessel name, and participation by year in the west coast Pacific whiting fishery.

Company	Vessel Name	Year													
		95	96	97	98	99	00	01	02	03	04	05	06	07	
All Alaskan	Heather Sea	X													
	Saga Sea	X													
American Seafoods	American Dynasty		X												
	American Triumph		X												
	Ocean Rover	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Arctic Storm	Arctic Fjord	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Arctic Storm	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Peter Pan/ Nichiro	Golden Alaska	X	X	X	X	X	X								X
Premier Pacific	Ocean Phoenix	X	X	X	X	X	X	X					X	X	X
MV Savage Inc/ Cascade Fishing/ Suisan	Sea Fisher													X	
Supreme Alaska	Excellence	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Vertical integration in the mothership sector is the largest relative to the other sectors. Based on available information, 10 LE permits that operate in the mothership sector are wholly or partially owned by four companies that operate motherships. This represents approximately 50 percent of the number of active mothership catcher vessels in any given year, and these permits stand to receive approximately 41 percent of the mothership sector allocation. Two companies have received more than 50 percent of their deliveries from affiliated catcher vessels over the 2003 to 2006 period, while the other two companies have received around 10 percent of their deliveries from their affiliated catcher vessels. This degree of vertical integration has important implications for negotiation between harvesters (those not vertically integrated) and motherships. Companies that own catcher vessels essentially pay themselves for catch from these vessels, making variations in ex-vessel price irrelevant. Vertical integration under a rationalized fishery will operate as if processors receive an initial allocation of quota.

In addition to the above factors, the structure of the existing fishery is an important element in determining the outcome of rationalization. The Pacific whiting fishery is generally considered to be an Olympic fishery, with a large amount of volume occurring over the course of several weeks. Such conditions generally lead to more processing and harvesting capital being utilized in the fishery than would be necessary if the fishery was spread out over a longer time. If the fishery were to occur over a longer time, less capital would be necessary, and this would tend to decrease the cost of engaging in Pacific whiting opportunities.

Olympic fishery conditions, like those in the whiting fishery, typically lead to high levels of competition among harvesters and processors alike. While harvesters can form bargaining arrangements through the Fishermen's Collective Marketing Act, which would allow them to hold out for favorable prices, the ability of these arrangements to be maintained over the long term is difficult because each harvester has a large incentive to cheat and go fishing. Under these conditions, it is likely that other harvesters will, in turn, go fishing, reducing the ability of these harvesters to negotiate prices. Rationalization should make it easier for harvesters to form and maintain bargaining arrangements.

4.4.2 Nonwhiting Trawl Industry

The nonwhiting portion of the fishery is a multi-species fishery with a focus on several types of soles, sablefish, and some rockfish. Other species were historically targeted in this fishery, but regulations have limited access to these stocks because of their association with depleted species. Harvesters in this sector primarily use bottom trawl gear on the continental shelf and slope and tend to have a lower capacity than Pacific whiting vessels. Harvest in this fishery has declined over the last decade, and inseason management of the fishery has become relatively unstable compared to previous decades. The reduction in harvest volume led to an erosion in the economic status of trawl harvesters and processors alike. This led to the implementation of a federal trawl vessel buyback intended to reduce harvest capacity in this fishery and improve the status of vessels remaining. There were 163 nonbuyback permits with some landings during the qualification period of 1994 to 2003, and 123 permits were active in 2006 with approximately \$25 million in ex-vessel revenue.

In the shoreside processing industry, several plants have closed down over the past decade, leading to consolidation among shoreside processors and relatively fewer companies processing a greater percentage of the harvest. The harvest that occurs in this fishery is principally destined for fresh markets; therefore, little of the harvest is frozen. Harvesters and processors alike may focus primarily on this fishery or engage in this fishery part time while focusing on other seasonal fisheries like Pacific whiting and Dungeness crab. Opportunities in this fishery are intended to accommodate year-round harvesting and processing activity, which fills voids that exist between harvest opportunities in other seasonal fisheries, or otherwise offers a year-round source of employment (for those who specialize in the nonwhiting fishery). Harvesters and processors alike repeatedly indicate the importance of this year-round fishery for maintaining crew and processing labor.

Since harvest in this fishery is composed of several different species, which are primarily sold into a fresh market, processing activity is relatively labor intensive. Processing relies on relatively skilled personnel that manually head and gut and fillet species that are harvested by trawlers in this sector.

In order to foster the year-round goal of this fishery, regulations are created with the intention of spreading the harvest throughout the year. These management tools evolved into two-month catch limits, which effectively act as a two-month nontransferable quota for vessels in the fishery. Because of this two-month quota system, Olympic conditions do not exist in this fishery, and large pulses of harvest over a short time generally do not occur, except in cases where prolonged episodes of poor weather have restricted harvest opportunities. The two-month limit structure and elimination of Olympic fishery conditions make it possible for harvesters in this sector to collectively negotiate over ex-vessel prices with processors compared to harvesters in the whiting fishery. However, the ability for these negotiations to occur appears to be somewhat limited by the length of the two-month period. If harvesters strike for more than 60 days, they risk foregoing the harvest available to them during that two-month period. While managers may increase opportunities later in the year to make up for lost harvest, history has shown that often this is not possible because of time-sensitive interactions with rebuilding stocks and the fact that protecting rebuilding stocks often leads to a reduction in harvest opportunity for healthy stocks. This means that, while harvesters have a greater likelihood of collectively negotiating higher prices in the nonwhiting fishery, the ability to do so may break down quickly as the end of a two-month limit approaches.

In general, since Olympic conditions do not exist, capital in this fishery should be expected to be more in line with available harvest (compared to the whiting sector, which may have more capital than necessary); however, because of regulations, and due to the reduction in harvest volumes over the past decade, it is generally accepted that the harvesting sector remains overcapitalized. Indeed, research by Lian et al. (2008), indicates the nonwhiting trawl fleet may be overcapitalized by more than 50 percent.

It is unclear whether and to what degree the shoreside nonwhiting processing sector is overcapitalized, however, information from the 2001 Groundfish Harvest Specifications EA (PFMC 2001) indicated the number of fillet stations available at shoreside processors and the number of those fillet stations that were actively used. In 1997, approximately 83 percent of the available fillet stations were used, while in 2000, 51 percent were used. This information suggests that in 2000, the shoreside processing industry was overcapitalized by as much as 49 percent. However, because of recent consolidation in the processing industry, it may be reasonable to expect that this same degree of overcapitalization no longer exists (meaning the processing sector may be less overcapitalized than the harvesting sector). Nonetheless, it is generally accepted that excess capacity remains in the shoreside processing industry.

Based on available information, the processing sector for nonwhiting trawl groundfish is characterized by a relatively small number of processing companies processing most of the harvest. The three largest companies handle approximately 80 percent of the nonwhiting trawl landings, while the fourth through sixth largest companies handle just over 10 percent of the landings.

As indicated previously, a relatively small number of companies handle the majority of nonwhiting trawl volume. The plants operated by these companies acquire volume through satellite buying stations, as well as acquiring deliveries at their main processing center. This means that those companies handling most of the volume also cover a wide geographic area. This pattern may very well exist because of the need to acquire sufficient volume to justify plant operation, but also to hedge against fluctuations in landings at individual ports. Radtke and Davis (2000) provide additional insights into the structure of the shoreside processing industry and reasons for consolidation:

Processing is being centralized to occur at plants in only a few regional commercial fisheries centers. The expense for equipment and refrigeration to meet new quality standards balanced against business risk makes it unlikely this trend will change.

Table 4-10 illustrates this information by showing the company engaged in processing of nonwhiting trawl groundfish, the city in which those fish are processed, and the port where those fish are purchased.

Table 4-10. Processors of nonwhiting trawl groundfish.

Processing Company	Processed City	Buyer City
Arrowac	Bellingham	Bellingham Bay
Bornstein	Astoria/Warrenton	Astoria
	Bellingham	Bellingham Bay Neah Bay
C - K FISH (out of business)	Blaine	Blaine
Caito	Fort Bragg	Fort Bragg San Francisco
	San Francisco	Bodega Bay San Francisco
Cal Shell	San Francisco	Bodega Bay
Central Coast	Atascadero	Morro Bay
Del Mar/Olde Port	Astoria/Warrenton	Astoria
	Avila	Avila Morro Bay
	Watsonville	Avila Eureka Morro Bay Moss Landing San Francisco
Fitz	Half Moon Bay	Princeton / Half Moon Bay

Processing Company	Processed City	Buyer City
Hallmark	Charleston (Coos Bay)	Brookings Charleston (Coos Bay) Newport
K Lyn	Charleston (Coos Bay)	Charleston (Coos Bay)
Morning Star	Half Moon Bay	Princeton / Half Moon Bay
Next Seafood	San Francisco	Moss Landing San Francisco
North Coast Fisheries	Santa Rosa	Bodega Bay Brookings Charleston (Coos Bay) Fort Bragg Moss Landing Oakland Princeton / Half Moon Bay
Oregon Brand	Charleston (Coos Bay)	Charleston (Coos Bay)
P & T Flannery	San Francisco	San Francisco
Pacific	Astoria/Warrenton	Aberdeen Astoria Garibaldi (Tillamook) Neah Bay Port Angeles Westport
	Charleston (Coos Bay)	Charleston (Coos Bay) Brookings
	Eureka	Bodega Bay Brookings Crescent City Eureka Fort Bragg San Francisco
	Newport	Charleston (Coos Bay) Garibaldi (Tillamook) Newport
	San Francisco	San Francisco
Pemberton Fish	El Granada	China Camp Princeton / Half Moon Bay
Royal Seafoods	Monterey	Monterey
Starvin Marvins	Charleston (Coos Bay)	Charleston (Coos Bay)
Three Captains	Half Moon Bay	Princeton / Half Moon Bay Santa Cruz Vallejo
W F Alber	San Francisco	Crescent City Dillon Beach Morro Bay San Francisco

Vertical integration in the nonwhiting industry exists, though not to the same degree as in the mothership sector. Available data at the time of this analysis indicate that 17 permits were held by eight shoreside processors, but 1 permit may be appropriately classified as a whiting permit because of the type of QSs that would be allocated to it. These 17 permits represent 14 to 17 percent of the number of active permits in the fishery in recent years. This means that the nonwhiting sector has a moderate

degree of vertical integration if compared to shoreside whiting (less than nonwhiting) and the mothership sector (more than nonwhiting).

4.4.3 Factors Influencing Negotiations in the Harvesting and Processing Sectors

The amount of competition between processors in a sector and between harvesters in a sector is an important element in determining the effect rationalization may have on ex-vessel prices. A high degree of competition across a large number of processors would tend to favor harvesters if harvesters own QSSs. This would occur because of processors bidding among themselves for the catch that may come from harvesters. The more processors, the more the bidding is likely to result in higher ex-vessel prices. Alternatively, fewer processors are likely to result in less bidding and, therefore, play less into the hands of harvesters.

The degree of competition among harvesters under Alternative 1 will have implications for what would be expected to occur after rationalization. Harvesters who are able to form bargaining groups with relative ease under Alternative 1 may not have that ability enhanced to much of a degree under rationalized fishery conditions. Alternatively, harvesters who currently are unable to find much success in forming bargaining groups under Alternative 1 are likely to have the ability to do so enhanced to a relatively large degree under rationalized conditions. This is because in a rationalized fishery, the actions of one harvester do not affect the catch available to another; therefore, the impact of one harvester in a bargaining group cheating does not have the same effect as would be the case in a derby fishery.

Negotiation factors in the nonwhiting trawl harvesting and processing sectors

- Consolidation in the nonwhiting processing sector appears to have been the consistent pattern over the past several years. This pattern appears to indicate consolidation into fewer geographic locations, as well as consolidation at an overall scale. Astoria has become increasingly more important as a regional center of processing and harvesting activity in the Pacific Northwest. Consolidation into fewer regional centers may indicate less competition among companies at a regional level.
- While much consolidation has occurred in other areas, some new investment has been made in the processing industry near Astoria. One company recently made investments in a new facility in Astoria designed to handle groundfish, salmon, sardines, albacore tuna, Dungeness crab, and shrimp.
- Based on results from Lian et al. (2008), harvesters in the nonwhiting sector generate no economic profit from harvest activity. While it is unclear whether processors generate any economic profit from processing of nonwhiting groundfish, it is clear that if profits exist in the industry, harvesters are not realizing those profits. This suggests that, if profits exist in the harvesting and processing of nonwhiting groundfish, harvesters lack much bargaining power in negotiations over ex-vessel prices with processors.
- Harvesters in the nonwhiting trawl sector do not operate in Olympic conditions; instead they operate under a system of two-month cumulative limits. Such conditions make it easier and more likely for harvesters to form negotiation agreements to bargain with processors over ex-vessel prices. This is because if one harvester in a negotiation arrangement cheats, it does not influence the harvest available to others. The catch available to each harvester is only available to each harvester during a two-month period. In spite of this structure, harvesters apparently

make no economic profit, meaning that they have apparently not leveraged any profits from processors (assuming profits are being generated by processors).

Negotiation factors in the shoreside whiting trawl harvesting and processing sectors

- As indicated above, new processing firms have entered the shoreside whiting industry in recent years. Much of this recent interest has focused around the Astoria area, though several processors in California have recently made attempts to process shoreside whiting. Such new interest and entrance into the shoreside whiting industry may be indicators of competition.
- Participation in the shoreside whiting fishery has increased in recent years, leading to the passage of the Groundfish FMP Amendment 15 to limit access to the fishery. Such increases in the number of participants suggest that profits are available to harvesters in the shoreside whiting fishery.
- The shoreside whiting fishery is generally considered to be an Olympic fishery where harvesters compete among one another for the available harvest. Such conditions make it more difficult for harvesters to form and maintain negotiation relationships designed to leverage higher ex-vessel prices from processors. This type of structure generally leads to high degrees of competition among individual harvesters.

Negotiation factors in the mothership whiting trawl harvesting and processing sectors

- Information indicates one new mothership entered the fishery in recent years, but did not participate again in 2007. Three catcher vessels recorded deliveries during the 2005 to 2007 period that had not recorded deliveries during a previous period. This new entry suggests that profits are generated in mothership sector.
- The degree of vertical integration in the mothership sector appears to be relatively large compared to other sectors. Vertical integration reduces the need for motherships to bid up ex-vessel prices to receive catch from independent harvesters, because they can receive volume from their company-owned catcher vessels and hold out against independent harvesters.
- Anecdotal information suggests that many of the relationships in the mothership sector are extensions of relationships that exist between entities in the Bering Sea pollock fishery. Industry representatives have indicated that profit-sharing arrangements exist between motherships and catcher vessels. It is difficult to determine the effect these relationship extensions have; however, it may be reasonable to expect that the effect rationalization has on relationships in the mothership sector may be minimized to some degree by the effect Bering Sea pollock has on the sector.

4.4.4 Implications of Existing Negotiation Factors on Ex-vessel Prices in a Rationalized Fishery

The information described above suggests that rationalization may have a larger effect on ex-vessel price relationships in the shoreside whiting sector than in the nonwhiting sector. This is because rationalization will make it easier for harvesters in the whiting fishery to form bargaining groups useful for negotiating with processors over ex-vessel prices. In addition, rationalization may have the effect of lessening the degree of vertical integration in the shoreside whiting sector because of the allocation

formula, effectively reducing the harvest controlled by processing industries (based on ownership data dated January 2007).

Ex-vessel prices in the nonwhiting sector may not be impacted to the same degree because the current two-month, cumulative limits structure of the fishery makes it relatively easy for negotiating groups to form among harvesters in this sector. Under rationalized fishery conditions, the ability for these harvesters to form negotiation groups may not be enhanced to the same degree as harvesters in the whiting sector. Nevertheless, if harvesters receive all of the initial allocation of Qs, there is reason to expect their negotiation power to increase. The fact that the two-month limit structure is replaced with quota that is available for a year extends the time horizon harvesters have to negotiate over prices without losing available fishing opportunity. However, new entry by nonwhiting processors may occur if harvest volumes or the type of species delivered change in the nonwhiting sector, and this may increase the degree of competition among processors of nonwhiting trawl groundfish, expanding the negotiation power of harvesters.

These factors have further implications for the allocation of quota among harvesters and processors in the shoreside whiting and nonwhiting trawl fisheries. The fact that it appears rationalization may influence ex-vessel prices in the shoreside whiting fishery more than in the nonwhiting fishery means that allocating 100 percent of the Qs to harvesters in the whiting sector may increase ex-vessel prices relatively more in that sector than if 100 percent of the Qs is allocated to harvesters in the nonwhiting sector. However, these implications depend on there being profits in the fishery to negotiate over in the first place. If economic profits are not being realized, then there is no room for ex-vessel price negotiation, and, therefore, no reason to expect an increase in ex-vessel prices.

The mothership sector is relatively more vertically integrated compared to the shoreside whiting and nonwhiting sectors, effectively meaning that mothership companies stand to receive Qs regardless of whether an explicit allocation is made to processors. Furthermore, information suggests that ex-vessel price relations between motherships and catcher vessels are influenced to a large degree by activities in the Bering Sea pollock fishery. This is evidenced by the profit-sharing arrangements that apparently exist between harvesters and motherships (which is an outcome possible under rationalization). However, anecdotal information indicates that negotiations do occur in some instances between harvesters and motherships that involve negotiating price contracts. In these instances, rationalization may influence these negotiations by perhaps folding them into a system of profit-sharing arrangements, or by influencing the negotiation power between harvesters and motherships. It is not immediately clear how much these negotiations may be influenced by rationalization, but a system with processor linkages will likely lead to a different outcome than a system of IFQs with an initial allocation to processors.

For those harvesters and motherships that currently negotiate prices in the mothership fishery, rationalization may lead to changes in the way profits and prices are negotiated. A system of IFQs imposed on the mothership sector will likely lead to a similar outcome as in the shoreside whiting fishery where an allocation to permits will tend to favor the negotiation stance of harvesters while negotiating over ex-vessel prices. However, the fact that more vertical integration exists in the mothership sector means that ex-vessel prices may not change as favorably toward the harvesters if IFQ is allocated to harvesters. If IFQ is allocated to motherships, it will tend to increase the negotiating stance of those motherships. A system of harvest cooperatives with linkages may lead to a different outcome. Under a cooperative system with mothership linkages, the operation of the harvester and mothership should begin to take on the operational characteristics of a vertically integrated firm where the goals of both the harvester and mothership become more aligned, largely out of necessity. The harvester will have to take into account the needs of the mothership and vice versa. Under this type of structure, it is more likely that a profit-sharing arrangement will develop between harvesters and processors.

Table 4-11. Effect of rationalization on ex-vessel prices if allocation made to permits.

Sector	Effect
Shoreside whiting	Relatively large: Shifting from an Olympic fishery to a rationalized fishery should allow harvesters to more easily form and sustain groups for negotiating ex-vessel prices. In addition, rationalization will have the effect of reducing vertical integration that currently exists because of the allocation formula.
Nonwhiting	Relatively small: Bargaining power of harvesters could change, but not as substantially as in shoreside whiting because they currently have two-month quotas that make it relatively easy for bargaining groups to form.
Mothership whiting	Relatively small and/or case-dependent: May have no effect in cases where relationships between harvesters and motherships are extensions of the BSAI pollock fishery. May have an effect in cases where harvesters and motherships do not have relationships from BSAI pollock activity. In these cases, the effect may be similar to that in shoreside whiting because of the elimination of derby fishery and formation of bargaining groups among harvesters. However, the effect is likely to be lower than in shoreside whiting because of the degree of vertical integration in this sector.

4.5 General Effects on Environmental Components Where No Significant Impacts are Anticipated

During scoping, a wide range of groups and resources were identified that could potentially be affected by trawl rationalization. These were incorporated into the Stage 1 Document, which was a proposed analytical framework and an EIS outline released in September 2006 (NEI 2006) as separate sections of Chapter 4 that would be evaluated in detail. Subsequently, the analytical team reviewed the analytical framework and outline and made a variety of revisions. Through this process, it became apparent that it is very unlikely that these groups or resources would be significantly affected by the proposed action. Furthermore, as with some of the environmental components that are evaluated in more detail because adverse effects are more likely (input suppliers, labor), only broad effects can be identified. In those cases, only Alternative 1 and the overall implementation of a trawl rationalization program can be compared; the alternatives do not reveal noticeable differences in terms of anticipated impacts. This is also the case with the resource components discussed in this section.

The following sections qualitatively describe potential effects to each component. Since only broad-level effects can be discerned, any comparisons are between Alternative 1 and the implementation of a trawl rationalization program incorporating any combination of the program features described in Chapter 2. Some attention is also given to the reasons to expect that the impacts will be modest and, therefore, unlikely to be found significant.

4.5.1 Fisheries Managed by Adjacent Fishery Management Councils

Fisheries managed by adjacent Councils include those under the jurisdiction of the WPFMC and the NPFMC. Vessels that participate in west coast groundfish fisheries also commonly participate in North Pacific fisheries. Participation by west coast groundfish vessels in Western Pacific fisheries is relatively uncommon for a variety of reasons, including the fact that species, gear types, and necessary capital can be quite different. Therefore, changes in west coast groundfish fishery management are not expected to affect Western Pacific fisheries. Some effect may be felt in North Pacific fisheries, with the most likely impact being on the Bering Sea pollock fishery and the GOA rockfish fishery. Many participants in the Pacific whiting fishery also participate in the Bering Sea pollock fishery and the GOA rockfish fishery. Rationalization of the Pacific whiting fishery may lead to a change in the timing and participation within

the Pacific whiting fishery, which may, in turn, affect the timing and participation in the pollock fishery and the GOA rockfish fishery. However, because both the Bering Sea pollock and GOA rockfish fisheries are rationalized (as are other North Pacific fisheries that may have some limited overlap with west coast fisheries) the effect of rationalizing the west coast groundfish fishery is not expected to have adverse consequences to North Pacific fisheries. Common concerns over rationalization's effect on other fisheries include the potential for effort spillover to occur, resulting in increased competition for fishery resources. Because many North Pacific fisheries are rationalized, it is not possible for effort spillover to result in increased competition over fishery resources. Therefore, rationalization of the west coast groundfish fishery is not expected to have any appreciable effect on fisheries managed by adjacent Councils.

4.5.2 *Buyers and Processors that do not Purchase Trawl-caught Groundfish*

Because they do not purchase trawl-caught groundfish, these buyers and processors will not be directly affected by the proposed action. Three types of indirect effects are described below.

First, the distribution of IFQ to processors could increase barriers to entry to the trawl groundfish processing sector for those processors who want to diversify (or switch) into that sector. They would not benefit from the windfall of initial allocation and would have to pay for all of the IFQ they may wish to acquire. It would be difficult to enter the sector without purchasing IFQ because they would likely have to pay higher ex-vessel prices than those that could use IFQ as leverage in price negotiations.

Second, if trawl-caught groundfish buyers and processors increase their market power and consolidate, they may subsequently expand the scope of operations (by horizontally integrating) and enter markets for nontrawl-caught fish. If they have more access to capital and operate more efficiently they would be able to out-compete existing operators, either forcing them out of business or purchasing their operations. More likely, it would be a combination of these two strategies, where they enter the market, and by out-competing, make existing operators sell out for a price below their opportunity cost.

Third, the overall viability of some west coast ports for fishing-related activities could be compromised by consolidation. Groundfish trawl vessels could relocate operations to fewer ports that offer advantages in terms of distance from favored fishing grounds and infrastructure. This could have a ripple effect whereby processors and input suppliers relocate or go out of business. If this, in turn, makes it difficult for other fishing vessels to use the port, even those processors who do not buy from the groundfish trawl fleet could be affected. This can be related to the concept of economies of agglomeration whereby related businesses cluster in a geographic area because of the positive externalities of having input suppliers, skilled labor, and other factors of production collocated. Such effects may be modest, however, because most west coast ports are small, so the attendant scale of agglomeration is limited.

4.5.3 *Recreational Harvesters*

Recreational harvesters are unlikely to experience discernable effects from trawl rationalization. Trawl rationalization by itself will not affect fishing opportunity, because the allocation of harvest opportunity to the trawl sector (and potentially between the nontrawl sectors) is addressed through separate actions. One action establishes fixed allocations between trawl and nontrawl sectors. A draft NEPA document has been prepared evaluating the impacts of these intersector allocations (PFMC and NMFS 2008). A second, ongoing process, biennial harvest specifications, will continue to be used to establish short-term allocations for severely constraining overfished species, minor shelf rockfish, and the Other Fish complex. The effects of biennial harvest specifications have been evaluated in either an EA or EIS

(since 2003, EISs have been prepared); future harvest specifications will be similarly evaluated. Both allocation processes seek to maintain recreational fishing opportunity, taking into account constraints imposed by stock abundance.

Recreational fisheries could be affected by consolidation-related impacts to fishing communities discussed elsewhere in this document, such as the loss of input suppliers that depend on groundfish trawl vessels for a substantial proportion of their business. It is unlikely, however, that this would have a substantial impact on recreational harvesters. First, the types of services and amenities that recreational harvesters depend on (e.g., charter operations, boat ramps, bait suppliers, and tackle shops) are unlikely to be so substantially affected by the loss of trawl vessels in a port community that they would cease to function. Second, most recreational harvesters do not live in coastal communities. They, therefore, have some flexibility regarding where they make purchases and where they may fish.

4.5.4 Consumers of Groundfish Products

Consumers of groundfish products could benefit from greater availability of target species, greater availability of product throughout the year, and new product forms. New markets that may develop as a result of trawl rationalization would benefit those who previously were unable to consume groundfish. Although the allocation of IFQ between harvesters and processors is likely to affect ex-vessel prices, any increase in those prices is unlikely to be passed on to the consumer because groundfish products face price competition from a wide variety of fish products. Prices could decrease if the supply of target species increases due to the development of successful bycatch avoidance strategies. Related to this, there is probably no one who consumes groundfish exclusively; consumers readily switch between fish products based on price and availability. Overall, trawl rationalization is expected to have modest beneficial impact for consumers.

4.5.5 General Public

The general public refers to nonconsumptive resource users (e.g., wildlife viewers), and nonusers (e.g., members of the general public who derive value from knowing that a species is being maintained at a healthy biomass level). Effects on consumptive users (commercial and recreational fishermen, processors, consumers of groundfish) are addressed in other sections. Of course, consumptive users may also derive value from nonconsumptive and nonuse resource attributes. Therefore, it is more appropriate to consider the general public in terms of how directly engaged individuals are with the resource. Consumptive users depend directly on the groundfish resource for their livelihood (commercial fishermen) or satisfaction (recreational fishermen). Nonconsumptive users may gain a livelihood from environmental amenities (e.g., whale watching charter operations) or enjoyment of the natural marine environment of which groundfish are but one part. Nonusers have an abstract relation to the resource that is expressed through broad social or public policy preferences, such as a desire for more rigorous regulation of consumptive activities to preserve existence, option, or bequeathal values. An individual will exhibit variation across these attributes expressed in terms of their prioritization and commitment to different uses and values. For example, a commercial fisherman is likely to prioritize consumptive use, but may also have nonuse values, albeit at a lower priority and level of commitment (i.e., be more willing to trade off long-term existence value for short-term consumption value). On the other hand, a nonuser who does not interact with groundfish directly (through consumptive or nonconsumptive use) may prioritize environmental preservation, but have a low level of commitment to advocating for specific social preferences or public policies to manage groundfish fisheries in a way that would produce a different suite of benefits (favoring nonuse of the resource over consumption).

Trawl rationalization could affect nonconsumptive and nonuse values if it led to substantial declines in stock abundance and, secondarily, if these declines had a clearly discernable effect on ecosystem function. Effects on groundfish, other fish, protected species, and the marine ecosystem are described in other sections of this chapter. Substantial adverse effects on these environmental components are not expected. Considering that groundfish are just one of a suite of amenities that support nonconsumptive use and nonuse, even moderate changes in stock abundance (through greater access to target stocks) would have a minor to negligible effect on these values.

Coastal communities provide services to nonconsumptive users (e.g., experiencing a working waterfront) and existence value for nonusers. As discussed in the section on communities, the character of some coastal communities could change as an indirect effect of fleet consolidation. However, any such changes, such as the disappearance of trawl vessels and related infrastructure, are unlikely to be discernable to most nonconsumptive users and nonusers. For communities with a diversified economy or substantial tourism, some of these changes might even be beneficial for nonconsumptive users. For example, wharfs and waterfront facilities could be converted to uses more directly related to tourism. While this could further alter the fundamental character of the built environment, the effect on nonconsumptive users is mixed since it represents a tradeoff between authenticity and amenities directly supporting nonconsumptive resource use.

4.5.6 *Effects of the Preferred Alternative*

The components of the preferred alternative incorporate various options and program features identified in the action alternatives. Therefore, the effects on the environmental components discussed in this section are not expected to differ substantially from the broad-level effects identified above. In summary, these effects are as follows:

- Fisheries managed by the NPFMC and WPFMC are not expected to be discernibly affected.
- Nongroundfish buyers and processors could face increased barriers to entering the groundfish market and increased market competition from consolidated and more efficient groundfish buyers and processors.
- Nongroundfish buyers and processors could be affected by any reduction in commercial infrastructure in ports losing fishing vessels and processors due to consolidation.
- Recreational harvesters are unlikely to experience discernable effects except indirectly due to consolidation-related reduction in commercial infrastructure.
- Groundfish consumers could benefit from increased availability of groundfish products.
- The general public (nonconsumptive users and nonusers) could experience adverse or beneficial impacts due to changes in stock status and commercial infrastructure in port communities.

4.5.7 *Cumulative Effects on Environmental Components Where No Significant Impacts are Anticipated*

The following actions and trends may contribute to cumulative effects on nongroundfish buyers and processors, recreational harvesters, groundfish consumers, and the general public:

- Groundfish harvest management (recreational harvesters, groundfish consumers, general public)
- Intersector allocation (recreational harvesters)
- Groundfish habitat protection and other changes in ocean use (recreational harvesters, general public)
- Population increase and increased demand for protein (nongroundfish processors, groundfish consumers)

- Changes in prices and costs (nongroundfish processors, recreational harvesters, groundfish consumers, general public)
- Increased consumer awareness (nongroundfish processors)
- Overfished species rebuilding (recreational harvesters, groundfish consumers, general public)
- Climate change (nongroundfish processors, recreational harvesters, groundfish consumers, general public)

4.5.7.1 Cumulative Effects on Buyers and Processors who do not Purchase Trawl-caught Groundfish

- Barriers to entry could be strengthened or weakened due to increased demand and price inflation. If product prices for these buyers and processors increase faster than input prices, they could be at a competitive advantage.
- Increased consumer awareness could improve nongroundfish buyers and processors competitive advantage in relation to trawl groundfish buyers if consumers perceive their products are more environmentally friendly and are, therefore, willing to pay a price premium.
- If climate change results in changes in resource availability, nongroundfish buyers and processors could be adversely affected. Adverse effects would occur if they specialize in fish species that become less available compared to trawl-caught groundfish species.

4.5.7.2 Cumulative Effects on Recreational Harvesters

- Recreational harvesters are affected by permanent or periodic allocation of yield and related management measures, because these actions affect fishing opportunity. As discussed above, these actions are evaluated in other NEPA documents.
- Habitat protection and other ocean uses could have beneficial or adverse impacts on recreational harvesters related to fishing opportunity. Adverse effects would result if preferred fishing areas could be closed de jure (e.g., MPAs) or de facto (displacement by other uses). Habitat protection could have beneficial impacts if it results in increased resource availability due to spillover.
- Price inflation would increase input costs relative to the perceived benefit of the recreational experience, reducing the net value of fishing opportunity.
- Overfished species rebuilding will increase fishing opportunity.
- Climate change could have beneficial or adverse effects depending on the resulting availability of preferred recreational species.

4.5.7.3 Cumulative Effects on Consumers of Groundfish Products

- Groundfish harvest management affects the availability of products in the market. Past misspecification resulted in overfishing and subsequent harvest restrictions, reducing product availability. Harvest management that rebuilds and/or maintains stocks at or near MSY will maximize availability of products. Rebuilding overfished species will be beneficial in this respect.
- Increased demand and related price increases would adversely affect consumers and offset the potential gains resulting from rationalization.
- Climate change could have beneficial or adverse effects depending on the resulting availability of preferred products.

4.5.7.4 Cumulative Effects on the General Public

- Nonconsumptive users and nonusers would benefit from increased abundance of groundfish species due to harvest management policies and improvements in habitat quality due to protection measures.
- Price inflation of inputs could diminish the net value of nonconsumptive use.
- Climate change is likely to have adverse impacts on nonconsumptive users and nonusers by changing habitat and ecosystem characteristics.

4.6 Impacts to Limited Entry Trawl Groundfish Harvesters

In this section, we describe the impacts of rationalization on LE trawl groundfish harvesters. This group is composed of individuals owning or operating groundfish trawl catcher vessels, individuals holding or owning LE trawl permits, or some combination thereof. In several cases, entities holding LE trawl permits may be processors of LE trawl-caught groundfish. Such entities are not examined in this section, but are examined under Section 4.9, describing impacts to processors of trawl groundfish.

We begin the section describing methods used to assess effects on groundfish trawl harvesters and the metrics used to illustrate those effects. This initial section is intended to assist the reader by establishing expectations about what is measured and identified so that the reader can anticipate some of the variables that can be compared and contrasted between the alternatives. Following the description of methodology, we discuss broad-level effects of rationalization on groundfish trawl harvesters. This section serves as a description of the big-picture issues that are implied by the alternatives, which the analysts believe may play a relatively important role when assessing the impacts of rationalizing the fishery. For some issues, there is no contrast available between the alternatives because the effect is limited to rationalizing the fishery or maintaining Alternative 1. In other cases, there are contrasts between the alternatives, and, if so, they are identified.

Following the description of broad-level effects, we assess the impacts of the alternatives (Section 4.6.3). This section begins by identifying the impacts that are expected to occur from each of the elements of the alternatives independently (Section 4.6.3.1). This is done to provide the reader with background on the motivations that exist within the alternatives and the fundamental reasons why the alternatives are expected to have different impacts. Following Section 4.6.3.1, the effect of each alternative on groundfish trawl harvesters is assessed. This assessment is designed to be fairly programmatic in nature and examines the ways groundfish trawl harvesters are affected by the combined suite of options contained in each alternative. After this, Section 4.6.3.8 provides a side-by-side summary comparison of the effects of each alternative on groundfish trawl harvesters. Finally, Section 4.6.4 assesses cumulative effects. This cumulative effects section briefly summarizes the past and present actions and trends with ongoing effects on groundfish trawl harvesters, as well as the RFFAs that are expected to have effects. The effect of these past, present, and RFFAs are combined with the effect of the alternatives to arrive at the cumulative effect.

4.6.1 *Methods for Assessing Impacts*

In this section, we describe the methodology for assessing the impacts of rationalization on groundfish trawl harvesters. We briefly summarize the expected impacts of rationalization in order to put the methodology into a better context, but the reader is referred to the subsequent sections for a complete description of the expected effects and why those effects are expected to occur. In this section, we describe the ways each of the expected impacts is measured and assessed. This section summarizes the potential impacts, the reasons why those impacts occur (the mechanisms), and the way in which the

analysis and models measure those impacts (the metrics). Table 4-12 provides an overview of the approach used to estimate the impacts of the alternatives on trawl catcher vessels. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the potential impact, 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis. This table shows that the expected impacts to trawl catcher-vessels are changes in vessel profits and fleet efficiency, individual and collective risk, and changes in vessel safety. The mechanisms that are driving changes in vessel profits include the distribution of harvest privileges, the pace of harvesting activity, changes in vessel catch, elimination of regulatory discard, ex-vessel price negotiation with processors, monitoring cost, harvesting cost, and fleet consolidation. Effects on individual and collective risks are driven by the probability of unexpected catch events, the presence of thin market conditions, and the cost of covering deficits. Changes in vessel safety are driven by fleet size, vessel operational flexibility, and the financial ability to invest in equipment and conduct vessel maintenance. Changes in the economic efficiency of the trawl catcher-vessel sector as a whole are primarily driven by fleet consolidation. Each of these mechanisms that is a driver for the potential impacts is measured through listed criteria (third column), which are estimated through the methods described in the final column. Many of these methods are described in detail in Appendix C.

Table 4-12. Overview of impacts, mechanisms, and metrics used to compare the effect of the Alternative 1 and the alternatives on trawl catcher vessels.

Potential Impacts	Reasons or Mechanisms for Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data, Models, and Methods Used for Assessing Impacts
Changes in vessel profits and fleet efficiency	Fleet consolidation	Number of active vessels	Model of fleet consolidation
		Fleet-wide costs	
	Distribution of harvest privileges	Number of initial QS recipients	Model of the effects of initial allocation of IFQ
		Ex-vessel value of QPs allocated to participants	
	Pace and location of harvesting	Length of season	Capacity analysis and timing of resource accessibility
		Geographic distribution of fishing effort	Model of geographic shifts in fishery patterns
	Changes in vessel catch	Catch from increased access to target species via a reduction in bycatch of overfished species	Model of changes in bycatch rate, catch, and revenue
	Changes in the amount of regulatory discards	Increased retention of currently discarded species	EFP documentation of nonmarketable discard
	Ex-vessel prices and negotiation with processors	Relative changes in ex-vessel prices	Utilization of microeconomic and game theoretical arguments
	Flexibility in harvest timing	Opportunities for modifying harvest timing	Qualitative assessment
Monitoring costs	Cost borne by trawl catcher-vessels to meet monitoring requirements	NMFS research on tracking and monitoring programs	
Harvesting costs	Annual cost of harvesting activity	Model of fleet consolidation	
Ability to conduct business planning	Relative certainty over future fishing opportunities	Qualitative assessment	
Change in value of capital assets	Value of quota distributed to permit owners	Receipt of transferable quota	Initial allocation data and qualitative assessment
	Change in the value of vessels and permits	Fleet consolidation and need for surplus fishing capital	Fleet consolidation model and qualitative assessment
Individual and collective harvesting risk	Likelihood of catch events that are greater than QPs	Relative risk to harvesters of exceeding QPs	Qualitative assessment
	Cost of covering deficits	Availability of quota for covering deficits	Qualitative assessment
	Risk associated with the presence of thin market conditions	Risk posed by trading quota in volatile markets	Qualitative assessment
Changes in fishing vessel safety	Fleet size; vessel operational flexibility; and financial ability to invest in vessel maintenance and safety equipment	Occurrence of safety-related incidents	Qualitative assessment based on literature and expertise of analysts

4.6.1.1 Potential Impacts, Mechanisms, and Metrics

Fleet consolidation: Under any of the action alternatives, fleet consolidation is expected to occur. Fleet consolidation is driven by the incentives to reduce cost and increase average catch per vessel. This, in turn, is expected to result in greater cost efficiencies and higher profits for trawl harvesters, all else being equal.

Distribution of harvest privileges: The way in which harvest privileges are initially distributed will impact operations at an individual level. Some recipients of QS may see their harvest opportunities increase, while others may see opportunities decrease. This initial distribution impacts individuals at the start of the program and over the longer term. Those who purchase quota to regain opportunities that are potentially lost will be relatively worse off than those who receive more quota than they have historically harvested.

Pace and location of harvesting: Any of the action alternatives will change the incentives faced by harvesters. A well designed rationalization program will eliminate the race for fish conditions that exist in the whiting fisheries, and this may tend to elongate the season in that fishery. This tends to increase product quality and decrease cost. Furthermore, holding vessels accountable for constraining species will impose an incentive that may cause vessels to move from current fishing grounds. By moving from grounds where constraining species are found, vessels may increase their harvests of target species. However, the effect of this accountability may tend to disadvantage those vessels in areas where constraining species are relatively abundant.

Changes in vessel catch: The individual accountability created through the action alternatives encourages vessels to reduce their encounter rate with constraining species. Evidence indicates that this effect will enable nonwhiting vessels to prosecute more underutilized target species, leading to an increase in gross revenues generated by the fishery. Based on past production levels for many species (from the 1990s), it is expected that markets will be able to absorb increased production from the trawl fleet.

Changes in regulatory discard: The existing management structure causes regulatory discard. Much of this discard exists due to trip limits that are constructed to reduce incentives or opportunities for fishing in areas where rebuilding species may be abundant, or to directly reduce opportunities for targeting rebuilding stocks. Vessels work within the system by being held accountable for landings, but freely discarding species in volumes above the trip limit. In the action alternatives, these tools become unnecessary, because vessels will be held individually accountable for their landings and discard, thus marketable species that are currently being discarded are more likely to be retained, increasing revenues.

Ex-vessel prices and negotiations with processors: There is a negotiating relationship between processors and harvesters with respect to ex-vessel prices. The alternatives would result in, at one extreme, 100 percent of shares going to permit owners. At the other extreme, processors may receive up to 50 percent of the QSs, or have a full processor-harvester linkage. As the amount of QSs held by processors increases, the ability for harvesters to negotiate prices to their favor will tend to decrease, thus impacting revenue generation.

Flexibility in harvest timing: Under existing management, harvesters have very little leeway in adjusting their harvest timing. In the whiting fishery, adjusting harvest timing may mean missing the season entirely, while in the nonwhiting fishery, adjusting harvest timing may mean missing opportunities in one cumulative period. Under any of the action alternatives, harvesters have the ability to time harvesting operations in a manner that responds to more favorable market conditions and more favorable cost conditions, providing a mechanism for increasing revenues.

Monitoring costs: It is envisioned that vessels participating in a rationalized fishery would be required to have full at sea observer coverage or monitoring of some kind. This is an added expense that vessels must pay above what occurs under existing conditions for many vessels and in addition to the maximum 3 percent fee that may be charged to recover Federal costs under LAPPs. If done through a third party system, this will mean added costs to vessels participating in the fishery.

Harvesting costs: Each of the action alternatives allows for fleet consolidation and adjustments to harvest timing. This allows vessels to reduce their average cost structure as annual costs are reduced and the average vessel harvests more species. Due to timing flexibility, harvesters can also prosecute species at times where they may be more aggregated or closer to shore, reducing the cost of fishing.

Business planning: The implementation of a rationalization program tends to increase the certainty about one's fishing opportunities in the future—provided they are holders of Qs or have catch history. This increased certainty allows for greater ability to conduct business planning, and more accurate business plans tend to increase the operational efficiency of the business. Such efficiency is translated into higher levels of revenue and lower costs.

Value of quota distributed to permit owners: If QS is gifted to permit owners, the QSs will act as the gift of a capital asset. The value of that quota is tied to revenues that can be generated in the fishery. If revenues improve under the action alternatives, then the value of the QSs will be higher than the existing value of the LE permit, tending to increase the value of assets held by harvesters, all else being equal.

Value of vessels and permits: If consolidation occurs in the fishery under the action alternatives, then the value of vessels could be expected to decline simply because there will be more vessels than necessary to prosecute fishing activity. The value of permits will be replaced by the value of the QSs simply because permits are currently the key to accessing the resource, whereas QSs will largely be the key to accessing the resource under the action alternatives. Unless harvesters receive a sufficient initial allocation of QSs to offset the decline in value of vessels and permits, harvesters may stand to see a decline in their asset value.

Likelihood of catch events exceeding QPs: Since fishing is a rather inexact method of extracting resources, there is some risk that a harvester could catch more than he/she has QPs for. This is tied to the types and number of species covered in the rationalization program. As the number of species in the program increases, there is an increasing possibility that a harvester could inadvertently catch an amount that exceeds the QPs of one or more of those species. Furthermore, if species are added to the program that are infrequently encountered in the fishery (and the amount allocated to the sector is similarly small), there is a possibility that a harvester could have a chance encounter with those species and not be able to find QPs to cover that catch.

Cost of covering deficits: The cost of covering deficits will depend on the species. In the case of constraining species, the cost of that quota will be substantial as it limits access to all other species. For other, more abundant species that are underutilized, the cost of acquiring quota to cover a deficit is likely to be very small.

Risks associated with thin markets: If infrequently encountered species are covered in the program, there is a possibility they will become a thinly traded species. In such cases, the appropriate price for buying and selling will be difficult to ascertain, and trades may be made more on personal relationships and negotiation skill than other conditions. This poses risks to harvesters who are not well versed in

trading in such conditions as they may end up selling quota for too low of a price, or buying at too high of a price.

Fleet size, vessel operational flexibility, and financial ability to invest in vessel maintenance and safety equipment: Under any of the action alternatives, the size of the fleet is expected to decline, operational flexibility to improve, and profitability to improve. Each of these factors will tend to improve safety conditions in the fishery as maintenance improves on vessels and as harvesters no longer feel the need to fish in hazardous weather conditions.

4.6.2 *Broad-level Effects of Rationalization on Limited Entry Groundfish Trawl Harvesters*

Limited entry trawl catcher-vessels and permit owners may be substantially affected by rationalization through a variety of mechanisms. These impacts are driven by the individual accountability for total catch (landings and discard) associated with rationalization, aspects of the existing alternatives that allow for consolidation, and the mechanisms that allow for harvest privilege transfers that are associated with the existing suite of alternatives.

In most instances, the LE trawl permit owner and catcher vessel owner is the same person; occasionally they are different people. Regardless, it is most straightforward to analyze the owners of catcher-vessels and permits in the same section because the impact on both parties is largely driven by the productivity of, and regulations applicable to, the vessel.

4.6.2.1 Impacts to Groundfish Trawl Harvesters in the Nonwhiting Trawl Sector

Trawl harvesters in the nonwhiting sector may be substantially affected by the rationalization of the west coast trawl fishery. The individual accountability measures and harvesting privileges associated with the rationalization alternatives are likely to induce substantial changes in the way vessels prosecute fishing activities. In the nonwhiting trawl fishery, substantial impacts are likely to occur because of the constraining nature of overfished species and the perceived reward that is associated with avoiding those stocks that may come in the form of increased catch of target species, which are currently underutilized because of weak stock management. The bycatch rate change model is used to show the amount of additional target species that can be leveraged as the nonwhiting trawl fleet reduces encounters with overfished species. The output of this model indicates that the fleet may generate several million dollars in additional ex-vessel revenue under a rationalization program compared to Alternative 1 activity if ex-vessel prices remain constant.

Increased profits and fleet consolidation

Some of the expected increase in ex-vessel revenue is likely to occur almost immediately after the fishery is rationalized. However, the fleetwide estimates are best perceived as a longer term outcome of rationalization that will occur as the fleet modifies gears and fishing location, the flow of quota through the market occurs in a way so that it reaches the more successful vessels, and processing companies find buyers for the potential increase in product quantity. For many species, the market's ability to handle an increase in volume is indicated by the levels of production generated in the mid-1990s, which ran from approximately 50 percent to more than 100 percent above recent levels in the nonwhiting fishery (Table 3-18). This is likely to be a gradual effect where ex-vessel revenue increases over time before reaching full potential. The length of time it takes for the increased harvest volume to be absorbed by the processing sector may also depend on the number of processing entities to whom harvesters have the opportunity to sell their catch. The requirement that the entire catch be off-loaded at a single processor

restricts—to some degree—the number of processing companies to which harvesters deliver. By relaxing this requirement, harvesters may be able to sell their catch to more than one buyer at a time. If these buyers have relatively different access to markets, harvesters may be able to sell catch to more than one buyer, making it more likely that an increase in catch can be absorbed by the market more quickly.

Figure 4-7 illustrates the potential range of ex-vessel revenues in the nonwhiting trawl fishery generated under a rationalization program compared to Alternative 1 if ex-vessel prices remain unchanged. The range of values presented is meant to bracket the range of uncertainty within the model while still providing realistic estimates.

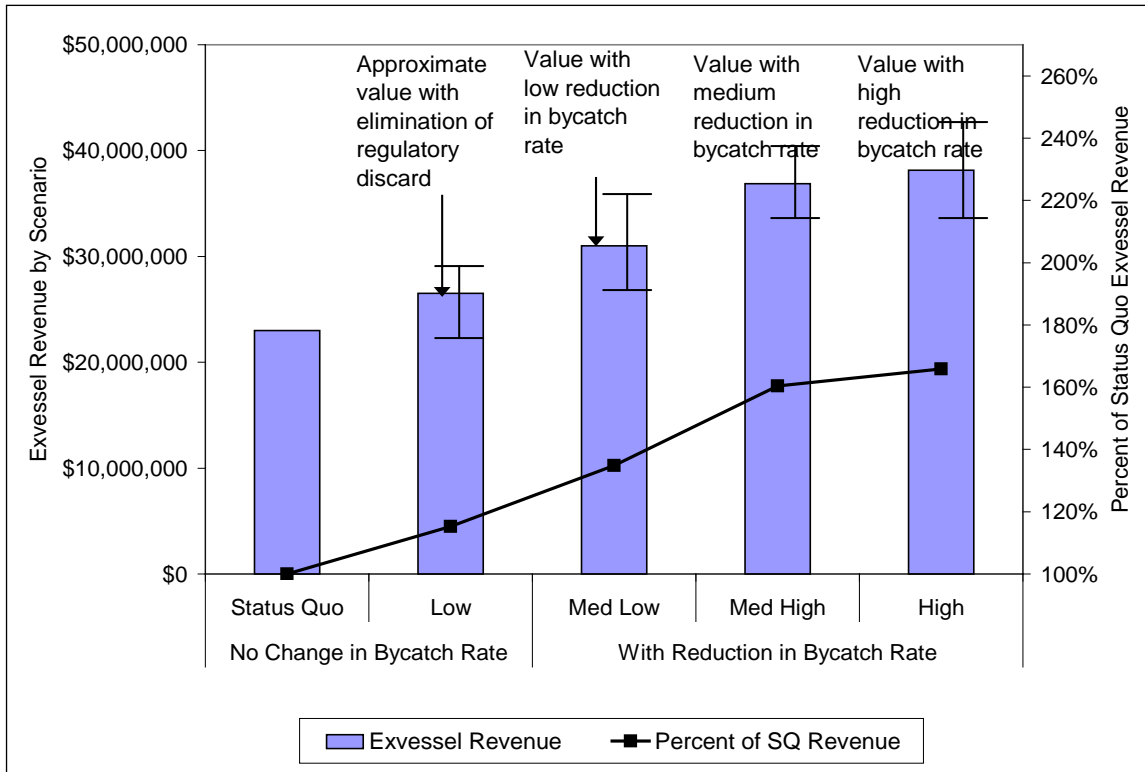


Figure 4-7. Potential ex-vessel revenue in the nonwhiting trawl fishery under rationalization.

Note: Bars are intended to represent uncertainty due to potential variations in ABCs and OYs. The uncertainty presented in this figure does not capture the risk posed by thin market conditions that may be present in an IFQ program because of species with low trawl allocations.

In addition to increased revenue being generated in the fishery, the consolidation likely to occur in the nonwhiting sector is expected to lead to substantial cost savings. Cost savings occur because of less capital, but also because the fleet is expected to consolidate toward the most efficient vessels. The fleet reduction and cost efficiency model shows the consolidation that may occur could diminish the number of vessels by 50 to 66 percent, or to a nonwhiting fleet size that is somewhere on the order of 40 to 60 vessels. This predicted cost savings is fairly sensitive to the design elements of the program and is also dependent on the quantity of species harvested. This consolidation is predicted to decrease costs of harvesting nonwhiting groundfish by as much as 60 percent annually (before incorporating the cost of at-sea monitoring). Using information from recent years, this may mean a cost savings of approximately \$13.8 million. Imposing accumulation limits can restrict the amount of expected cost savings substantially. Retaining the vessel length endorsement may restrict cost savings by 10 percent,

though this may be lower since harvesters can bundle permits and change the length endorsement. If a 1 percent accumulation limit is placed on vessels, cost reductions may be restricted by approximately 20 percent.⁸⁸ At-sea monitoring costs add an additional cost burden to vessels that is not currently incurred. If at-sea monitors cost vessels \$350 per day, this may tend to reduce the size of the fleet from the 40 to 60 vessels expected and increase the average size of vessels remaining. This is because additional costs of fishing will mean the optimal fleet size is smaller. The average size of vessels in the fleet is increased with a daily observer cost because such costs comprise a larger portion of small vessels costs than that of larger vessels. At-sea observers will also reduce fleet-wide profits. The fleet reduction and cost efficiency model illustrates that at-sea observers may cost the nonwhiting fleet \$2.2 million if all vessels in the fishery operate near capacity. If some relatively marginal producers remain in the fishery, the cost will be higher.⁸⁹ Table 4-13 illustrates the effect of various factors on profitability.

Table 4-13. Factors affecting profitability.

Effect of Consolidation	Improves harvesting cost efficiency. May allow the fleet to realize profits of ~\$14 to \$23 million compared to \$0 or less under Alternative 1.
Effect of Accumulation Limits	No effect unless vessel limit is smaller than ~2.5 percent. A 1 percent vessel limit restricts potential cost efficiency by ~20 percent
Effect of Permit Length Endorsement	Restricts cost efficiency by ~10 percent, or imposes costs of ~\$1.5 to \$3 million ^a
Effect of At-Sea Observers	Increases average vessel size slightly. Decreases fleet size slightly. May reduce profits by ~\$2.2 million depending on fee structure.

a) This estimate was modeled based on the idea that QSs would be restricted from trading across vessel size classes. That restriction is not part of the options contained in the existing alternatives. Therefore, this estimate does not apply to the existing alternatives for rationalization of the trawl fishery.

Figure 4-8 shows potential fleet-wide profit if all vessels are operating at their most cost effective point. The results in this figure use the fleet-wide revenue estimates shown above in conjunction with the cost-savings and consolidation model. The results show profit under unconstrained cost conditions, profit with a vessel length restriction (i.e., retaining the permit length endorsement), and profit with a vessel length restriction and at-sea observers. Although not shown in the figure, for reference purposes Alternative 1 profits in the fleet are estimated to be between zero and a loss of approximately \$2 million annually.

⁸⁸ The lowest accumulation limit of 3 percent in the alternatives is not expected to impose cost inefficiencies on the nonwhiting trawl sector so long as prices and available harvest volumes do not decrease.

⁸⁹ Section 4.16 on page 574 discusses impacts to management agencies, including initial and ongoing implementation costs in addition to the maximum 3 percent fee that may be charged to recover Federal costs for limited access privilege programs. Those cost estimates, developed by NMFS NWR and the WCGOP, also include observer costs, which are expected to be borne by harvesters. The daily cost estimate provided by the WCGOP is \$500, higher than the \$350 estimate used by Lian, et al. (2008).

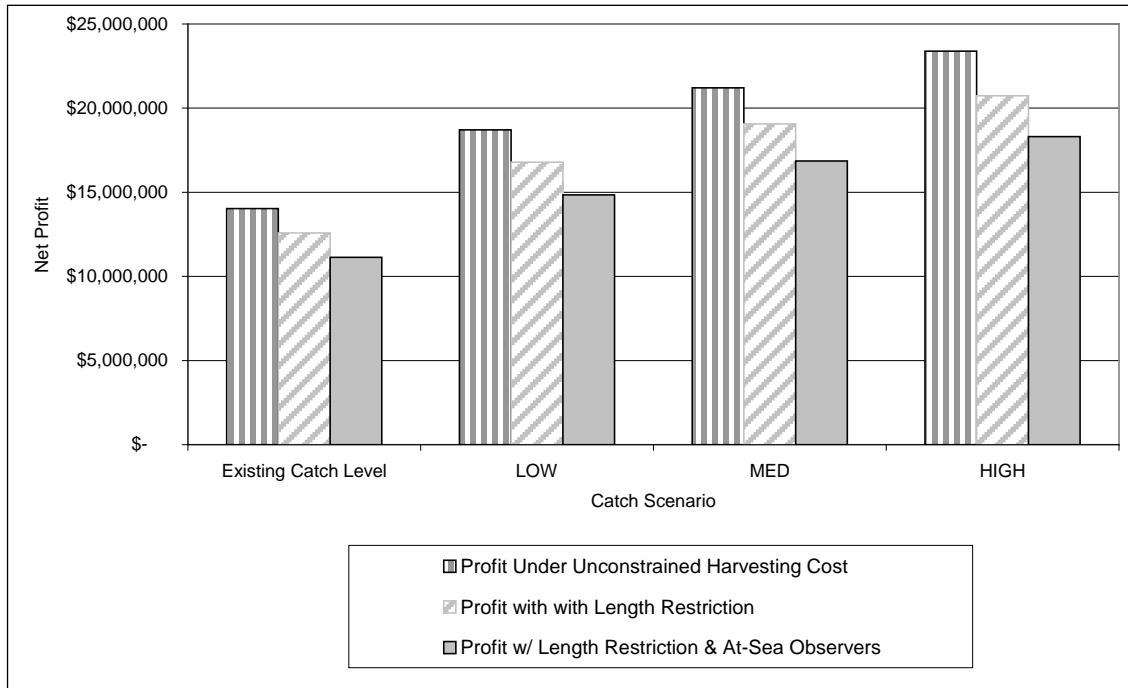


Figure 4-8. Estimated fleetwide profit in a rationalized nonwhiting trawl fishery.

The above information shows that when potential cost savings are combined with the projected increase in gross revenue displayed in Figure 4-7, actual revenues to catcher-vessels and permit holders may increase by several million. Empirical evidence from other programs suggests that consolidation and the associated cost savings could occur quite rapidly after the fishery is rationalized.

The consolidation and cost efficiency model shows that the most efficient vessels for harvesting nonwhiting trawl groundfish are approximately 60 to 70 feet in length. Smaller vessels tend to be limited by the effectiveness of harvest capacity per vessel size, while larger vessels tend to operate in an area where costs are increasing more rapidly per scale compared to harvest effectiveness. Vessels that are larger or smaller may find it more profitable to sell Qs and leave the fishery rather than remain in the fishery.

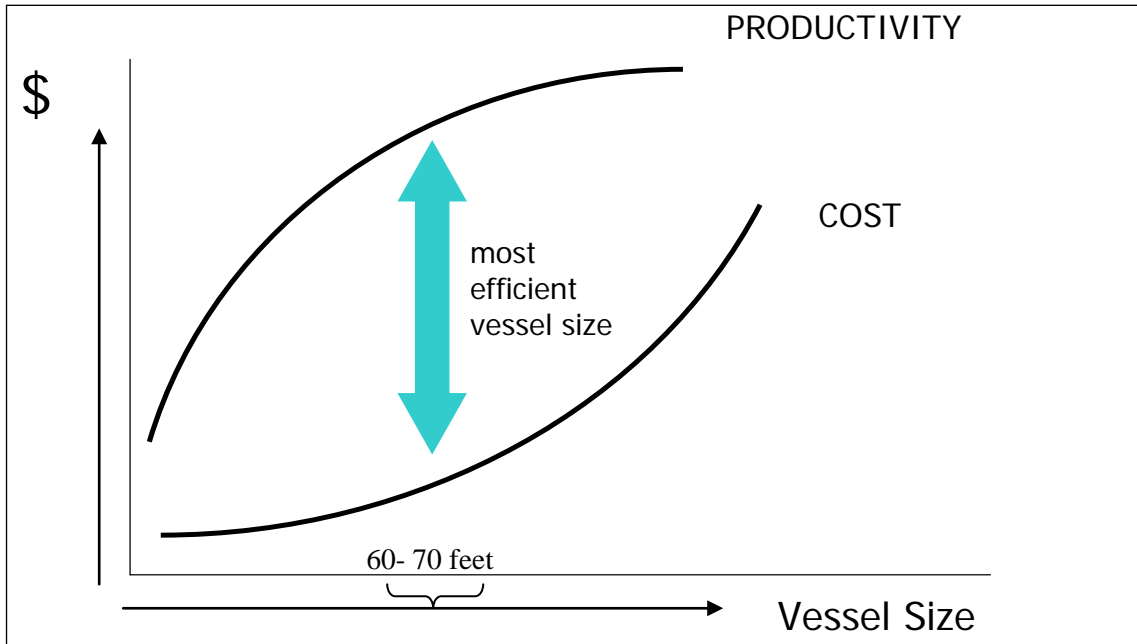


Figure 4-9. Conceptual description of vessel efficiency estimation.

The consolidation and profitability analysis assumes that harvesters of nonwhiting groundfish will tend to specialize in that fishery. This is due to the concept of economies of scope, which means there is a cost of switching from one fishery to another, and there is a loss of efficiency associated with not specializing in one fishery. For fisheries where year-round opportunities exist, this specialization assumption is reasonable. However, for fisheries where there is a limited time window of resource accessibility, vessels are likely to participate in several different fisheries. Specialization in a time-constrained fishery would mean that a vessel would sit idle for several months of the year before and after the season, and this is cost inefficient. If the opportunity exists, vessels engaged in seasonal fisheries are likely to participate in other fisheries in order to keep those vessels operating. Since the Pacific whiting fishery has a limited time window of resource accessibility, those vessels are likely to participate in other fisheries. The fisheries they are most likely to participate in are those most appropriate for that particular vessel. In the case of Pacific whiting vessels, other fisheries are likely to be other trawl fisheries or crab fisheries, because of the relative similarity of capital used to prosecute those fisheries. Many Pacific whiting vessels participate in the Bering Sea pollock fishery and are likely to continue doing so if the Pacific whiting fishery is rationalized. However, some vessels may elect to participate in the nonwhiting trawl fishery. Since the nonwhiting fishery consolidation analysis assumes that the nonwhiting fleet will be composed of nonwhiting fishery specialists, such diversification of Pacific whiting catcher vessels into the nonwhiting fishery makes the nonwhiting fleet consolidation estimates somewhat uncertain and should, therefore, be treated as order of magnitude estimates.

Consolidation in the harvesting side of the trawl industry has the potential for leaving existing participants with less capital wealth than they may have under Alternative 1 conditions. Those participants that are consolidated out of the fishery are likely to find that their fishing vessels and equipment are worth less than they may have been before rationalization as this equipment will likely be viewed as surplus and not necessary for continued prosecution of the fishery. If existing participants are the initial recipients of QSs (or catch history in a cooperative program), the decline in value of physical capital assets and the investments made in those assets may be offset by the receipt of QSs and the value of those QSs.

Changes in geographic distribution and timing of harvest

Distributional and geographic effects will almost certainly occur as a result of rationalization. Certain vessels may be more or less able to access their target species because of the geographic location of constraining overfished species. Vessels that traditionally operate in areas with relatively high bycatch rates may find themselves less able to prosecute target species activity relative to other vessels when they become individually accountable. This is because those vessels would be more likely to reach their QPs of constraining stocks in any given year and be forced to stop fishing earlier than vessels operating in an area without the same relative presence of those constraining stocks. Since those vessels may find it more difficult to access target species, they may be more likely to sell Qs to another vessel and leave the fishery, or move their operation to another port in order to access grounds where constraining stocks are less abundant. Such geographic considerations are likely to be influenced by market conditions as well. If a vessel fishes in an area with a relatively high bycatch rate of constraining overfished stocks, yet that vessel is economically efficient and delivers to a port with relatively good market conditions, then that vessel may continue to fish in that area regardless of the fact there is a relatively higher presence of constraining stocks in that area. The model that describes and estimates the result of these factors is described in more detail in Appendix C. Table 4-14 summarizes the geographic effect on fishing activities—and the vessels that fish in those geographic areas—that are likely to occur as a result of rationalization. These results are based on the regional comparative advantage analysis contained in Appendix C.

Table 4-14. Geographic effect of rationalization on catcher-vessels in the nonwhiting trawl fishery.

Area	Effect on Vessels from Rationalization
Northern Washington Coast—Shoreward of the RCA	It is highly likely that vessels fishing this area will be geographically disadvantaged by rationalization because of relatively restrictive bycatch conditions, relatively poor market conditions, and relatively inefficient vessel sizes.
Central and Northern Oregon Coast—Seaward of the RCA	Vessels fishing in this area may have to be relatively more selective about fishing practices because of bycatch concerns, but are not likely to move dramatically because of relatively beneficial market conditions.
Southern Oregon Coast—Shoreward of the RCA	Vessels fishing in this area may be forced to alter fishing behavior and location to a greater degree than vessels in other areas because of bycatch conditions.
Central California Coast—Shoreward of the RCA	Vessels fishing in this area may have to alter behavior to some degree because of bycatch conditions, but are not likely to move dramatically because of beneficial market conditions in the area.
Other Areas of the Coast	Vessels in other areas are likely to see liberalization of trawl fishing activity relative to Alternative 1 because of relatively lower bycatch rates, relatively more beneficial market conditions, or some combination thereof.

Regional differences in bycatch rates may also encourage vessels to use other legal groundfish gear to prosecute their fishing opportunities. Since different gear types have different relative rates of bycatch, some vessels operating in high bycatch areas may choose to use pot gear for example instead of trawl gear. In addition to these regional differences in bycatch rates as a motivation for using different gears, other vessels may choose to use another gear in order to capitalize on different markets, or they may choose to use trawl gear during certain times of the year and nontrawl groundfish gear during another time of year. Such gear switching may be driven by an attempt at capitalizing on economic opportunities, but it may also be driven by political motivations, social considerations, or public relation issues.

The flexibility that nonwhiting trawl harvesters have under rationalization to fish when they please is greater than Alternative 1. Although harvesters have flexibility under Alternative 1 because of the two-month limit structure of the fishery, that flexibility only exists within that two-month period. Issuing IFQs for groundfish species allows harvesters to engage in fishing operations as they please throughout the course of the year to take advantage of such things as variations in the price paid for harvested species. The following figure shows the average price per pound paid for select trawl target species. While this information may not suggest a clear seasonal pattern, it does illustrate that variations in the price per pound for groundfish occur throughout the year, and this information lends itself to suggesting that harvesters may vary fishing practices to some degree to capitalize on periods of higher prices. Allowing this flexibility in harvest timing works at enhancing opportunities for generating profits.

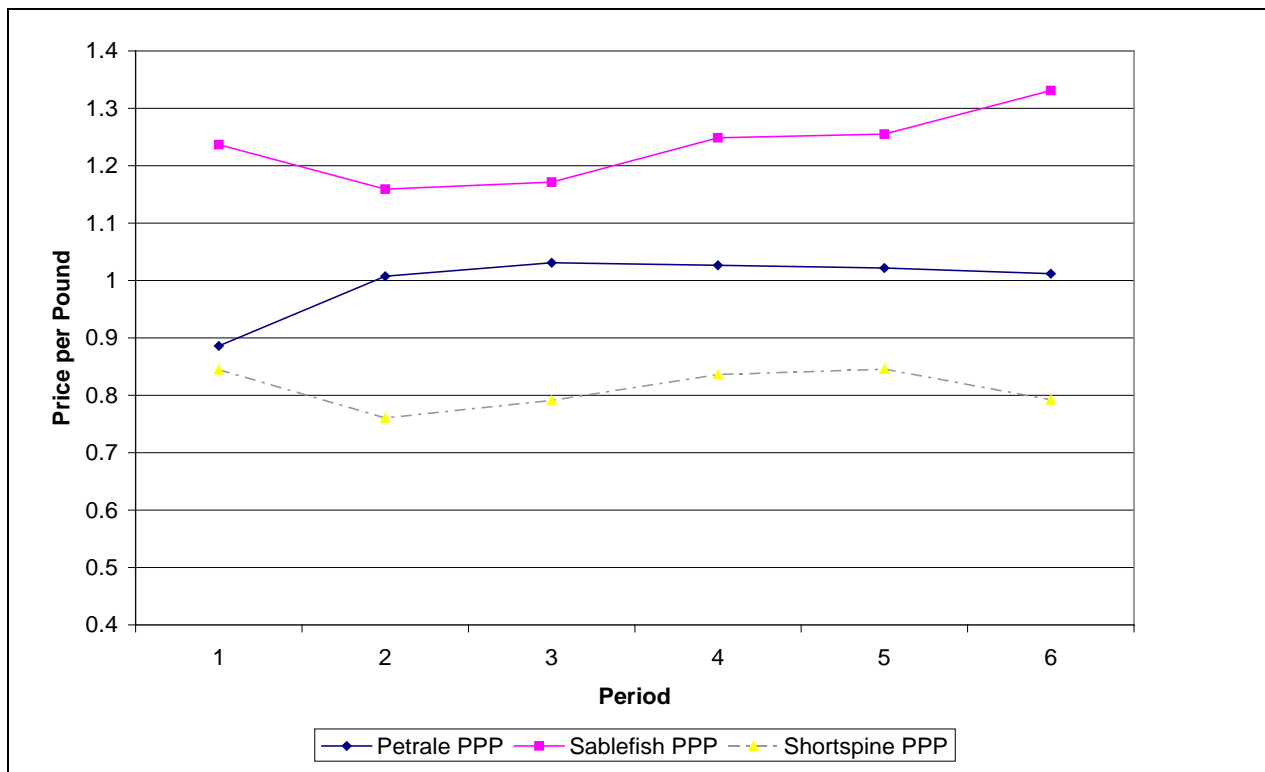


Figure 4-10. Average price per pound for select target species caught with trawl gear (2004-07).

Gear switching

In addition to the flexibility in harvest timing created by an IFQ program, the gear switching provisions allowed for an IFQ program further enhance flexibility. Such gear switching may be used to balance catch accounts (because different gears have relatively different catch rates), take advantage of differing market opportunities, or to respond to public relations issues. Although difficult to predict, some information suggests that there are harvesters located in different sections of the west coast who are more likely to engage in gear switching on a permanent basis. Harvesters located in the central and southern-central California coast have expressed a desire to switch from trawl gear to groundfish fixed-gear (longline and pots) in recent years because of public relations issues and because consumers in central and southern California appear to prefer nontrawl-caught fish. In addition, harvesters who have typically relied on areas with relatively high rates of constraining species bycatch may be more likely to

switch to a nontrawl gear to avoid those constraining stocks since many types of fixed-gear have lower bycatch rates of overfished stocks than trawl gear. This may encompass harvesters located in northern Washington and some harvesters in southern Oregon ports. Other factors may cause harvesters to temporarily use nontrawl gear to prosecute fishing activities during certain times of the year. This may be due to market conditions where there is a noticeable differential in the prices paid for groundfish species caught with one gear versus another. This is particularly the case for sablefish. The figure below shows that there is a substantial price differential between fixed-gear-caught sablefish and trawl-caught sablefish. If the trawl sector harvests 10 percent of the trawl allocation with fixed-gear, this would increase ex-vessel revenues by approximately \$600,000. If 20 percent of the trawl allocation was caught with fixed-gear, ex-vessel revenues may increase by \$1.2 million.

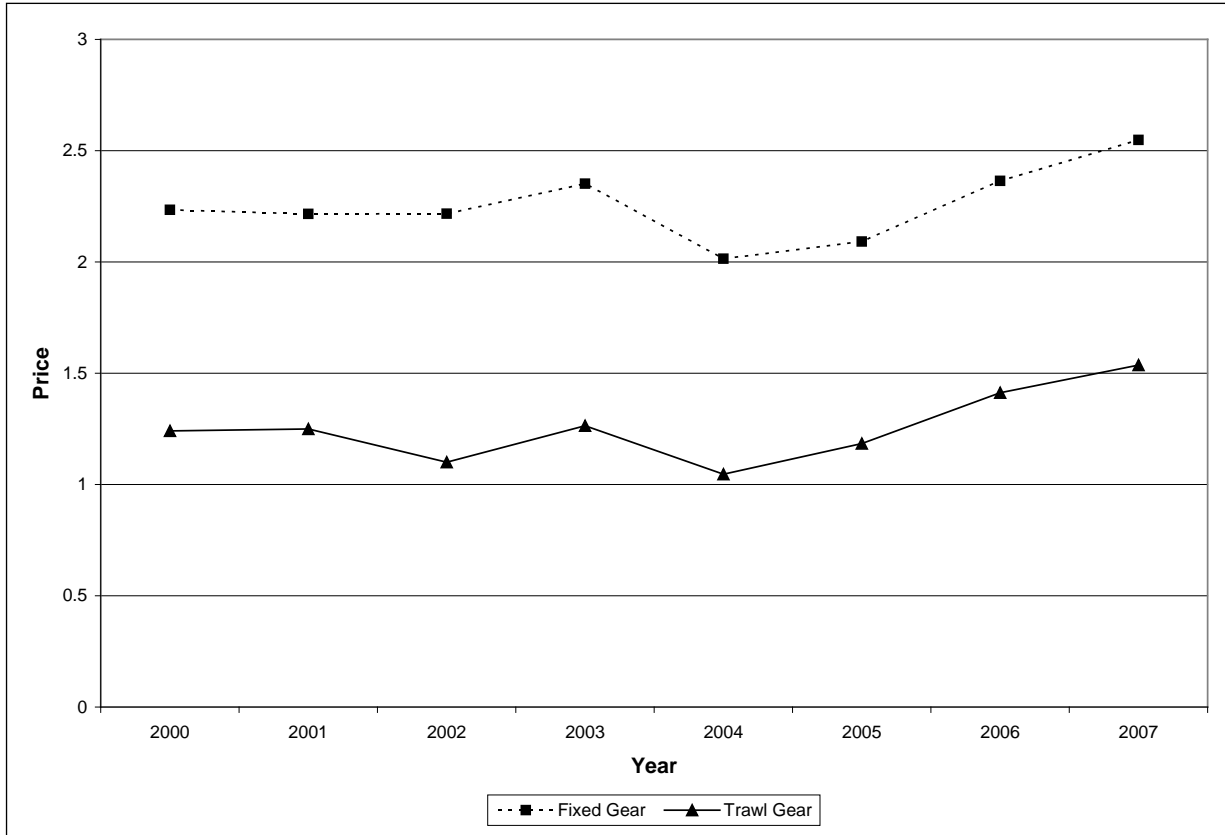


Figure 4-11. Average price per pound for sablefish by gear type (2000-07).

Another factor influencing gear switching, aside from the price differential, is the ability to harvest some types of groundfish with trawl gear that cannot be caught with nontrawl gear. Harvesters in many areas are not likely to abandon trawl gear completely because doing so would mean giving up the catch of many species of flatfish, which are not easily caught with nontrawl gears. In other words, in many areas of the coast, harvesters may use nontrawl gear to target species such as sablefish during certain times of the year and use trawl gear to prosecute petrale sole, Dover sole, and other flatfish during other times of the year. The relative catch rate—under Alternative 1 conditions—for bottom trawl and fixed-gear is shown in Table 4-15. This information shows that fixed-gear is successful at catching sablefish, shortspine thornyhead, and arrowtooth to some degree, but is not productive for catching many types of flatfish. Trawl gear, on the other hand, is capable of catching all of the species listed in the table. The reason these flatfish are not successfully caught with hook-and-line gear is because of their feeding patterns. While many longline fishermen may use herring with large hooks, for example, several of the

flatfish shown below feed on small prey, like worms, and have mouths too small to be caught with many of the hook sizes currently used. This information implies that large-scale gear switching may result in several species of flatfish being left unharvested.

Table 4-15. Catch of select groundfish by gear type, mt (2006).

Species	Nonwhiting trawl	Fixed-gear
Sablefish	2,654.3	3,119.3
Shortspine	648.7	178.1
Longspine	821.3	21.2
Dover sole	7,475.5	4.6
Petrale sole	2,690.1	4.1
English sole	1,291.4	0.0
Arrowtooth flounder	2,817.6	78.8
Other Flatfish	1,854.9	4.1

4.6.2.2 Impacts to Groundfish Trawl Harvesters in the Mothership and Shore-based Whiting Fishery

The effect of rationalization on whiting catcher vessels is more difficult to estimate and is more likely to be a result of improved product quality, slower-paced harvest activity, increased yield (which should increase ex-vessel prices), and enhanced flexibility and ability for business planning. Some consolidation may occur in these sectors, though the magnitude of consolidation is expected to be less than in the nonwhiting trawl fleet.

Consolidation

Using historic performance of catcher vessels in the shoreside and mothership sectors in the whiting fishery as a guide, the productive potential of catcher vessels in each sector can be estimated. Depending on the season length of a rationalized fishery, the number of vessels that would remain in each sector can be calculated. Assuming Alternative 1 season lengths, whiting OYs equivalent to the 2007 year, and the production potential of vessels based on historic data, information suggests that the number of catcher vessels in the shoreside sector may be approximately 20 vessels, and the number of catcher vessels in the mothership sector may be approximately 12 vessels after the fishery is rationalized (Figure 4-12).⁹⁰

⁹⁰ The assumptions used in developing these estimates are that 1) shoreside catcher vessels catch an average of 100,000 lb of Pacific whiting per day during an 84-day season and 2) that catcher-vessels in the mothership sector catch an average of 140,000 lb per day during a 56-day season.

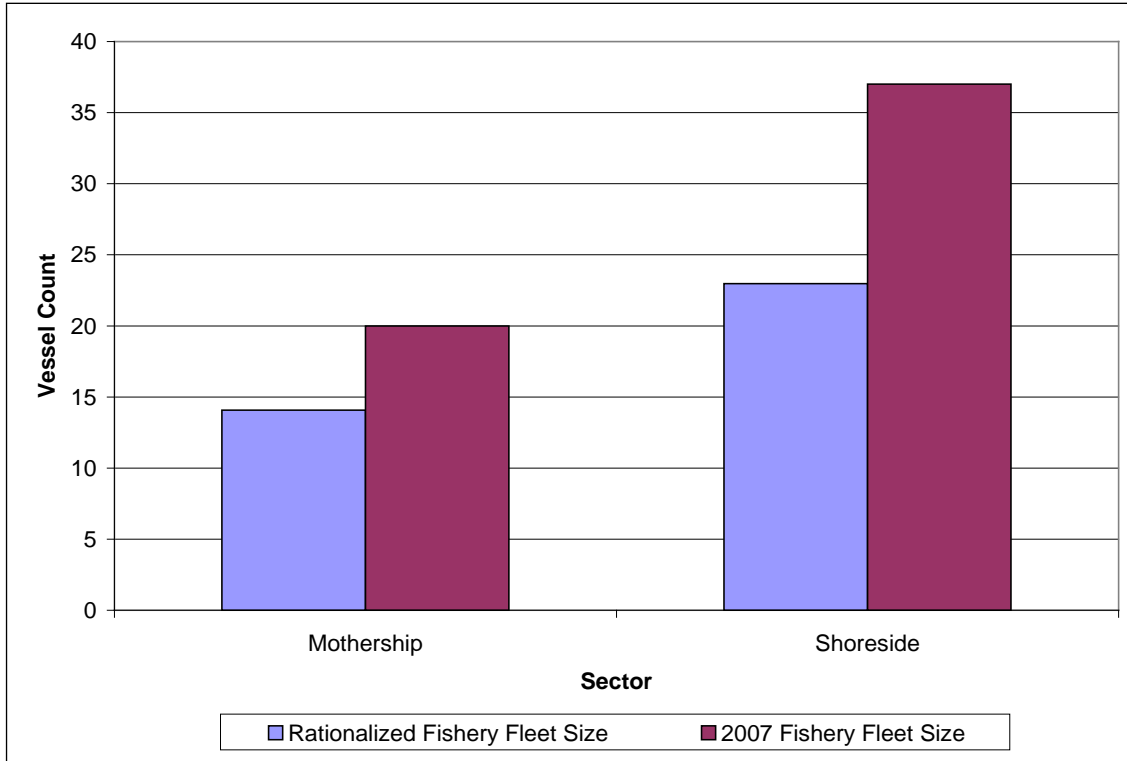


Figure 4-12. Order of magnitude estimates of catcher vessel fleet size in the whiting fishery.

Consolidation in the shoreside and mothership sectors of the whiting fishery should result in cost reductions and increased profitability. However, cost-earnings data are not readily available for estimating such cost savings, and, therefore, estimates showing improvements in profitability are not possible for this group of harvesters.

While net revenues per boat in the whiting fishery cannot be readily calculated, estimates of gross revenue can be derived using the fleet consolidation estimates and a set of assumed U.S. whiting OYs and ex-vessel prices. Using ex-vessel prices and OYs from the 2007 fishery, an estimate can be derived for gross revenue per boat in the shoreside and mothership whiting fishery. Figure 4-13 illustrates these estimates. This figure shows that catcher vessels in both the shoreside and mothership whiting fishery may be expected to generate slightly more than \$400,000 on average under Alternative 1 management conditions (assuming the entire U.S. OY is harvested), while the average vessel may be expected to generate approximately \$800,000 after the fishery is rationalized and fleet consolidation occurs.

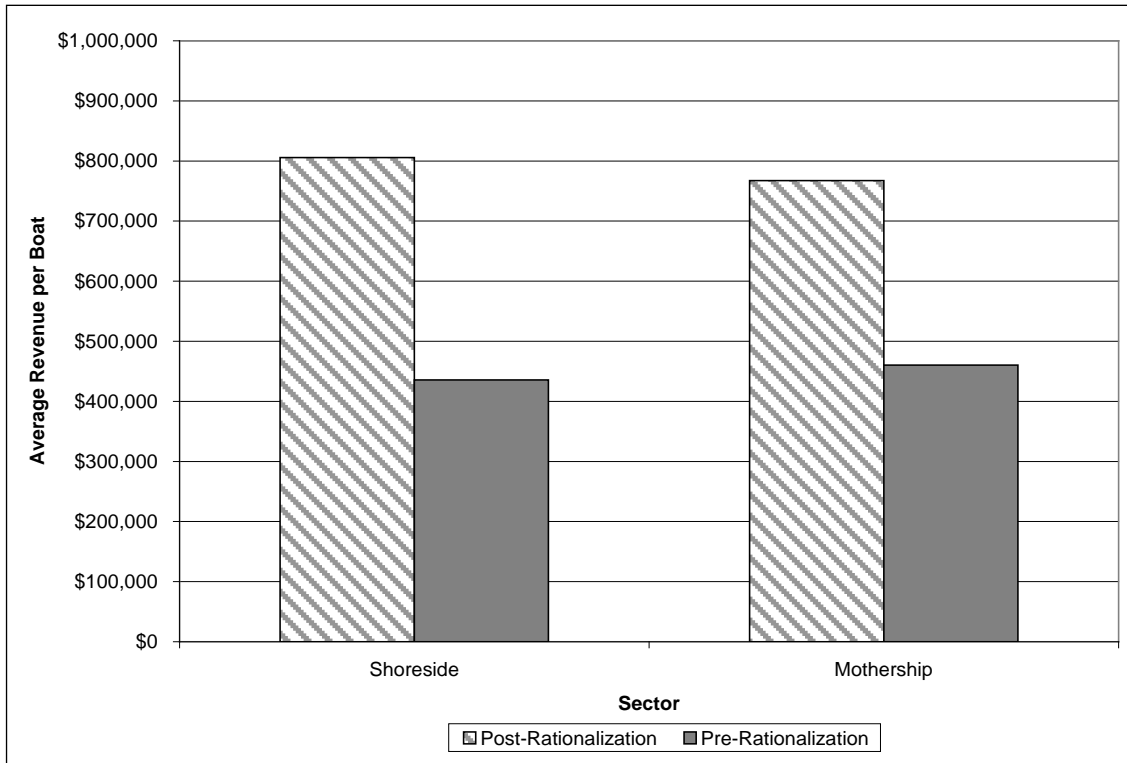


Figure 4-13. Average gross revenue per vessel in the whiting fishery (assuming 2007 OY and ex-vessel prices).

Product quality improvements

Empirical evidence has shown that substantial increases in product recovery have occurred after other rationalization programs went into effect. An increase in product recovery should increase profits in the industry, and those profits are likely to trickle down to catcher vessels in the form of higher ex-vessel prices. The Pacific Whiting Conservation Cooperative reports that product recovery increased by 40 percent after the voluntary co-op was formed (D. Waldeck, pers. comm., Executive Director Pacific Whiting Cooperative, May 2008). In the Bering Sea pollock fishery, product recovery increased from 19.5 percent to 29 percent in the best year (for a 48 percent increase) after the formation of the Pollock Conservation Cooperative (Wilén and Richardson 2003).

While substantial increases in product recovery have occurred after other programs were rationalized, it is not necessarily reasonable to assume that those same increases will occur in the at-sea portions of the Pacific whiting fishery. In the mothership portion of the whiting fishery, substantial increases in pollock product recovery came about as a result of modifications to processing capital that occurred after implementation of the American Fisheries Act. The motherships that participate in the Pacific whiting fishery also participate in the pollock fishery, and, therefore, gains in product recovery in the Pacific whiting fishery have already occurred because that same (improved) capital is being employed off the Pacific Coast in the mothership whiting fishery. However, given that portions of the Pacific whiting fishery function as an Olympic fishery with little opportunity for business planning, increases in product recovery may occur because of a slower pace of harvesting, flexibility, and ability to more selectively process harvested species. This may increase the ex-vessel price that whiting catcher vessels receive for their catch.

Seasonal and geographic changes in the fishery

To some degree, we would expect the whiting fishery to operate over a longer time period as the fleet is rationalized and prosecutes the fishery in a more strategic manner, though this is tempered to a large degree by the availability of the Pacific whiting resource, the level of participation of Pacific whiting vessels in other fisheries, such as Alaska pollock, and the timing of those fisheries. In addition, certain sectors of the fishery are time and geographically constrained. Experience with fishing patterns exhibited by catcher vessels in the shoreside sector of the whiting fishery indicates that it may not be feasible for those vessels to fish in the fall months because the type of vessels and nets employed in that sector limits access to the resource.⁹¹ This may be the same for mothership catcher vessels, though available information and experience with the fishery makes this point less clear. Catcher vessels in the shoreside sector are geographically constrained because of the north/south distribution of whiting processing plants. In order for vessels to make deliveries to those plants, those vessels have to fish in nearby areas off central Washington, southern Washington, Oregon, and northern California. Since the Pacific whiting resource migrates north during the course of the year, this geographic limitation of the processing plants—and the need to land deliveries to those plants before the whiting spoils—restricts the time of year when shoreside catcher vessels can prosecute the fishery. If historic patterns are a guide, shoreside fishing operations may be prosecuted successfully during months prior to October. Beginning in October, it is less clear whether shoreside vessels can successfully prosecute the whiting resource.

While resource timing and delivery location may constrain the time window for prosecuting the shoreside whiting fishery, there are reasons to prosecute the whiting resource later in the year. Larger whiting are caught later in the year, one of several traits that are desirable to consumers. Published research has demonstrated that quality and price increase as whiting are harvested later in the season (Larkin and Sylvia 1999). Therefore, to some degree, we would expect both the shoreside and mothership sectors of the whiting fishery to fish longer and/or later in the year to take advantage of these improved market conditions.

4.6.2.3 Changes in the Value of Capital Assets Held by Trawl Harvesters

Rationalization has the potential to change the value of assets trawl harvesters currently own. Capital assets related to fishing include the vessels used by fishery participants, the LE permits those participants hold, and the equipment those harvesters use to prosecute fishing activity (such as nets). Much of this capital may have little or no other use than fishing or may become relatively valueless. The former is often called “stranded capital” and can generally be described as capital that experiences a substantial or total loss of value as a result of some action. This capital experiences a reduction in value because it has little or no alternative use and there is little or no demand for that capital after the implementation of some action.

The consolidation of the LE trawl fleet that is expected from rationalization is anticipated to reduce the amount of capital deemed necessary to harvest groundfish species in the trawl sector. This should result in an excess number of vessels that may have an alternative use if they participate in another sector, but the value of those vessels may be reduced because the demand for those vessels has become reduced. Those harvesters who are consolidated out of the trawl fishery may be expected to experience a decline in the value of their fishing vessels.

⁹¹ It is generally accepted that Pacific whiting change their distribution as the year progresses. This change is reflected latitudinally and by depth. Fishermen who operate Pacific whiting catcher vessels have indicated that they have trouble successfully targeting Pacific whiting during later months of the year because their equipment does not allow them to fish at depths where the whiting are located.

The value of LE trawl permits will also change as a result of rationalization. Limited entry trawl permits act as a resource access privilege under Alternative 1 conditions, but that access privilege is the fishing quota under a rationalized fishery. While the program envisioned for the west coast requires that a vessel have a permit to prosecute opportunities in the rationalization program, the majority of the resource access privilege is tied to the fishing quota as that quota directly influences the amount of fish a vessel can harvest. Therefore, the value of permits held by trawl harvesters will decline in a rationalization program, but that decline in permit value may be offset by the receipt of Qs, depending on the volume of Qs those permit holders receive.

The rationalization of a fishery fully developed will undoubtedly result in a relative change in the value of capital assets held by participants in the fishery. As mentioned previously, the decline in value of LE permits and trawl vessels can be offset by the granting of Qs to those participants. Those Qs will have value if transferable, making those Qs a capital asset. In those alternatives where processors receive an initial allocation, harvesters will receive less of an initial allocation. Thus, the decision regarding whether and to what degree to allocate to processors will directly affect the value of capital assets harvesters receive through the initial allocation process.

4.6.2.4 Risks Imposed by Bycatch Species and Thin Markets for IFQ

While information suggests revenue could be increased substantially under rationalization, significant risk to nonwhiting trawl harvesters may be associated with an IFQ-based program. This risk comes from two sources: individual accountability and thin market conditions. Individual accountability is a source of risk because of the uncertainty that is associated with fishing and the fact that, for some species, accidentally exceeding QPs may be extremely costly to individual harvesters because of the cost of purchasing enough quota to cover that deficit, or the fact that that the vessel may be required to forego future fishing opportunity because of an enforcement action. A thin market for IFQ could occur when allocations of some groundfish species are so small that there are a very limited number of suppliers and a very limited number of transactions occurring on the market. Such conditions often lead to volatile price fluctuations (of quota in this case) and quota transactions that involve strategic behavior. The effect of thin market situations can create cases where the market cannot reach equilibrium and transfers occur based on mechanisms other than market mechanisms (such as personal relationships). In addition, thin market conditions are related to the risk posed by individual accountability. Species with few QPs available may make it problematic for vessels to actually find quota to cover catch deficits, and this poses a financial risk to harvesters.

Table 4-16 lists the species that may be the source of risk posed by thin market conditions under an IFQ-based program. This table is based on the assumption that allocations made to the trawl sector will be similar to the amount of catch that occurs under Alternative 1 management. While allocations could be made that grant more pounds to the trawl sector, these species are fully allocated, meaning any increase in trawl sector take would mean a reduction in the take of other sectors. Given the fact that many of these species are targets of the other sectors, a substantial change in the allowable take by the trawl sector seems unlikely. If these species create a great enough set of risks to harvesters, the response may be an avoidance of fishing activity in areas where these species are found.

Table 4-16. Species for which thin market conditions may exist in an IFQ program.

Thin Market Species in Nonwhiting Sector	Thin Market Species in the Whiting Sectors
Canary	Lingcod South of 42° N. latitude
Cowcod	Pacific Cod
Yelloweye	Pacific ocean perch
Longspine S 34°27' N. latitude	Chilipepper
Minor Nearshore Rockfish North	Bocaccio
Minor Nearshore Rockfish South	Splitnose
Black Rockfish (WA)	Shortspine
Black Rockfish (OR-CA)	Longspine
California Scorpionfish	Cowcod
Cabezon	Yelloweye
Kelp Greenling	Black Rockfish (WA)
	Black Rockfish (OR-CA)
	Minor Nearshore Rockfish North
	Minor Nearshore Rockfish South
	California Scorpionfish
	Cabezon
	Dover Sole
	English Sole
	Petrals Sole
	Arrowtooth
	Starry Flounder
	Other Flatfish
	Kelp Greenling
Longnose Skate	

Note: If three whiting sectors are established and the shoreside whiting and nonwhiting use common quota, the thin market species for the shoreside whiting sector would be the same as the species in the nonwhiting column.

The following table illustrates annual landings and discard for select species in the nonhake trawl fishery in 2007, 2006, and 2005. Earlier years were not provided because estimates were not readily available.

Table 4-17. Catch of select species in the nonwhiting trawl fishery by year (mt).

	Year		
	2007	2006	2005
Bocaccio	5	19	29
Canary	19	24	26
Cowcod	3	1	1
Yelloweye	0	1	1
Black rockfish	3	5	1
Cabezon	0	0	0
California scorpionfish	0	NA	NA
Kelp greenling	0	NA	NA
Minor nearshore N	0	2.7	0
Minor nearshore S	1	0	0
Shortbelly	0	0	NA

Note: "NA" means that estimates were not available

The following table illustrates annual harvests of species in the at sea fishery from 2003 through 2007 where the total catch during this period was at least 1 metric ton.

Table 4-18. Catch of select species in the at-sea trawl fishery by year (mt).

Common Name	Year				
	2003	2004	2005	2006	2007
Spiny Dogfish	269	615	355	61	155
Widow Rockfish	14	21	80	142	146
Yellowtail Rockfish	36	47	112	110	79
Rougheye Rockfish	2	14	36	7	29
Sablefish	17	29	15	2	3
Darkblotched Rockfish	4	7	11	11	12
Splitnose Rockfish	12	9	15	1	2
Shortspine Thornyhead	16	5	7	1	3
Arrowtooth Flounder	4	3	4	3	3
Pacific ocean perch	6	1	2	3	4
Lingcod	1	1	3	3	6
Shortbelly Rockfish	1	0	3	11	0
Redstripe Rockfish	5	2	5	0	1
Rex Sole	7	2	3	0	0
Canary Rockfish	1	5	1	1	2
Sharpchin Rockfish	2	0	0	0	1
Big Skate	0	1	1	1	1
Stripetail Rockfish	2	0	0	0	0
Longnose Skate		0	1	0	1
Shortraker Rockfish	0	1	0	0	0
Dover Sole	1	0	0	0	0
Greenstriped Rockfish	1	0	0	0	0

Cabezon specifications are specific to waters off California. This species is not found outside state waters, and California has prohibited LE trawling in state waters, which calls into question the necessity of establishing trawl IFQ for these species. Kelp greenling harvest specifications are specific to waters off Oregon and are set outside the Council process by the state of Oregon, which raises questions about how QPs would be issued. Furthermore, several species in the whiting sector column do not extend into the waters where the whiting fishery takes place; therefore, there is some question about the necessity of establishing QPs for these sectors in the whiting fishery. These species include lingcod south of 42° N. latitude, cowcod, minor nearshore rockfish south, cabezon, and bocaccio.

Whether the risk is great enough to have a noticeable impact on the effect rationalization will have on the fishery depends, in part on the amount of QPs available to each harvester and the type of catch limit (either total catch or landed catch). Table 4-16 lists species for which this risk appears relatively great under an IFQ program because of thin market conditions. Under Alternative 1 conditions, the comparatively lower level of risk is a result of catch limits that are based on landed catch (therefore harvesters can avoid penalties by discarding catch in excess of catch limits) and the size of the two-month limit. In a rationalized fishery, catch limits will be total-catch-based (harvesters cannot avoid penalties by discarding) and it is likely that the size of IFQ available for each vessel could be much smaller than the two-month limits currently available to each fishery. To illustrate this effect Figure 4-14 shows the existing two-month limit for nearshore rockfish species in the trawl fishery against the amount of IFQ available to each vessel (on average) to constrain harvest to Alternative 1 levels. For reference purposes, Alternative 1 harvest of nearshore rockfish in the nonwhiting trawl fishery is approximately 1 mt annually (compared to a northern OY of 142 mt and a southern OY of 564 mt). Figure 4-14 shows that the current two-month landing limit of nearshore rockfish is 0.14 mt (300 lbs) per two-month period. To constrain the trawl fishery to a 1 mt total catch of nearshore rockfish in an IFQ program, the average vessel would receive 0.009 mt (19 lbs) of nearshore rockfish quota for an entire year. Though the actual magnitude will differ for each of the species listed in the table above, the concept shown below would hold for almost each case: the two-month limit currently specified for those species will be substantially higher than the amount of IFQ available to each vessel to maintain the same harvest. The exception is where existing two-month limits are zero (cowcod).

The reason for the difference between the size of the cumulative catch limit and the likely size of an IFQ allocation is that cumulative catch limits are often constructed in a manner that limits few, if any, vessels, but may allow targeting of various other stocks while discouraging targeting on these nontrawl stocks. In the case of nearshore rockfish species, the existing two-month limit clearly discourages targeting, but is not so small as to result in much regulatory discard. The result, however, is that the total catch varies to some degree from year to year. In an IFQ program designed to maintain the same level of catch, that level of catch is divided among participants in the fishery in such a way that the total amount of QPs available to the participants equals the overall level of catch allowed for that sector.

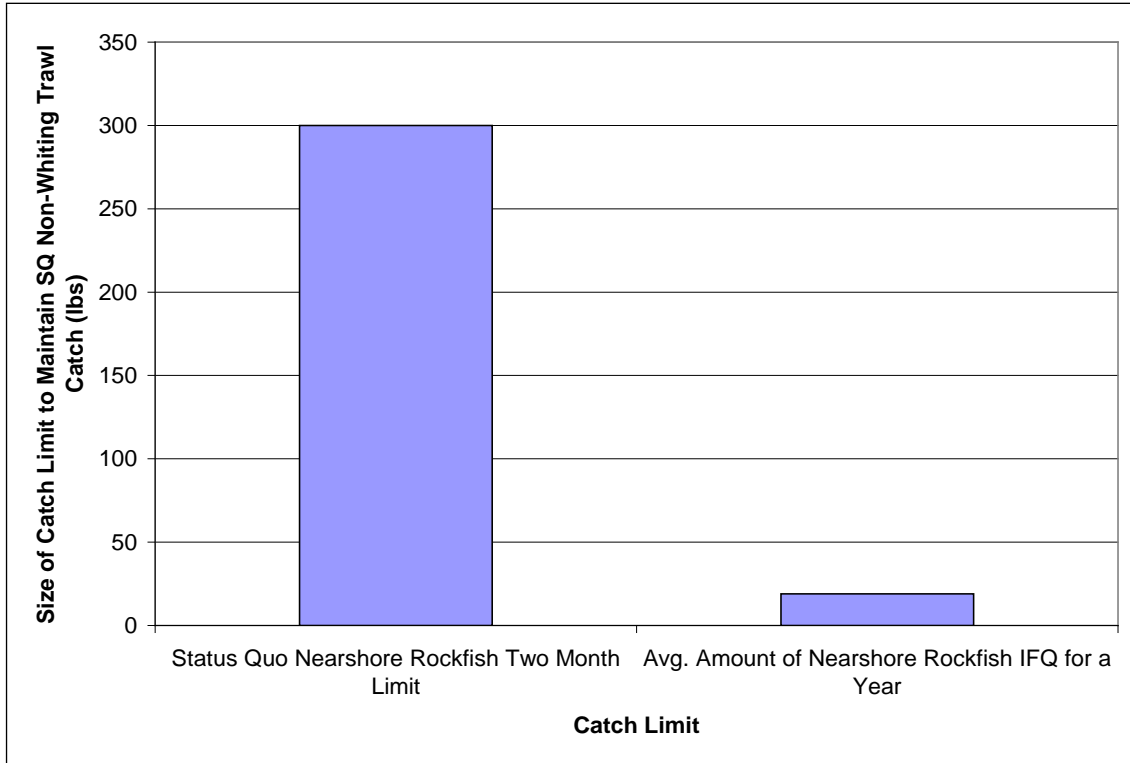


Figure 4-14. Size of catch limit necessary to maintain Alternative 1 catch of nearshore rockfish in nonwhiting trawl fishery.

In addition to the size of the cumulative limit, the actual quantity of nearshore rockfish landed with trawl gear is small. We examine black rockfish landed with trawl gear on a per-vessel basis, since this is the most frequently encountered nearshore species, and find that the occurrences of black rockfish landed with trawl gear is small, and the size of those landings is also typically small (less than 83 lbs in any given period). Most landings made with trawl gear have no black rockfish. However, of those vessels that have landed black rockfish over the 2004 to 2007 period, most have been between 1 and 83 lb over a two-month period. This is evidenced in Figure 4-15 illustrating that there were 61 occurrences over the 2004 to 2007 period with vessels that have landed between 1 and 83 lb of black rockfish during a given period.

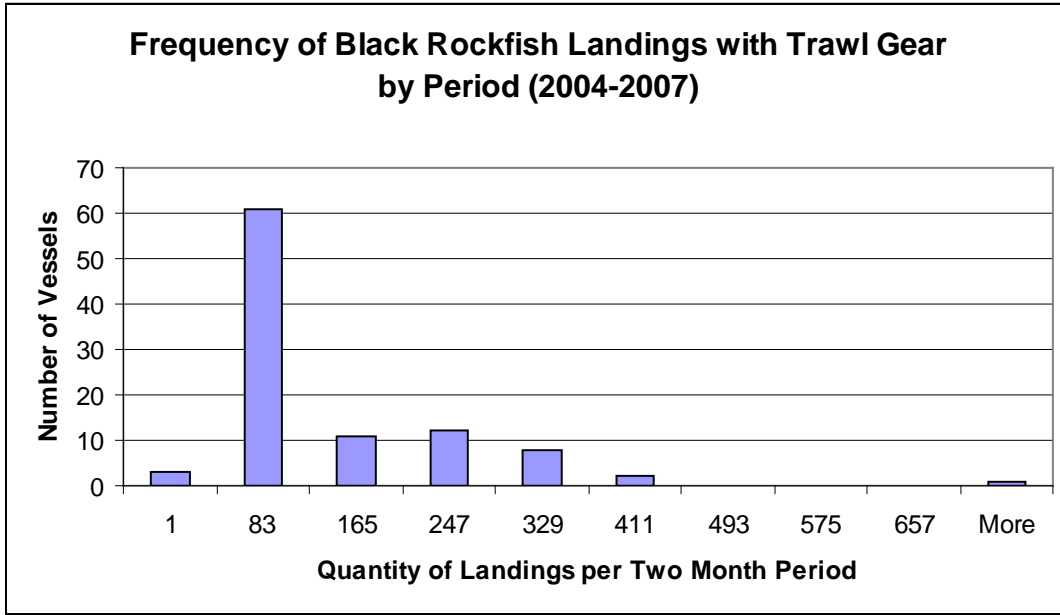


Figure 4-15. Frequency of black rockfish landings with trawl gear by period (2004-07).

The recent catch of several nearshore species in the trawl sectors is shown in Table 4-19. This information is shown against the 2008 OY for each stock to provide an indication of the scale of trawl catch relative to the OY.

Table 4-19. Catches of selected nearshore species by trawl sectors, 2005-06.

	2006		2005		2008 OY
	Nonwhiting Trawl	Whiting Trawl	Nonwhiting Trawl	Whiting Trawl	
Black rockfish	5	0	1	0	1,262
Other Nearshore rockfish N	3	0.1	1	0	142
Other Nearshore rockfish S	0	0	0	0	564
Cabezon	0	0	0	0	69
Kelp greenling	0	0	0	0	NA

The species for the nonwhiting trawl sector shown in the above table are predominately found in the nearshore areas and along the continental shelf areas within, or shoreward, of the RCA. If the average vessel receives small QPs for some, or all, of these species, they may very well forego target species opportunities in those same areas because the risk of encountering these low allocation species is too great. The socioeconomic effects of the fleet foregoing harvests of associated target species are a reduction in ex-vessel revenue and catch from what is expected, fewer vessels than expected, and fewer fishing related jobs. The biological effect depends on policies established in response to such changing catch levels; however, it is reasonable to expect that foregoing harvest of target species will increase their abundance. For most species, listed in the above table, the foregone mortality that may otherwise be induced by the trawl sector will not be large enough to have any discernable effect on population size.

Figure 4-16 is intended to demonstrate why some target species may not be accessed if the risk posed by low trawl allocation species is large. This figure shows the abundance of other flatfish, excluding rex

sole, in the trawl survey by depth.⁹² This is plotted against the abundance of canary rockfish and minor nearshore rockfish by depth. This information suggests that, given enough risk posed by individual accountability of nearshore rockfish and canary rockfish in an IFQ-based program, the trawl fleet may forego the catch of other flatfish because they are found in the same areas. Catch of other target species is likely to be foregone as well if vessels avoid areas shoreward of the RCA (including petrale sole during summer months); however, the following figure is meant to illustrate the risks posed by managing some species with IFQ.

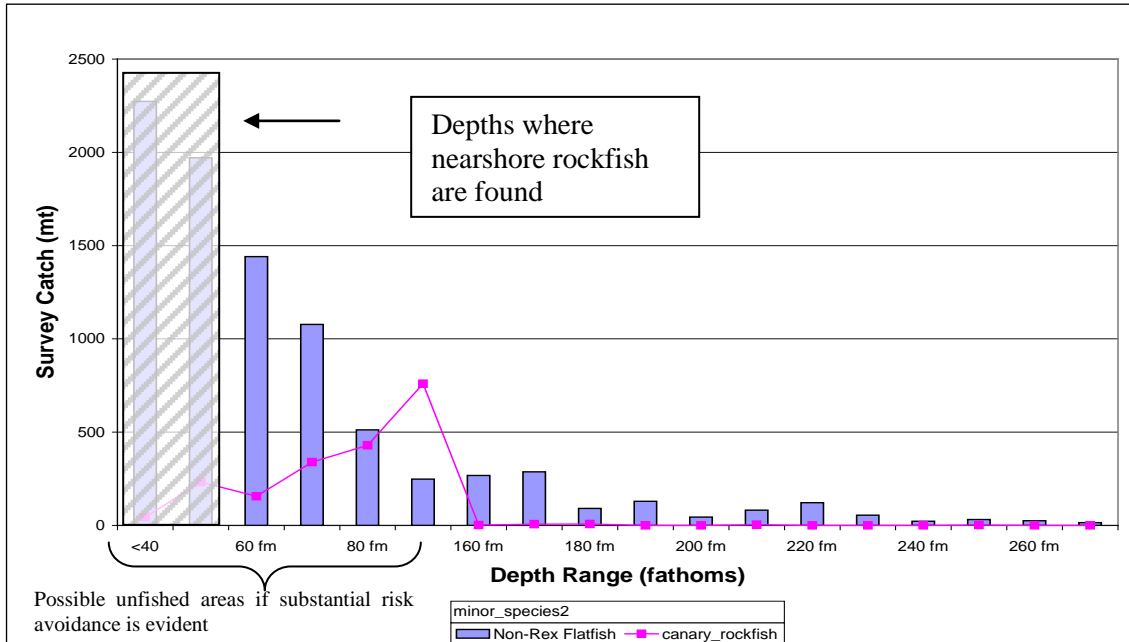


Figure 4-16. Abundance of select groundfish species by depth. (Source: NOAA Fisheries trawl survey data.)

The individual accountability of low allocation species creates a risk to harvesters where there is a relatively large potential for harvesters to encounter stocks, but a relatively small amount of quota available. This concept is weakly differentiable from thin market conditions because the number of transactions could presumably be large. The risk posed by accountability of low allocation species differs from thin market conditions in that the number of transactions of QPs is large enough to avoid the price volatility present in thin markets. The implication of low trawl allocation species is that the demand for quota of those species is likely to be high relative to supply, thus making the cost of purchasing quota of those species high. The risk posed by thin market conditions and low allocation species with relatively high probabilities of encounters may end up being the same (high costs of acquiring quota); however, the species may be different. For example, a species like darkblotched rockfish may have enough quota available, and be encountered enough, so that transactions occur in a manner that is sufficient to avoid thin market conditions. However, demand may be large relative to supply, and, therefore, the cost of this quota may be relatively high. In this case, the market is likely to work effectively because the number of transactions may be large enough to avoid thin market conditions, but the cost to individual harvesters trying to purchase quota could be substantial.

The sources of risk identified above pose risks to individual entities, but they also pose a collective risk to the entire fleet. Given the uncertainty about what will be caught when deploying fishing gear, there

⁹² Rex sole was excluded because it is found across a much wider depth distribution, and, therefore, the catch of rex sole may not be affected.

may be a potential for a harvester to have a disaster tow where a single haul catches the remaining trawl sector allocation. The alternatives under consideration would require that when the trawl sector allocation is reached or exceeded, large areas of the coast may be shut down to prevent further harvests of those species. This action will almost certainly foreclose further harvest opportunities for vessels and several target species. If there is an expectation that disaster tows will occur, then the fishery may begin to take on the characteristics of an Olympic fishery where harvesters begin fishing operations in January and attempt to harvest as much of their quota as they can before one harvester preempts future opportunity through an unexpected disaster tow. Another potential outcome of these risks is that the fleet may completely avoid certain areas and forego harvest opportunities for target species in those areas. This would tend to reduce ex-vessel revenues from those expected.

One factor in the alternatives that may mitigate some of the risk is the presence of a carry-over provision. This provision would allow harvesters to debit an overage from a subsequent year and avoid the purchase of costly quota and avoid a possible enforcement action. Another way of managing risk in an IFQ-based program is for harvesters to form voluntary pools for sharing quota and spreading the risk of unexpected catch events. It can be reasonably well expected that this will happen to some degree; however, two provisions that may make it difficult to form such voluntary pools are the manner in which quota is initially allocated and whether there is the presence of a grandfather clause for constraining stocks. The management of risk by harvesters can be affected by initial allocation and by the presence of a grandfather clause. If harvesters rely on collective, voluntary pooling arrangements to collectively manage low trawl allocation species, then the initial allocation may influence the success of those pools forming. The formation of such collective arrangements relies on potential participants having relatively even power in the negotiations that occur while forming such collective agreements. Such even power does not necessarily mean that all collaborators should have equal allocations of all species, but it does mean that if one collaborator has a large amount of low allocation species, that harvester will be at a relative advantage in the negotiation. If initial allocation favors some harvesters more than others, or a grandfather clause allows some entities to hold more constraining species quota than others, the ability of those harvesters to form risk pooling arrangements may be problematic. This is because the outcome of negotiations would tend to favor fewer individuals (those with more negotiating power). Such an outcome would tend to breakdown collective agreements that are intended to treat individuals equitably and result in risk sharing.

In a co-op program, the type of risk described above is minimized through collective management that spreads the risk across the multiple participants in the co-op or fishery. However, if the risk is spread across too many participants, the ability of those participants to agree to a bycatch management plan may be jeopardized and there is a potential for a race for bycatch to develop among harvesters.⁹³ The risk that a race for bycatch may develop depends on the number of co-ops or sectors to which a bycatch limit applies. If a bycatch limit is applied to a relatively small pool of vessels (e.g., to individual co-ops), the possibility of a race for bycatch developing is relatively small. Conversely, if a bycatch limit is applied at a relatively gross level (to all three commercial whiting sectors combined), it is more likely that a race for bycatch would develop. However, other risks become evident if bycatch limits are established for a relatively small group of vessels. The risk of an unexpected disaster tow preempting the harvest opportunities of harvesters in a co-op is greater if the bycatch limit is established for a relatively few number of harvesters. This type of risk can be managed through the presence of inter-cooperative agreements to manage bycatch. A fishery operating with such agreements would likely rely on the individual co-op agreements to specify the management of bycatch of individual harvesters (thus

⁹³ The term “race for bycatch” is used in this case to describe a type of behavior that occurs when harvesters do not believe that the bycatch limit will be successfully managed. In this event, harvesters believe that they face the risk of being preempted by the attainment of a bycatch limit and, therefore, race for fish in order to harvest their allocated target species.

imposing individual accountability for bycatch) and would depend on the inter-co-op agreement to spread the risk of catch uncertainty across more participants. While this type of framework appears similar to IFQ-level management of bycatch, the presence of bycatch species quota in an IFQ program can potentially stand in the way of collective management agreements. This is because those holders of bycatch quota would tend to have a relatively greater negotiation stance. This concept is discussed in more detail under the earlier section comparing cooperative institutions with individual quota institutions.

Table 4-20. Individual and collective bycatch risk at different levels of the fishery.

Level of Bycatch Management	Collective Risk (risk of a race for bycatch)	Individual Risk (risk posed to individuals from catch uncertainty, low trawl allocation and thin market species, and individual accountability)
IFQ	Low	High
Co-op Level	Med-Low	Med-High*
Sector Level	Med-High	Med-Low
Fishery Level	High	Low

*If inter-cooperative agreements are formed for managing bycatch across co-ops, a co-op level allocation of bycatch species may have a low level of risk posed by individual accountability and catch uncertainty, while also having a low level of risk that a race for bycatch could develop. This is because a co-op level allocation of bycatch forces the cooperative to internalize bycatch management, and this would be evident in the cooperative agreement signed by harvesters in that cooperative. Such internalization of bycatch management in the co-ops would tend to foster the development of high levels of individual accountability for bycatch by members. Allowing intercooperative agreements to form would allow cooperatives to spread the risk of catch uncertainty across cooperatives (thus reducing individual risk) if those cooperatives can agree to terms.

A program that requires whiting catcher vessels to cover low OY and low trawl allocation species with quota will almost undoubtedly create a thin market for IFQ. As described above, including these species in a program creates risk because vessels that exceed their holdings of QPs for one of those species may find it difficult to purchase QPs to cover those overages. If QPs cannot be found or acquired, that vessel may incur a substantial penalty. This places a high burden on the individual, which may be appropriate if the situation warrants such a threshold. In a cooperative program, such thin market conditions are unlikely, since nontarget species will be covered by a collective bycatch limit that does not rely on market mechanisms, but rather relies on social arrangements and relationships. Pooling of nontarget species in this manner alleviates some of the individual burden in favor of risk sharing across participants in the fishery.

Species coverage and gear switching

As shown above, trawl gear may not substantially encounter many types of groundfish species, arguably making the coverage of some species in an IFQ program unnecessary (and potentially having adverse consequences if they are covered). However, gear switching opens up a new set of possibilities for trawl harvesters because nontrawl gear can be more adept at accessing some types of groundfish—particularly those groundfish that may live in rocky or high-relief habitats that trawl gear cannot access under existing footrope restrictions. Therefore, when considering which species should be covered with IFQ, it is important to consider those species substantially caught with trawl gear, along with those species that may be substantially caught with nontrawl gear.

When considering which species to cover under management of a rationalization program, one can differentiate between nearshore species and other types of groundfish—in this case, they can be differentiated because of state management regulations that restrict the harvest of these species and the fact that those regulations will likely continue to restrict the harvest of those species if the trawl fishery

is rationalized. The following bullets outline, generally, the regulations that dictate commercial nearshore groundfish regulations off the three west coast states.

- Off the Washington coast, the state of Washington has eliminated commercial fishing for groundfish in coastal state waters. This effectively eliminates the harvest of nearshore species by commercial vessels operating off the Washington coast.
- Off the Oregon coast, the state of Oregon restricts landings of nearshore species through the commercial nearshore management program. Vessels landing nearshore species are required to hold a state nearshore license. Vessels landing nearshore species along the Oregon coast would, therefore, fall under the nearshore commercial fishery regulations and would not be operating under the trawl rationalization program. This elimination of targeting opportunity heavily restricts the catch of nearshore species off the Oregon coast by vessels without a nearshore license.
- The state of California manages nearshore species similarly to Oregon, but has also implemented trawl gear closures in much of the state waters. Vessels landing appreciable amounts of nearshore species in California would, therefore, fall under the state nearshore fishery management regulations and would not be operating under the trawl rationalization program. Like Oregon, these measures heavily restrict the catch of nearshore species off the California coast.

Species affected by the state management described above include the following: cabezon, black rockfish, kelp greenling, California scorpionfish, and the various species making up the nearshore rockfish group (including deeper and shallow nearshore). It is possible that fishermen could target other species that occur in nearshore waters (such as lingcod) with nontrawl gear, incidentally encounter nearshore stocks, and incur large amounts of discard due to state landing restrictions. Therefore, if nearshore species are not covered with IFQ, it may be necessary to impose differential RCA restrictions on IFQ vessels using nontrawl gear versus those using trawl gear. The appropriateness of this measure would depend on the likelihood of vessels fishing in nearshore areas with gears that encounter nearshore species.

Other species that are not covered by state-based nearshore management regulations may or may not be frequently encountered by trawl and nontrawl vessels. Those species that are not actively encountered by commercial groundfish vessels may have a lower priority or necessity for management under the rationalization program than those species which are more frequently encountered. Eliminating some of these species from the program may reduce some administrative costs and other potentially adverse economic effects (such as those described under previous sections). In order to examine the type of species encountered and the scale to which they are encountered, past fish ticket data were analyzed. While these data do not include discards, they provide a reasonable index for mortality levels for those species that are not prohibited or have highly restrictive trip limits.

Table 4-21. Average annual shoreside landings by gear group (2003-07), mt.

Species Name	Average Annual Shoreside Landings by Gear Group (2003-07)					
	Hook and Line	Net (incl set net)	Pot	Shrimp Trawl	Trawl	Troll
Arrowtooth	5		1	0	2,605	0
Chilipepper	3	0	0	0	45	0
Dover Sole	2	0	1	2	7,298	2
English Sole	0	0		1	1,047	
Lingcod	86	0	5	0	141	10
Longspine	22	0	0	0	917	0
Other Flatfish	3	1	0	15	1,312	0
Pacific Cod	5		0	0	880	0
Pacific Whiting	0	0	0	0	96,461	0
Petrale Sole	1	0	0	2	2,334	0
Sablefish	1,973	3	799	1	2,314	2
Shortbelly	0				0	
Shortspine	141	0	0	0	591	0
Slope Rockfish	140	16	5	0	261	1
Spiny Dogfish	449	13			248	0
Splitnose	0		0	0	24	0
Yellowtail Rockfish	5		0	0	544	16

Of those species above which are caught in noticeable volumes by nontrawl gear, some may be better described as being incidental to other types of targeting activity. Longspine thornyheads fall under this category as the price for these species is low, and the size of these species is relatively small, meaning the revenue per unit of effort is minor. Based on industry representatives, fixed gear vessels do not actively target longspine thornyheads (Richter, pers. comm., 2008). Longspine south of 34 degrees 27 minutes N. latitude are found in areas not accessible to trawl gear. When combined with the fact that fixed gear vessels do not target longspine thornyheads, it may be reasonable to exclude longspine in this area from the IQ program because the catch of that species is likely to be small.

Finally, as part of the Council's decision on Intersector Allocation, the trawl sector was allocated a quantity of Pacific halibut that is noticeably lower than what has been taken under Alternative 1 conditions. In the B.C. trawl fishery, the bycatch of Pacific halibut has declined substantially as a result of imposing individual limits on Pacific halibut. This suggests that trawlers along the west coast may also be able to substantially reduce their take of Pacific halibut if individual limits are imposed on west coast trawlers. However, one major difference appears to exist between the B.C. system and what is proposed for the west coast system. Under the B.C. system, the trawl sector is allocated substantially more than what they take each year. This means that there is a substantial supply of halibut quota available to the sector, even though they take far less. In the west coast system, the trawl sector will be allocated an amount of halibut that the Council feels is an appropriate level for the trawl sector to catch. In other words, the B.C. trawl sector will allocate more than they are expected to catch, while the west coast system will allocate a target amount on a par with the Council catch level for the trawl sector. Under the B.C. system, more QPs are available than used, while under the west coast system the availability of QPs will likely be more in line with what is expected to be caught. Through simple supply-demand mechanisms, it is reasonable to expect that the price of halibut quota on the west coast market will be substantially higher than in the B.C. system because of the relative scarcity of halibut QPs. This cost of quota, combined with the fact that the trawl sector may be allocated an amount of halibut that proves to be somewhat constraining, may lead to effects on the trawl fishery that are similar

to overfished species or to other types of constraining fisheries. Those harvesters operating in areas where Pacific halibut are relatively abundant (northern Washington) may find it more difficult to avoid halibut and may reach their halibut IBQ amount sooner than harvesters in other parts of the coast. The result may be similar to trawlers operating in areas where overfished species are relatively abundant; quota may be transferred to another area of the coast, or vessels may move. Should the trawl sector be highly effective at avoiding Pacific halibut, however, the amount allocated to the sector may end up being more than what is expected to be caught in any given year. If this is the case, the west coast system may look similar to the B.C. system, and the effect of imposing individual limits on Pacific halibut may not have the same degree of regional effects as described above.

4.6.2.5 Other General Effects of Rationalization on Trawl Harvesters

While it can be reasonably well expected that individual accountability measures and an elimination of an Olympic fishery will increase ex-vessel revenues in the fishery (risk conditions aside), changes in the way the fishery is prosecuted will be a likely result. In the nonwhiting portion of the trawl fishery, vessels are likely to modify their behavior in several ways to decrease bycatch of overfished species. This may come in several forms, including gear modifications, using a different type of gear altogether (i.e., nontrawl gear), or changing the location of fishing. Changes in the location of fishing effort are likely to be driven to a large degree by the relative presence of constraining stocks and the fact that those stocks tend to be patchily distributed. As vessels become individually accountable for their catch of constraining stocks, they are likely to move from those patches where there is a relatively high abundance and bycatch rate, and, if that distance is substantial, this may have repercussions on adjacent communities that are dependent on trawl fishing activity. This effect is described in more detail under community impacts.

Consolidation of the trawl fishery will almost certainly be another outcome of rationalization. A reduction in fleet size is likely to be nonhomogenous across the fleet, meaning that there are vessels and operators with certain characteristics that may make them more or less likely to drop out of the fishery when a rationalization program goes into place. This consolidation should increase efficiency and net revenues and may also result in increased wages to those employed on fishing vessels. However, it is also likely to result in fewer fishing-related jobs and a disproportionate reduction in the number of vessels in some ports, with potentially adverse impacts to input suppliers, processors, and other fishing support businesses in those places, while having potentially beneficial impacts in other places. This effect is further described in the analysis of impacts to captain and crew (page 390), impacts to processors (Section 4.7), and impacts to communities (see Communities).

Initial allocation

The initial distribution of quota is likely to have an effect on groundfish trawl harvesters. While this is primarily a distributional issue, some research suggests that variations in overall economic performance could occur depending on the way quota is allocated (Hurwicz 1995). Overall economic performance could be affected because of the transfer costs associated with finding and trading quota, and also because of the relative amount of financial assets fishermen have to purchase quota, which may limit their ability to acquire additional quota. Economic performance may be compromised if the initial allocation to harvesters differs substantially from their current and recent fishing practices.

This initial allocation creates something like a capital asset and also influences the amount of harvest available to those individuals. Depending on the allocation formula, some permit holders and catcher vessels may receive a greater or lesser amount of allowable catch than under Alternative 1 conditions. In addition, they may receive a different mix of species allocated as quota compared to the mix of species they currently harvest. In the long run, transfers of those fishing privileges should occur in a

way that is more optimal to individual harvesters, and that transfer will act as a cost to those that purchase the shares and as a benefit to those that sell them.

Rationalization and distribution of harvest privileges may disadvantage people who currently own and/or operate vessels but are not groundfish trawl permit holders. This is because these people will not receive an initial allocation of quota. The consolidation of harvest privileges (be it IFQ or co-ops) onto fewer vessels may put those individuals without an initial distribution of harvest privileges at a relative disadvantage. They will be less able to pay quota holders to lease their unused quota compared to other quota holders wanting to lease it. This is based on the notion that vessel owners with an allocation of quota can cover their costs with their own quota and then bid higher prices to lease quota from others. Vessel operators without an initial distribution will need to cover their costs and generate revenues on quota they may lease from other individuals and this makes them less able to bid high prices to lease quota. Since holders of harvest privileges will want to get the best price, those vessel operators unable to pay for it will be shut out of the market.

The share of quota initially allocated to harvesters and processors will tend to influence ex-vessel price. Ex-vessel price is generally expected to increase relative to Alternative 1 if the entire allocation of IFQ is made to permit holders. As processor initial allocation is increased, ex-vessel price is expected to decrease. It is not clear how this compares to Alternative 1 ex-vessel prices however. In the cooperative program proposed for the whiting sector, which has linkages between harvesting and processing entities, it is unclear what will happen to ex-vessel prices. In situations where there is one buyer and one supplier, prices are typically set by nonmarket mechanisms. Personal relationships are likely to play a great role in ex-vessel price setting in such cases.

Initial Allocation of Overfished Species

Perhaps one of the most important initial allocations is the allocation of overfished species. Since overfished species will continue to limit access to target species, overfished species quota is likely to be costly and will also determine if harvesters can access their initial allocations of target species. The cost of overfished species quota will be largely determined by the degree to which they constrain access to target species. Those species that are highly constraining will likely reflect much of the value of the fishery in the price of the quota, even if the revenue generated from landing those species individually is small. For example, two of the most valuable species (in terms of landed catch value) tend to be sablefish and petrale sole. It is expected that the value of sablefish and petrale sole quota will be higher than other target species, such as Dover sole or English sole. However, the price of canary rockfish quota may well be higher than any target species simply because, in order to access many target species, one will need quota of overfished species. In some ways, those permits that do not receive an initial allocation of overfished species may be in a position that is in some ways similar to a second-generation fisherman who must buy into the fishery, simply because a large portion of the value of the fishery is contained within the price of overfished species quota. Therefore, the way overfished species are allocated has a large impact on the future success of existing fishing operations and (when viewed in more aggregate terms across multiple vessels in a port or region) on fishing communities.

An additional consideration concerns the ability of harvesters to form risk pools. If the initial allocation has an impact on the longer-term outcome of individual harvesters—and the amount of overfished species quota individual harvesters hold over the longer term—then the ability for risk pools to form and remain intact can be affected by the initial allocation. As indicated previously, if a small number of participants in a risk pool have a relatively large influence, or control, over the outcome of that pooling arrangement then the arrangement should be expected to be relatively unstable. In the case of overfished species, if one harvester holds substantially more overfished species quota than other harvesters, then that first harvester may have substantially more influence over the pooling arrangement

than others, destabilizing the arrangement and jeopardizing the continued success of that arrangement. An initial allocation that results in a relatively steep high to low distribution of overfished species QSS may have the effect of making it difficult for pooling arrangements to form, while an initial allocation that has a less severe high to low allocation may create conditions where pooling arrangements may form and may remain intact over the longer term.

Each of the options for initial allocation of overfished species results in different allocations of some species when compared to the other options for allocating these species. Some options concentrate quota into a small number of entities, while others spread out the initial allocation among all trawl permits. Summarized results for these initial allocation estimates are shown below.

As indicated in the table below, the effect of the initial allocation depends heavily on the formula chosen. For each formula that does not include an “equal sharing of buyback history” component, many permits receive zero allocations of overfished species. For some species where the scope of the allowable catch is area-specific (such as bocaccio and cowcod), this outcome may be reasonable. Those permits with history fishing north of Cape Mendocino (where the bocaccio and cowcod OY does not apply) are not held accountable for these species because management of those species does not extend to that area. For other species such as canary and widow rockfish, where the stock distribution is more widespread, an initial allocation of zero is likely to make it difficult for harvesters to engage in fishing activity unless they can purchase quota of these species through the market. Finally, some formulas result in a relatively large concentration of overfished species quota to a small number of permits. Cowcod, for instance, is heavily affected by the formula with landings-history-based formulas allocating a large portion of the quota to a single permit.

Table 4-22. Summary statistics of overfished species initial allocation to permits by initial allocation formula.

Initial Allocation Formula	Overfished Species	Initial Allocation to Permits		
		Maximum	Median	Minimum
Bycatch rate (pro rata for whiting) plus equal sharing of BB History	Bocaccio	10.88%	0.10%	0.10%
	Canary	1.91%	0.37%	0.18%
	Cowcod	8.11%	0.30%	0.30%
	Darkblotched	1.13%	0.46%	0.26%
	POP	1.81%	0.39%	0.23%
	Widow	1.58%	0.39%	0.17%
	Yelloweye	3.25%	0.40%	0.18%
Bycatch rate (pro rata for whiting) only	Bocaccio	13.22%	0.00%	0.00%
	Canary	3.17%	0.30%	0.01%
	Cowcod	17.71%	0.00%	0.00%
	Darkblotched	1.71%	0.40%	0.00%
	POP	2.80%	0.28%	0.00%
	Widow	1.86%	0.36%	0.02%
	Yelloweye	4.67%	0.33%	0.00%
Landings history plus equal sharing of BB history	Bocaccio	11.15%	0.10%	0.10%
	Canary	2.97%	0.33%	0.17%
	Cowcod	40.00%	0.30%	0.30%
	Darkblotched	3.77%	0.38%	0.26%
	POP	2.47%	0.29%	0.23%
	Widow	3.35%	0.23%	0.15%
	Yelloweye	5.42%	0.29%	0.18%
Landings history only	Bocaccio	13.55%	0.00%	0.00%
	Canary	3.28%	0.28%	0.00%
	Cowcod	90.00%	0.00%	0.00%
	Darkblotched	6.83%	0.23%	0.00%
	POP	4.13%	0.10%	0.00%
	Widow	5.03%	0.13%	0.00%
	Yelloweye	7.99%	0.17%	0.00%

Safety

Qualitative information has shown that safety onboard fishing vessels is generally improved as a result of rationalization. Typically this has been the result of an elimination of Olympic-style characteristics in fisheries; vessels no longer have to fish in hazardous weather conditions as often after the fishery is rationalized. Other reasons for changes in safety include the capability of vessel owners to adequately maintain vessels and safety equipment. This maintenance is directly associated with the amount of net revenue generated by fishery participants, and therefore, a fishery that experiences an increase in net revenue will likely experience a decrease in safety-related incidents. Since rationalization is generally expected to result in an elimination of the race for fish and an increase in net revenue across catcher vessels, it is expected that safety will be enhanced by rationalization of the west coast trawl fishery.

These expectations are supported to some degree by data on fishing-related safety incidents reported by NIOSH. Based on data on the west coast trawl fishery reported from 2000 to 2008, several incidents (both fatal and nonfatal) appear to have occurred due to weather or appear to have occurred as a result of some failure of structural integrity of the vessel. Furthermore, some incidents involved vessels with

wood hulls, or vessels that were older than 100 years. It is reasonable to expect that some of the weather-related events may have been avoided; it is also reasonable to expect that events involving structural integrity may be avoided if harvesters are generating additional income and using that income to improve maintenance. Furthermore, if harvesters are generating higher levels of income, they may be inclined to purchase vessels made of more rigorous material than wood (such as steel) and to fish on vessels that are relatively new. These factors should tend to improve safety conditions.

4.6.3 Direct and Indirect Effects of the Alternatives on Limited Entry Trawl Harvesters

In addition to the general effects described above, each of the alternatives is expected to impact catcher vessels and permit owners in different ways. The alternatives result in different impacts because of variations in the elements of those alternatives. This section analyzes the direct and indirect impacts of the alternatives on groundfish trawl harvesters.

In this section, we begin by describing the manner in which each of the elements of the alternatives is expected to impact catcher vessels and permit owners. This description of expected effects serves as an overview and introduction to the way the elements of the alternatives will impact this particular environmental component. Immediately following the overview of how the elements of the alternatives impact groundfish trawl harvesters is a description of the impacts of each alternative. Where appropriate, these impacts are compared to Alternative 1 conditions and to the other alternatives. Following the description of impacts of each alternative is a comparative summary of the effects of each of the alternatives.

4.6.3.1 Expected Effects of Elements of the Alternatives on Limited Entry Trawl Harvesters

The effect of the alternatives on LE trawl harvesters is evaluated in two ways. First, we evaluate the specific elements, or program features, that are varied across the alternatives (these are the rows in Table 4-2 describing the alternatives). Second, the entirety of each alternative is evaluated for its effects.

How do IFQs and co-ops change things relative to Alternative 1 for groundfish trawl harvesters?

Changing the primary catch control tool in the fishery to total catch IFQs and/or harvest co-ops is expected to impact groundfish trawl harvesters in a variety of ways. In general, shifting to IFQ and harvest co-ops will allow harvesters to optimize the timing of their fishing practices to maximize net revenues. In addition, IFQs and/or harvest co-ops will tend to eliminate the Olympic characteristics of the whiting fishery and to facilitate the development of strategies that increase product quality and yield. Knowledge transfer between fishermen will tend to be greater than under Alternative 1 when the catch control tool is changed because they are no longer competing to catch the largest possible share of the OY. However, knowledge transfer and communication are likely to be different in IFQ programs than in co-op programs. This is because harvesters in a co-op (be it a voluntary or mandatory cooperative) have more incentive to act collectively, which requires communication and information-sharing for collective success. This may influence the degree of success fishermen have in dealing with collective action problems such as bycatch avoidance and successfully targeting of desired species (Pacific whiting).

The individual accountability for total catch associated with IFQs and co-ops increases the financial risks that individual harvesters face when prosecuting fishing activity. This is particularly the case for vessels that may encounter species with low OYs and/or low trawl allocations. While theory suggests that fishermen will simply avoid stocks for which they do not have quota, fishing is inherently an

inexact method of extracting resources. This uncertainty means that there is a potential for harvesters to catch species that they may not intend to harvest, or may, in fact, be trying to avoid. If harvesters accidentally incur a catch deficit by exceeding their holdings of QPs, they will need to cover that deficit by purchasing additional quota. For species with low OYs (ACLs) and/or low trawl allocations, this quota may come at prices that are extremely expensive. This possibility creates a large risk to individual harvesters who are participating in an IFQ program. This risk does not necessarily exist to the same degree in a co-op system. In a co-op system, the risk of an unforeseen or unexpected catch event is spread across the co-op participants who collectively absorb that event.

IFQ may create more individual accountability than co-ops in some cases. This is partly because of the implications described above from encountering low OY species, or species with low trawl allocations. The fact that co-op members must internalize the unforeseen or unexpected actions of other co-op members tends to reduce the penalty individual harvesters must internalize from an unexpected catch event to some degree. This difference in individual accountability between the two systems is not likely to affect the outcome of the program if it is minor, but if the degree of individual accountability becomes too low, a race for fish could ensue across all harvesters in a sector because of fear of preemption over bycatch. Alternatively, if the risk associated with the harvest of some species in an IFQ program is too great, harvesters may forego the catch of some target species to avoid risk.

The imposition of IFQs and/or harvest co-ops as a catch control tool is likely to induce behavioral changes that influence the magnitude and type of species harvested in the fishery relative to Alternative 1. This is because of the perceived reward in the form of increased catch of target species associated with reductions in the catch rate of constraining overfished species.

Finally, as harvesters transition from Alternative 1 conditions to a system of IFQs or harvest cooperatives, there is likely to be an adjustment period. Research has indicated that participants have difficulty understanding and setting appropriate prices during the initial period of a new market system. This can have different effects on individuals as some pay prices that are too high or sell at prices that are too low. In subsequent periods, those who sold at inappropriate prices may try to compensate, negatively affecting the ability of the market to reach equilibrium (Anderson 2004).

How does initial allocation affect groundfish trawl harvesters?

The initial allocation of IFQ and catch history (a term used to describe harvest privileges in a cooperative system) will affect individuals differently. Under some situations, it may affect overall performance. The distribution of harvest privileges may change the fishing opportunities of several vessels when compared to Alternative 1 and some vessels may find themselves better off while others may find themselves worse off. This distributional effect may be seen as being more or less equitable by some stakeholders.

One factor that can be influenced by initial allocation is the ability of harvesters to form voluntary associations to manage risk. Some interested parties have used the term “risk pools” to describe these arrangements. If the initial allocation of groundfish—particularly constraining stocks—is done in a manner where relatively small numbers of entities receive a relatively large amount of constraining species quota, harvesters may have difficulty forming and maintaining voluntary risk pools because those with relatively large amounts of constraining species quota will have an advantage in negotiation.

How will accumulation limits affect groundfish trawl harvesters?

Accumulation limits affect how IFQ will be distributed and also affect the economic performance of individual catcher vessels and the trawl fleet as a whole. The presence of an accumulation limit would

tend to increase the number of vessels in the fishery and spread the amount of fishing activity across a wider number of entities. This, in turn, would tend to lower economic efficiency for the average vessel compared to a case where there is no accumulation limit because it would restrict consolidation. Higher degrees of consolidation would tend to restructure the fleet toward the most economically efficient vessels and increase fleet-wide economic efficiency. Other aspects of accumulation limits are discussed in more detail in Appendix A.

How will a grandfather clause or a divestiture provision affect groundfish trawl harvesters?

The inclusion of the grandfather clause would allow entities to hold quota in excess of an accumulation limit. The presence of a grandfather clause would tend to make it more likely that large producing entities would be able to maintain that relatively large degree of production, whereas the absence of a grandfather clause may eliminate, or make it more difficult, for certain entities to maintain historic levels of production and participation. A grandfather clause may also influence the negotiations that occur between harvesters and processors over ex-vessel prices. In the alternatives that include a grandfather clause, large producers that receive Qs in excess of accumulation limits would be in a stronger position during such negotiations in comparison to alternatives without this feature.

A grandfather clause also affects the ability for harvesters to form “risk pools,” or voluntary arrangements to manage constraining species. Voluntary sharing arrangements rely on there being a relative balance in negotiation power. A grandfather clause would tend to allow some entities to receive substantially greater amounts of quota than other entities. This relative imbalance—particularly in the case of constraining stocks—limits the ability of harvesters to form stable and long-term risk pools since some entities will have more bargaining power than others as a result of a grandfather clause applied to constraining species. Not having a grandfather clause for constraining species would make it easier to form risk pools.

A divestiture provision acts similarly to a grandfather clause in some respects and differently in others. During the period when the entity is able to hold quota in excess of limits, the divestiture provision may act similarly. However, a divestiture provision requires that the entity transfer quota by a date certain so that he/she is within the established accumulation limits. During that transfer period, the entity is likely to transfer that overage quota in a manner that is beneficial to him or her. This may mean simply selling to the highest bidder and capturing the rent associated with fishing that quota, or transferring that quota to someone with whom that original entity may have relations. This is different than a case where no grandfather clause or no divestiture provision is allowed. Under this latter case, overage quota would be automatically redistributed to QS holders on a pro rata basis, leaving no opportunity for the entity potentially over the accumulation limit to have input on where that quota goes and leaving no opportunity for that original entity to capture any of the rent associated with that overage quota.

How do processor allocations/ties affect groundfish trawl harvesters?

An initial allocation of IFQ to processors and/or processor linkages in a co-op program will tend to influence the negotiating power harvesters have over ex-vessel prices. An initial allocation of IFQ to processors may impact the harvest quantities available to various vessels, while a processor linkage will arguably not influence the harvest quantities available to vessels. If no IFQ is allocated to processors, it is expected that harvesters will have more negotiating power over ex-vessel prices compared to Alternative 1. This is because it is expected that they can hold out longer in negotiations with processors without losing fishing opportunity. If IFQ is allocated to processors, it is expected that harvesters will not have the same degree of negotiation power because processors will be able to fish their own IFQ while negotiating with harvesters. In addition, if IFQ is allocated to processors, the amount of quota available to harvesters is likely to differ from a case where the quota is allocated to

permits. If IFQ is allocated to processors, those processors may elect to have vessels that otherwise do not hold IFQ fish to their quota.

Alternatives with a processor linkage in a co-op program are expected to affect harvesters somewhat differently than alternatives where IFQ is allocated to processors. A harvester-processor linkage creates a condition where ex-vessel price negotiations are based more on personal relationships than market conditions. Therefore, the effect on ex-vessel prices cannot be predicted. However, establishing a processor linkage does not change the distribution of harvest opportunities for vessels like an initial allocation of IFQ to processors might do. This is because catch opportunity is tied to a single vessel, and processors do not have control over the quantity of fish available to harvesters.

How will the species covered through the program affect groundfish trawl harvesters?

Both the number and kinds of species covered in an IFQ or co-op program will affect harvesters. If a larger number of species are covered by IFQs or co-op allocations, individual vessels will tend to face more constraints on their harvesting opportunities. Alternatively, if fewer species are covered in the program, harvesters are less constrained and have more flexibility in prosecuting fishing activity. In the extreme case, however, enough species without coverage may tend to erode the effects of rationalization. In addition to the number of species, the type of species can have a large impact on harvesters. If the species covered in the program have a relatively large trawl allocation and a large amount of QPs are available on the market, trawl harvesters may find it relatively easy and cost-effective to use the marketplace to transfer quota and balance catch accounts. The smaller the trawl allocation, the more problematic it will be, at some level, for harvesters because the purchase of quota may prove costly. Below that level, the markets may begin to lack thickness, or the presence of enough transactions that a clear price signal will develop. Under this situation, empirical evidence has shown that prices become highly variable and that individuals begin to engage in strategic games. This reduces the efficiency and effectiveness of the market. In addition, if one must cover a catch deficit by purchasing quota for species with extremely low trawl allocations, that quota may be unavailable, meaning the harvester would not be able to cover the deficit.

Finally, for some species, it is necessary to consider the potential magnitude of a disaster tow relative to the trawl sector allocation. If the potential magnitude of a disaster tow is large enough relative to the trawl sector allocation (and the conditions described above pertain, making it difficult to purchase quota), then it would be reasonable to expect a gradual creeping of harvest activity toward earlier months of the year and harvest activity that begins to appear like an Olympic fishery. This would take place if a disaster tow occurs that causes the trawl sector to reach or exceed its allocation, and NMFS closes all or portions of the fishery upon attainment of that allocation. This event would essentially mean that harvesters risk being preempted by other harvesters. The potential of this occurring provides an incentive for harvesters to hedge against the possibility of their fishing opportunity being preempted by someone else by fishing earlier in the year. If this behavior is evidenced in enough harvesters over time, the fishery may begin taking on the appearance of an Olympic fishery.

How does the number of trawl sectors influence harvesters?

Since either three or four trawl sectors (two for at-sea whiting and either a single shoreside sector or two shoreside sectors) are being considered for the allocation of harvest privileges, this section compares the effects of having a single shoreside sector or two separate sectors for shoreside whiting and nonwhiting. It has been hypothesized that if one sector of the fishery has more financial capability of purchasing quota than another sector, then establishing a single shoreside sector may tend to result in a flow of quota from one group of harvesters to another. If overfished species IFQ flows from one sector to another (because one sector has greater purchasing power), the sector that loses the overfished species

IFQ may see its ability to access target species reduced (because of the constraining nature of overfished stocks). Alternatively, if there are four sectors, the separation would tend to preserve the amount of species available to each sector. This argument is theoretical. Available information suggests that both shoreside sectors will see profits improve under a well designed rationalization program. Harvesters in the nonwhiting portion of the fishery should see profits improve substantially, putting them on a more level field with shoreside whiting harvesters. This means that it appears unlikely that one portion of the shoreside fishery will outbid another portion of the shoreside fishery simply because one is more profitable than the other. However, having a single shoreside sector will tend to make it easier for trades to occur across the two existing shoreside sectors (which would be merged under a single sector option), meaning that species will tend to be traded according to their most optimally economic use between those sectors.

The number of trawl sectors established will likely influence the flexibility that harvesters have in either sector. By creating three trawl sectors and bundling both shoreside sectors into a common allocation, the trading of quota can occur between both sectors in a manner that creates flexibility in harvesting activity because of the ability to acquire and sell quota as needed. The establishment of four trawl sectors imposes risks on harvesters because it reduces the amount of QPs available to each sector and creates a firm set of allocations that could cause a sector to close if one or more of those allocations were met. For example, if the incidental catch of Pacific whiting in the nonwhiting sector is higher than anticipated, nonwhiting harvesters could end up being constrained by Pacific whiting and would not be able to purchase whiting quota from shoreside whiting harvesters to alleviate some of that constraint. This division of quota between the shoreside sectors could restrict the ability of nonwhiting harvesters to prosecute fishing activity if some species become unexpectedly constraining, because it establishes boundaries and restrictions on fishing activity without a mechanism for harvesters to work around those restrictions. Alternatively, the establishment of four trawl sectors implies that a set-aside or allocation of non target species will be necessary for the whiting fishery. Such a set-aside may be a target species for the nonwhiting fishery. Setting firm allocations may mean a loss of economic opportunity in years where the whiting fishery does not need that entire set-aside, thus jeopardizing the ability of the trawl sectors to achieve their allocation.

Sablefish is one example of a species where catch in the whiting fishery has varied from year to year and for which allocations necessary to establish four sectors may result in lost potential or produce a constraining species. In years where the catch of sablefish is low in the whiting fishery, that catch will reflect a lost economic opportunity to nonwhiting harvesters if that quota cannot be transferred to them. Figure 4-17 shows sablefish catch in the whiting fishery over the past several years. This figure shows that the catch of sablefish has varied substantially. The largest source of variation is in the shoreside whiting fishery. In years where sablefish bycatch is low, the inability to transfer that catch to the nonwhiting sector (because of the establishment of four trawl sectors) represents a lost opportunity.

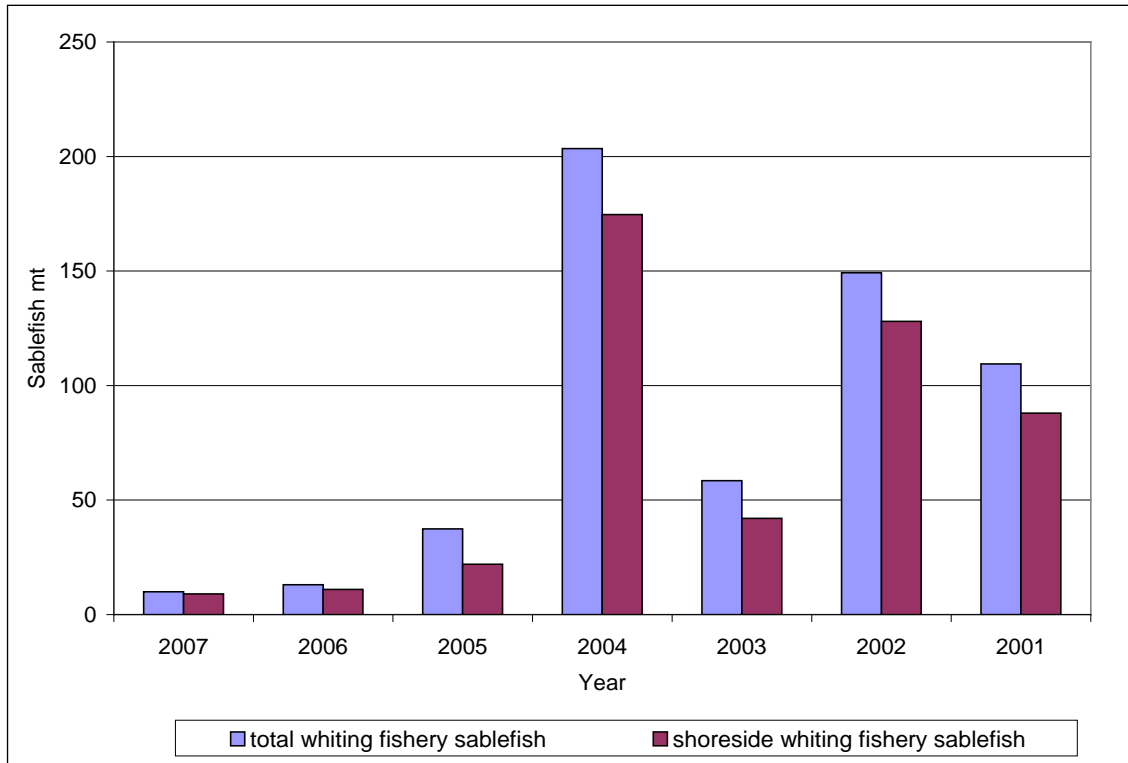


Figure 4-17. Bycatch of sablefish in the Pacific whiting fishery (2001-07).

How will an adaptive management provision affect harvesters?

An adaptive management provision will have a distributional effect on harvesters. If the Council chooses to implement an adaptive management provision that uses 10 percent of the available quota for various objectives, then some vessels may receive portions of this quota while others may not. Compared to Alternative 1 it is difficult to predict whether harvesters will gain or lose, but compared to a rationalization program without an adaptive management provision, some vessels may gain and others may lose because of the distributional effect of the provision. There is some possibility that an adaptive management provision will have an effect on ex-vessel prices since an adaptive management provision will work against a market-driven outcome, potentially leading to a downward effect on overall profitability.

When considering the use of an adaptive management provision to assist new entrants (which is one goal for the AMP), such new entrants may be simply considered as those harvesters who are not initial recipients of Qs. Published research has suggested that it is very difficult for harvesters who are not initial recipients of Qs to become independent owner operators as initial recipients of QS trade among themselves at prices that are relatively high. Those market prices for quota are bid to high levels because initial recipients of Qs have already covered their costs and generated profit from their “gifted” quota and can afford to make small margins on subsequent purchases of quota (Pinkerton and Edwards 2009). Directing AMP QPs to those harvesters who may not be initial recipients of quota at no, or a low, cost can help those harvesters bridge a profitability gap and allow them to save enough money over time that they can eventually purchase their own Qs.

How will a carry-over provision affect harvesters?

A carry-over provision will tend to influence the time horizon for managing individual IFQs. Harvesters are required to stop fishing for the remainder of the year if they are in a deficit (catch exceeds the QPs they possess); a carry-over allowance reduces the risk of going into a deficit because it allows harvesters to avoid penalties associated with a deficit condition.

How will tracking and monitoring affect harvesters?

The type of tracking and monitoring program will primarily influence cost from a harvester's perspective. This is because harvesters may be required to pay for some of the cost of carrying an observer. Monitoring may also affect the quota trading system as a whole if the quality of catch data collected is inadequate or imposes different standards on different harvesters. Catch data of insufficient quality may create conditions where it is possible for harvesters to cheat and discard catch, for example, while catch monitoring not applied in a uniform fashion across harvesters may put some at a relative advantage/disadvantage, thus affecting the ability of those harvesters to trade between one another.

4.6.3.2 Alternative 1 (No Action)

The effect of the Alternative 1 on harvesters is largely expected to mean the continuation of the status described in Chapter 3. To a large degree, harvesters are expected to be constrained in their opportunities because of measures designed to protect depleted species. While these depleted species are expected to rebuild with time, the rebuilding plans of some species state that they will not rebuild for several decades, meaning that restrictive fishing opportunities are likely to persist over the long term.

The effect of Alternative 1 on vessel profits and fleet efficiency

Under the Alternative 1, economic profits are estimated to be zero for average nonwhiting trawl vessels. Based on the results from Lian et al. (2008), the average nonwhiting trawler is able to cover costs and make wages, but nothing more. Since this is an average estimate across the fleet, some vessel owners do worse and would be better off not fishing, while other vessel owners do manage to make some profits. Under the Alternative 1, it is expected that the general state of the industry would persist, largely because the management regime is not expected to appreciably change, especially in the short term. Management under Alternative 1 prevents much fleet consolidation and provides fishing opportunities that are heavily restricted by measures designed to foster the rebuilding of depleted species. It is expected that these restrictive measures would remain in place, at least in the short term, while depleted stocks rebuild. Over the longer term, and as several rockfish stocks become rebuilt (widow and darkblotched for example), management may change, and some additional opportunities may be developed which could lead to profit generation by harvesters. For a variety of reasons, which include the fact that other depleted species may continue to dominate fishing opportunities, it is not clear how vessel profits will fare over the longer term because it is not known how management will respond as stocks become rebuilt. As stocks become rebuilt, it is possible that access to them may continue to be restricted by other depleted species, meaning that, because of the multi-species nature of the fishery, several stocks may have to be rebuilt before fishing opportunities can be liberalized.

Vessels operating in the whiting fishery are generally expected to fare better than vessels in the nonwhiting fishery. While estimates of profitability in whiting operations are not available, it is generally expected that the recently improved market conditions for whiting will be more typical in the future. Because of increased population growth, increased purchasing power from developing countries, and a depressed status of white fish resources in other parts of the world, the price received for whiting is expected to remain high relative to historic levels. When combined with the LE program

implemented as part of Amendment 15, which restricts access to sectors of the whiting fishery, the average whiting vessel is expected to be somewhat better off under Alternative 1 conditions than the average nonwhiting vessel. However, due to the Olympic structure of the fishery, large inefficiencies are expected to remain, including overcapitalization and race-for-fish behavior. These factors will lead to inefficient costs of harvesting and lower revenues than would otherwise exist under a different, more rationalized, regime. In addition, the Olympic structure of the fishery discourages fishing later in the year when it has been demonstrated that whiting are more valuable (Larkin and Sylvia 1999), and this means the amount of revenue generated by fishing activity is less than what could be the case.

Fishing vessel safety

Fishing vessel safety under Alternative 1 is expected to remain relatively unchanged. Nonwhiting trawlers are expected to have some flexibility in deciding when to fish because of the two-month limit structure of the fishery, and this is expected to result in less pressure to fish during periods of unfavorable weather. However, because of the lack of profits generated in the fishery, reinvestment into capital and maintenance that may help with safety conditions is not expected to be as great as in a case where larger profits were being generated. In the case of whiting harvesters, Alternative 1 conditions provide a large incentive to engage in race-for-fish behavior that often leads to fishing activities during periods of unfavorable weather. Because vessels in the whiting fishery tend to be better off and participate in other, profitable fisheries, (e.g., Alaska pollock), however, the condition of whiting vessels is generally expected to be better maintained than vessels in the nonwhiting sector.

4.6.3.3 Alternative 2a

The Effect of Alternative 2a on vessel profits and fleet efficiency

Alternative 2a is expected to result in larger vessel profits than other alternatives because of a decrease or elimination of regulatory discard, due to an increase in the catch of target species in the nonwhiting fishery, increased flexibility in harvest timing, and cost efficiencies created by fleet consolidation. Such changes are expected in both nonwhiting and whiting fisheries, with the nonwhiting fishery experiencing more cost efficiency gains than the whiting fishery. These expectations are tempered by risks posed to harvesters because of the low trawl allocations expected to be made for some species and the number of those species that are managed with individual quota under this alternative. In this respect, Alternative 2a results in the highest degree of risk across the largest number of harvesting entities of all alternatives.

Nonwhiting trawl fishery

Figure 4-7 shows that ex-vessel revenue in the nonwhiting fishery may increase to \$32 million to \$40 million compared to Alternative 1 ex-vessel revenues of \$22 million to \$23 million. Regulatory discards are decreased or eliminated in this alternative because the IFQ is defined as a total catch tool.⁹⁴ Vessels fishing under a total catch program will tend to retain more of their catch because catch is debited from their quota account regardless whether they retain that catch or not. If catch is discarded under a total catch program, that discard has a cost because it is a lost opportunity. This reduction in discard is expected to increase ex-vessel revenues to the fleet by \$2 million to \$3 million annually. Target species catch is increased in the nonwhiting fishery under this alternative because there is a reward associated with avoiding overfished stocks that comes in the form of increased harvests of

⁹⁴ Pacific halibut is covered by IBQ in this alternative. However, trawl gear is not a legal gear for Pacific halibut, and, therefore, regulations will likely still require discard of this species if caught with trawl gear.

currently under-utilized target species. The reader is referred to the description of the bycatch reduction analysis in Appendix C for more detail on these effects.

Fleet consolidation in the nonwhiting sector is expected to be substantial under Alternative 2a. Analysis indicates that the fleet may be expected to consolidate to between 40 and 60 vessels in the nonwhiting fishery. Accumulation limits under this alternative do not appear to restrict such consolidation, and, therefore, the full effect of potential cost efficiency should be realized under this alternative.⁹⁵ When combined with potential increase in ex-vessel revenues, profits under this alternative may be on the order of \$12 million to \$20 million (or average vessel-level profits of \$300,000 \$330,000 annually), compared to Alternative 1 fleetwide revenues of zero to \$2 million in losses annually. The reader is referred to Appendix C for more detail on fleet consolidation.

The ex-vessel price received by nonwhiting trawl harvesters is likely to be higher in this alternative compared to all other alternatives, and higher prices will mean that the actual levels of ex-vessel revenue will be higher than the predicted levels shown above. The reason for these higher prices is that the initial allocation of IFQ is made exclusively to LE trawl permits, and this enhances harvester's negotiation power relative to Alternative 1. This enhanced negotiation power is likely to exist in the short term and possibly over the long term. While theory would suggest that quota could be purchased by processors over the long term (thus increasing processor's negotiation power and resulting in some decrease in ex-vessel price), the accumulation limits included in this alternative will limit the ability of processors to purchase substantial quantities of quota. Accumulation limits tend to work in the harvesters' favor over the long term because scale economies tend to lead to the creation of fewer processors than harvesters. The accumulation limits in this case would lead to a maximum of 3 percent being controlled by any single entity, and this is substantially less than the quantity of groundfish currently handled by several processors of trawl groundfish on the west coast. This means that the accumulation limits act as a de facto limit on the amount of quota that could be purchased by processors of trawl groundfish and insure that Qs remain—to a large degree—in the hands of harvesters, or other relatively small entities.

⁹⁵ This statement assumes the vessel length endorsement is eliminated.

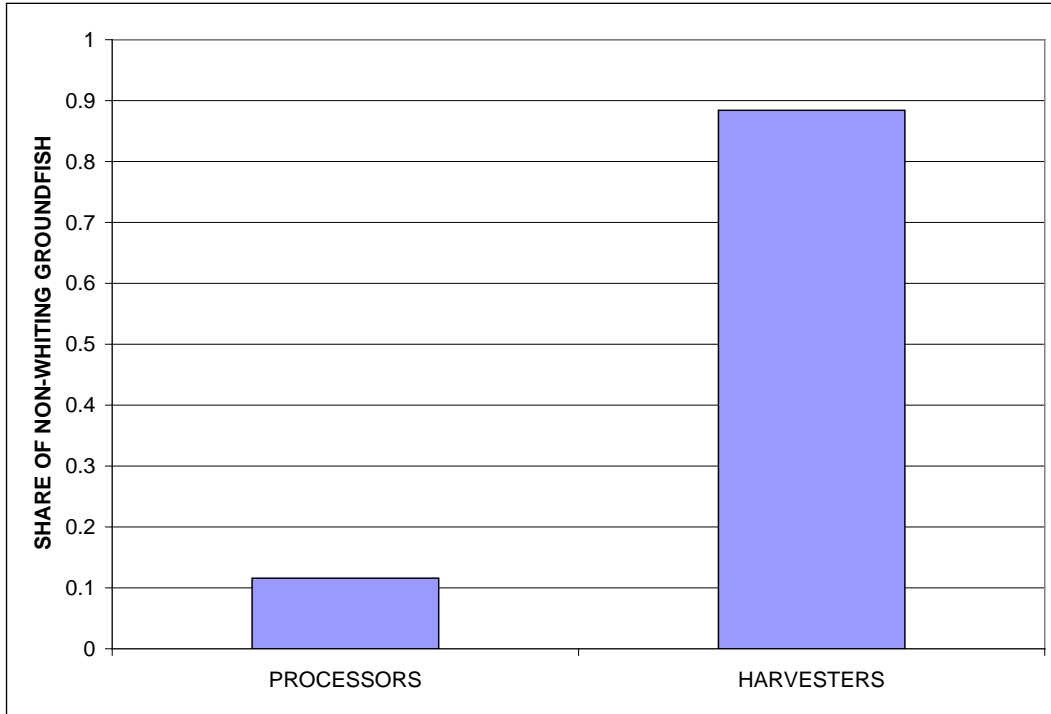


Figure 4-18. Share of nonwhiting groundfish allocated to harvesters and processors in Alternative 2a.

Pacific whiting trawl fishery

Ex-vessel revenues are not expected to change substantially in the whiting sectors relative to Alternative 1, but profits are expected to improve. Benefits from rationalization may be realized by whiting catcher vessels because of increased operational flexibility, enhanced ability for business planning, and fleet consolidation. Operational flexibility allows entities to minimize costs, maximize gross revenue potential, or take advantage of favorable market conditions, thereby increasing profits. Increases in product quality and product recovery may occur to some degree in the whiting sector, and these improvements may trickle down to harvesters in the form of higher ex-vessel prices. A quantitative prediction of changes in ex-vessel prices as a result of these effects cannot be made. However, qualitative information suggests that these effects should be minor in the mothership sector. This is because processing capital is being used in the at-sea fishery that is already more efficient as a result of the American Fisheries Act, which rationalized the Bering Sea pollock fishery. These improvements led to processing capital with higher recovery rates than prior to enactment of the AFA, and that same capital is being used off the west coast to process Pacific whiting. Therefore, changes in product recovery should be minor. Any changes in product quality and recovery that occur should come about as a result of an increase in operational flexibility, which allows harvesters to change strategies to capitalize on more favorable conditions.

Fleet consolidation in the mothership segment of the whiting sector should be minor relative to the nonwhiting sector. Since harvesting opportunities in the mothership sector are bounded by opportunities in the shoreside whiting sector (some mothership vessels also participate in the shoreside fishery) and on opportunities in the Alaska pollock fishery, the degree to which harvest timing can change is limited, and this restricts consolidation to some degree. It is expected that the mothership sector will continue to operate prior to the start of the shoreside sector. An increase in fishing effort may also occur during the fall months to take advantage of more favorable market conditions.

However, a substantial change in the harvest timing is not very likely because of the timing of the shoreside whiting fishery, the Alaska pollock fishery, and the availability of the Pacific whiting resource. Without a substantial increase in season length, it is unlikely that there will be substantial fleet consolidation because doing so would mean foregoing harvest quantities.

In the shoreside portion of the whiting fishery, it may be reasonable to assume fleet consolidation that is greater than the mothership sector, but not as great as the nonwhiting portion of the fishery. More consolidation is expected because the number of vessels in the fishery has increased over the past several years without much change in the Pacific whiting OY. Therefore, it is reasonable to expect that fewer vessels could participate in the fishery while still taking the harvestable surplus; however, how much consolidation will actually occur is limited by fishing season length and seasonal distribution of the stock. While the Pacific whiting stock migrates north throughout the course of a year, it is unlikely that shoreside whiting processors will establish themselves further north than the southern Washington coast to take advantage of this northern migration. This is because several coastal Washington ports (such as Neah Bay) have limited access to fresh water (which is necessary for processing). Infrastructure is also limited in many of these ports and may not be sufficient to support a processor large enough to handle Pacific whiting deliveries. As discussed above, the shoreside whiting sector's season may be limited by the depth-based migration of the stock, which can make the fish inaccessible to these vessels by October (and possibly earlier). Thus, both geographic and depth migration factors may limit the shore-based sector's season.

The length of harvesting activity in the mothership and shore-based whiting sectors is expected to get somewhat longer as those sectors switch to a rationalized fishery. This is due to elimination of competition for the resource because of increased flexibility in harvest timing and changes in quality attributes (such as fish size and flesh color) that improve the value of Pacific whiting later in the year. This change in the pace of harvesting will tend to increase product quality, and this should tend to increase the price that vessels receive for their catch.

The negotiation power that Pacific whiting harvesters have over ex-vessel prices is higher in this alternative relative to the other alternatives, including Alternative 1. Under Alternative 2a, holders of LE trawl permits receive the entire initial allocation of quota, and this is expected to increase the negotiation power of harvesters. Over the long term, however, processors may be able to acquire enough Pacific whiting quota to influence ex-vessel prices. The control limits specified in this alternative for Pacific whiting could allow four business entities to control the harvest of shoreside whiting and four business entities to control the harvest of mothership whiting. Since there are currently more than four processing entities, this alternative could allow processors to have control over all of the whiting IFQ over the long term, and, therefore, ex-vessel prices may only be higher in the short-term.

Under the initial allocation scheme included in this alternative, some processing entities will receive an initial allocation of quota because they own LE trawl permits (see Figure 4-19).

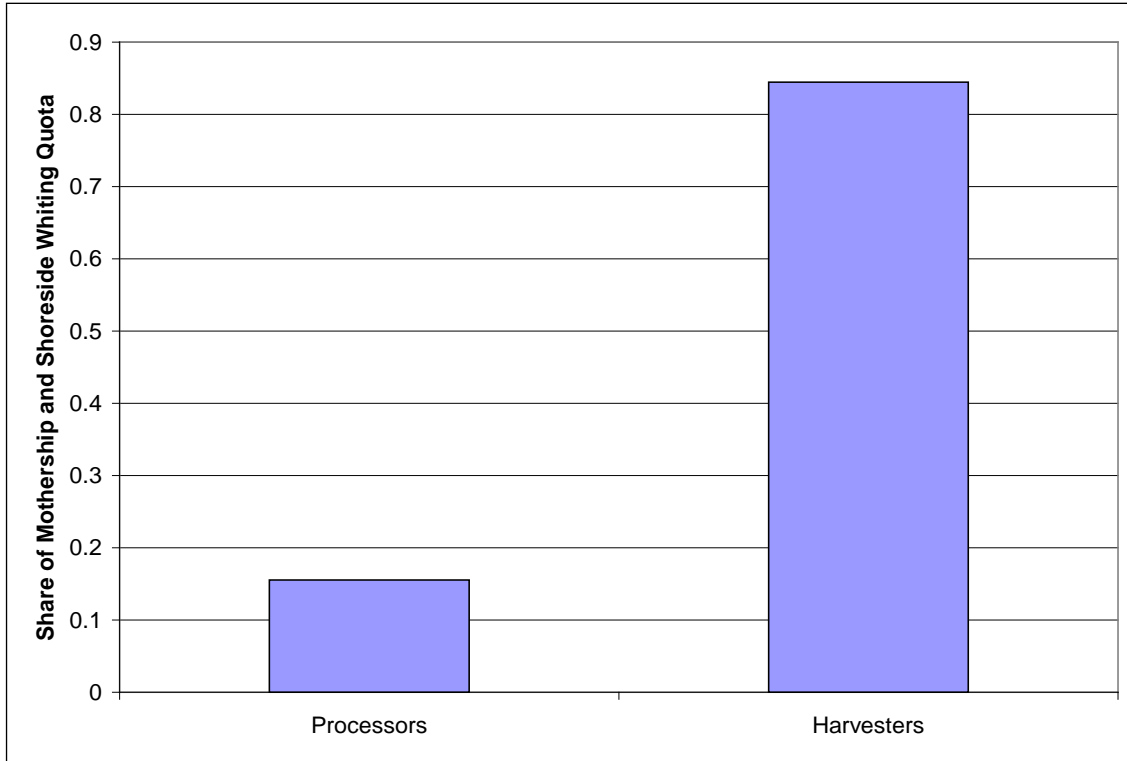


Figure 4-19. Share of mothership and shoreside Pacific whiting allocated to harvesters and processors in Alternative 2a.

Additional factors influencing the profits of nonwhiting and whiting harvesters

Another way this alternative affects profitability, which was not addressed previously, is the costs that harvesters must bear in administering the trading and transfers of Qs and QPs. This cost is a result of the number of species covered in the program and the complexity that is created by the trading and tracking of several species of groundfish. This alternative has the largest number of vessel-species combinations in the quota trading and catch tracking aspect of the programs being considered. This number of vessel-species combinations is likely to translate into a high relative cost that harvesters bear in conducting such activities.

The establishment of three trawl sectors for the purpose of trading quota may have an effect on costs as well. Establishing a larger, common pool of quota available to both the shoreside whiting and nonwhiting sectors may make it easier for vessels in each sector to find quota on the market to trade.

Table 4-23. Summary of the effect of Alternative 2a on profits and fleet efficiency.

Nonwhiting Catcher Vessels	Fleetwide profit expected to increase by \$12-\$22 million as a result of increased catch and fleet consolidation. Ex-vessel prices should increase profit to higher than indicated numbers as a result of negotiation power and because of gear switching. Accumulation limits do not appear to restrict consolidation.
Shoreside Whiting Catcher Vessels	Some fleet consolidation expected. Minor changes in ex-vessel revenue may be expected as a result of improved product quality. Ex-vessel prices are expected to increase in the short run as a result of increased negotiation power.
Mothership Catcher Vessels	Some fleet consolidation and associated cost savings expected. Minor changes in ex-vessel revenue may be expected as a result of increased product quality. Ex-vessel prices may increase as a result of increased negotiation power.

The distribution of profits under Alternative 2a

The distribution of profits under this alternative is influenced by the initial allocation of Qs and also by the species that are covered by IFQs in the program. The species covered in the program will tend to influence the distribution of revenues, and this may result in a negative impact on some harvesters while positively impacting others. Harvesters who operate in areas where constraining groundfish species are more commonly caught will tend to find it more difficult to access target species relative to harvesters in other areas. This is because the individual accountability of catch will restrict opportunity if a vessel reaches or exceeds the constraining species quota it holds. Vessels operating in areas where there are relatively more constraining species may run out of constraining species quota before accessing all of their target species. This constraint may make it more difficult for some vessels to access target species relative to Alternative 1. Since this alternative does not have elements that would mitigate against these regional effects, they are likely to be the most pronounced under this alternative (and Alternative 2c) compared to others.

Initial allocation under this alternative has a relatively uneven distribution relative to Alternatives 3 and 4a. This means that there is a large difference in the distribution of wealth created by the initial distribution of shares. This initial distribution may influence short-term harvest opportunities and will tend to favor relatively fewer individuals than the other alternative ways of distributing quota.

The accumulation limits specified under this alternative do not appear to restrict vessel consolidation (as illustrated in previous paragraphs under broad-level effects), but one entity may be restricted by the control limits. The grandfather clause allows that entity to exceed the control limit initially, but it cannot acquire additional quota. Several entities receive Qs that are approaching zero, some entities receive Qs that are higher than 3 percent, and the majority of entities receive Qs that are between 0.5 percent and 2 percent of the nonwhiting QS. Figure 4-20 shows that 116 entities would receive an allocation of nonwhiting groundfish under this alternative.

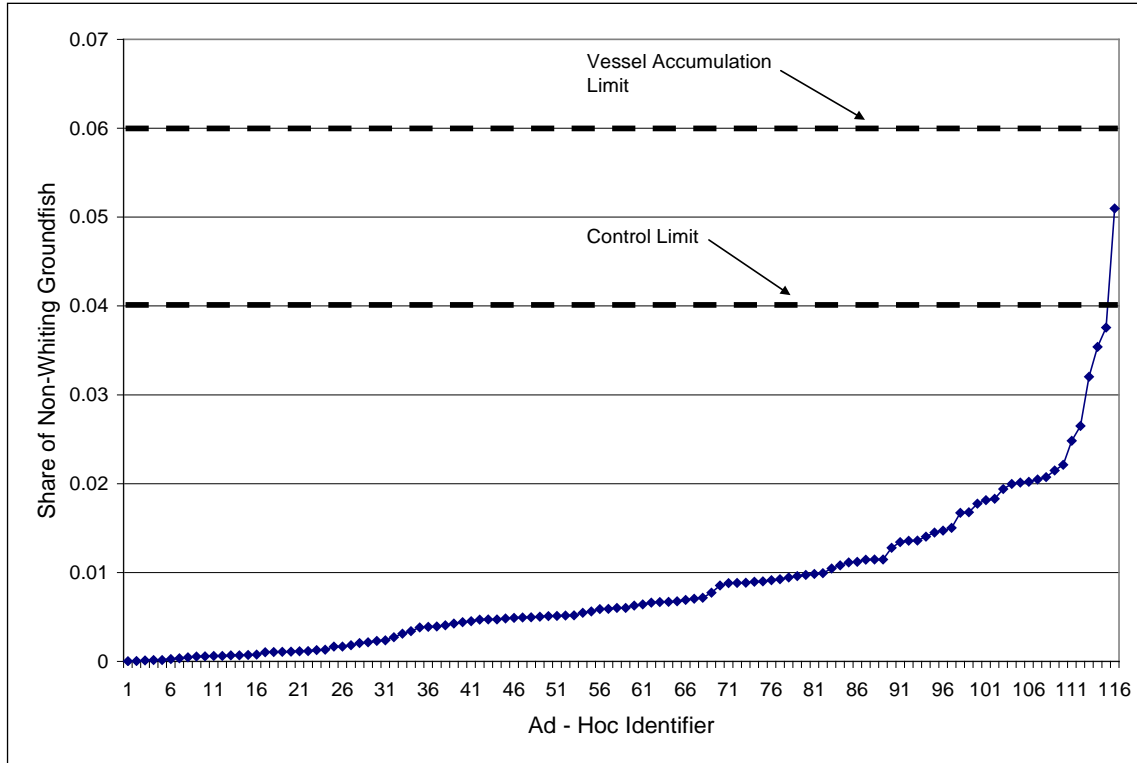


Figure 4-20. Distribution of aggregate nonwhiting QSs and accumulation limits under Alternative 2a (entities with no initial allocation are excluded).

In the whiting fishery, accumulation limits also do not appear to be restrictive. In all three sectors of the whiting fishery, business entities do not appear to be restricted by vessel limits or control limits. Nor would these limits likely restrict holdings by those entities that participate in more than one sector of the whiting fishery. The number of entities receiving an initial allocation of whiting under this alternative is listed in Table 4-24. In addition, 53 entities will receive an initial distribution of whiting from one or more sectors of the whiting fishery (including the catcher-processor sector).

Table 4-24. Total number of QS recipients for each sector.

Quota type	QS Recipients
Nonwhiting	116
Shoreside Whiting	47
Mothership	28
Total (NonCP Sectors)	120

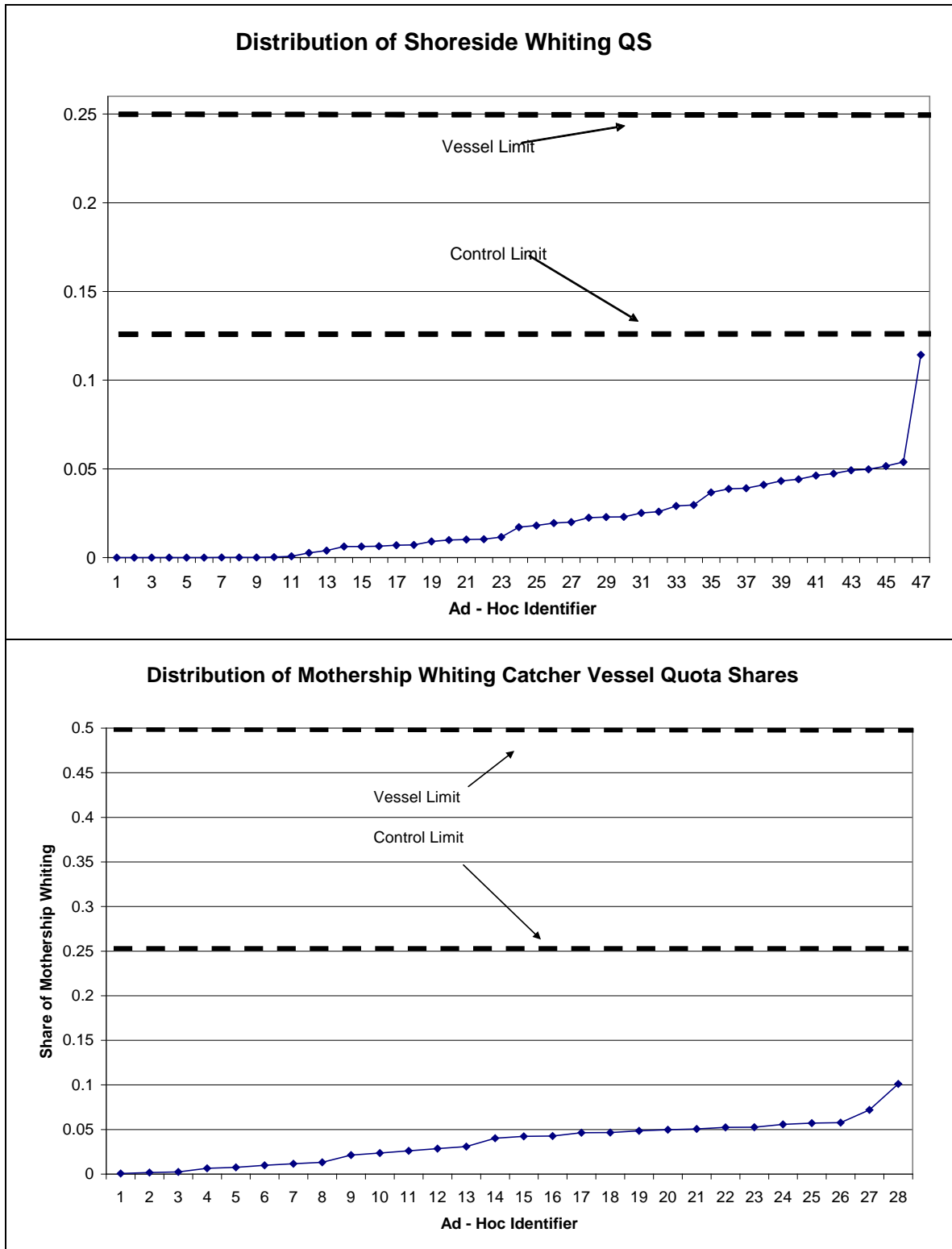
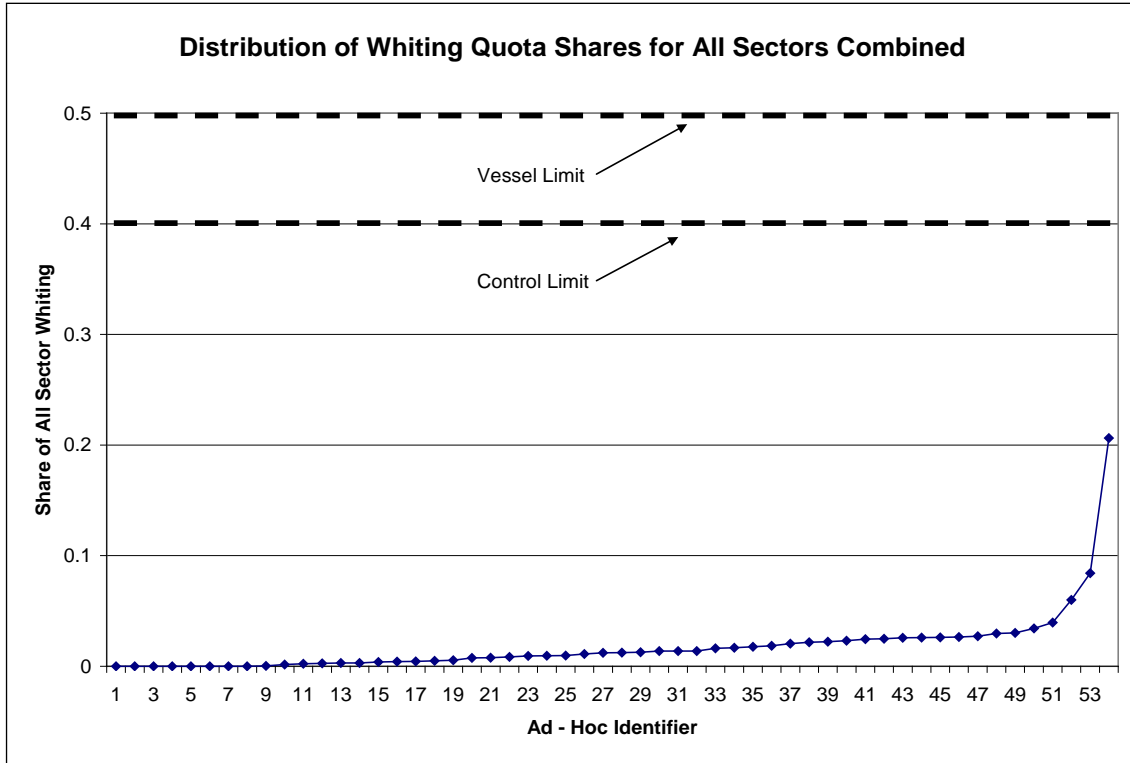


Figure 4-21. Distribution of whiting QSs and accumulation limits under Alternative 2a (entities with no initial allocation are excluded).



(Figure 4-21 cont.)

Under this allocation scheme, many of the eligible recipients will receive no initial allocation of some types of groundfish. This is likely caused by the fact that the history being used is landings history, and it may be reasonable to assume that in many of these instances, vessels actually did catch some of these groundfish, but they were discarded for one reason or another. Since the rationalization program envisioned under this alternative accounts for total catch (landings and discard), those permits that do not receive an initial allocation of some groundfish will almost certainly have to purchase QSs or QPs of these species. This serves as a distributional issue that may be an important consideration since the initial allocation may tend to favor some while disadvantaging others. The information describing this effect is covered in more detail under Appendix A.

Table 4-25. Summary of the effect of Alternative 2a on distribution of profits.

Nonwhiting Catcher Vessels	Harvesters not owned by processing companies will receive nearly 90 percent of the initial allocation of nonwhiting groundfish. Harvesters in high bycatch areas or areas with unfavorable market conditions may be at a relative disadvantage. The high/low relative distribution of nonwhiting QSs is large. Some harvesters will not receive allocations of some groundfish species.
Shoreside Whiting Catcher Vessels	Harvesters not owned by processing companies will receive approximately 85 percent of mothership and shoreside whiting quota. The high/low relative distribution of whiting QSs is small relative to the distribution of nonwhiting QSs.
Mothership Catcher Vessels	Harvesters not owned by processing companies will receive approximately 85 percent of mothership and shoreside whiting. The high/low relative distribution of whiting QSs is small relative to the distribution of nonwhiting QSs.

The risk to profits posed by Alternative 2a

Alternative 2a imposes risks to individual harvesters across the largest number of entities of all alternatives, including Alternative 1. Risks associated with this alternative create a potential for harvesters to generate less profit than expected under a rationalized fishery. In the worst case alternative, these individual risks may result in less aggregate revenue in the fishery than expected. This increase in risk relative to Alternative 1 is due to the presence of thin market conditions for several species, including overfished stocks and various nearshore groundfish species, and individual accountability for species with low trawl allocations.

Since this alternative results in a more extreme high/low relative distribution of QS (since it is based on catch history), and has a grandfather clause (particularly for constraining stocks), the ability of harvesters to form voluntary pools to manage risk may be the most difficult under this alternative compared to the other alternatives because these factors tend to favor some harvesters more than others.

Table 4-26. Summary of the effect of Alternative 2a on risk to profits.

Nonwhiting Catcher Vessels	High level of risk created by thin market conditions and by individual accountability of low OY and low trawl allocation species. The initial allocation of QSs favors some relatively more than others, making the formation of risk pools difficult.
Shoreside Whiting Catcher Vessels	High level of risk created by thin market conditions and by individual accountability of low OY and low trawl allocation species. The initial allocation of QSs favors some relatively more than others, making the formation of risk pools difficult.
Mothership Catcher Vessels	High level of risk created by thin market conditions and by individual accountability of low OY and low trawl allocation species. The initial allocation of QSs favors some relatively more than others, making the formation of risk pools difficult.

Fishing vessel safety

Fishing vessel safety is typically enhanced by the elimination of Olympic-style fisheries, increased flexibility in timing fishing operations, and improvements in revenues being generated by fishing activity. It is envisioned that the rationalization programs being considered will tend to increase operational flexibility and, in this way, improve safety conditions. As stated previously, information reported by NIOSH suggests safety-related events that may be avoided with more flexibility in harvest timing and a more profitable fleet that is able to stay current on maintenance. Under Alternative 2a, profits are generally expected to increase for both nonwhiting and whiting sector catcher vessels, and it may be reasonable to expect that this increase would lead to better maintenance of fishing vessels. The elimination of Olympic fishing activity in the mothership and shoreside sectors of the whiting fishery is also expected to enhance fishing vessel safety, because vessels will no longer feel the need to compete against one another to maximize catch, which can cause them to fish in hazardous conditions. In the nonwhiting fishery, an Olympic-style fishery does not currently exist. Safety concerns in this fishery are driven largely by a lack of profitability under Alternative 1 conditions. As illustrated previously, it is estimated that vessels participating in this fishery generate profits somewhere between zero and a loss of \$2 million annually. This creates conditions where vessel maintenance may be less than adequate, and such lack of maintenance may lead to conditions that are relatively less safe than under conditions where vessels are better maintained. Therefore, it is reasonable to expect rationalization to improve safety conditions in the nonwhiting sector because of increased profitability and to improve safety in the

shoreside and mothership whiting sectors because of increased profitability, enhanced operational flexibility, and an elimination of Olympic fisheries.

Table 4-27. Summary of the effects of Alternative 2a on safety.

Nonwhiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits that are expected to lead to improvements in the level and type of maintenance.
Shoreside Whiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits that are expected to lead to improvements in the level and type of maintenance. The elimination of the Olympic fishery and enhanced operational flexibility should also improve safety conditions as the fleet no longer feels the need to compete and to fish in hazardous conditions.
Mothership Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits that are expected to lead to improvements in the level and type of maintenance. The elimination of the Olympic fishery and enhanced operational flexibility should also improve safety conditions as the fleet no longer feels the need to compete and to fish in hazardous conditions.

4.6.3.4 Alternatives 2b and 2c

Alternatives 2b and 2c are intended to respond to the Council's request to consider and contrast two different methods for addressing processor concerns. Therefore, these two alternatives are examined simultaneously in this section and compared and contrasted consistently throughout this section.

The effect of Alternatives 2b and 2c on vessel profits is similar in many respects to that of Alternative 2a: harvesters are likely to access more target species in the nonwhiting sector, consolidation and associated cost savings are expected in the harvesting side, operational flexibility and ability to conduct business planning is enhanced, and risks exist to individual harvesters because of low trawl allocation species and the presence of thin markets. However, Alternatives 2a, 2b, and 2c differ in several ways in terms of the overall magnitude and/or distribution of profits. The overall magnitude of vessel profits gained under Alternatives 2b and 2c is potentially affected by an initial distribution of Qs to processors (Alternative 2c) and the fact that such a distribution to processors may influence ex-vessel prices. Alternatively, vessel profits are potentially affected by Alternative 2b because of the presence of an adaptive management provision and the fact that using such a provision to allocate QPs to processors enables processors to use additional leverage when negotiating terms (such as prices) with harvesters. In other words, Alternative 2b assumes that an adaptive management provision is used to mitigate against adverse impacts that occur to processors.⁹⁶ In addition to leverage over prices gained by processors who receive adaptive management quota, an AMP is likely to work in contrast to the effect of the market. This is simply because the adaptive management quota would be allocated in a manner that is not market-based, but rather is based on a decision or framework outlined by the Council. Since markets tend to work toward efficient and profitable outcomes, a program that counters a market effect may restrict some of the gains in profitability and efficiency expected from rationalization.

The distribution of vessel profits is also affected by the conditions prevailing under Alternatives 2b and 2c. A distribution of Qs to processors will tend to have a geographic effect as those processors

⁹⁶ The existing suite of alternatives allows the adaptive management provision to be used for more than just adversely impacted processors. If an adaptive management program is adopted as currently specified, the adaptive management program could be used for many different objectives such as incentives for bycatch reduction, the use of habitat-friendly gear, for adversely impacted communities, to help second generation fishermen/new entrants, or for adversely impacted processors.

direct landings associated with their QSs to particular ports where their plants are located. An adaptive management provision will tend to have geographic consequences, as well, if adversely impacted processors are located in distinct areas, and adaptive management shares are directed to processors in those distinct areas. It is likely that the geographic effects of both options will differ. Alternative 2c may tend to result in a flow of QSs toward stronger ports with more vibrant and robust processing facilities and infrastructure, whereas Alternative 2b may result in a flow of quota toward less advantaged processors in less advantageous locations. Harvesters are impacted through these measures indirectly to the extent that they harvest the quota owned by the processor, or held by the processor via the AMP.

Given that the only differences between Alternatives 2b and 2c are the consideration of processor allocations of QSs and an adaptive management provision to mitigate against adverse impacts to processors, this section concentrates on the effect of those two elements on harvesters.

The Effect of Alternatives 2b and 2c on vessel profits and fleet efficiency

Whether there is an initial distribution of QSs to processors, or an adaptive management provision used to address adversely impacted processors, is unlikely to impact the tendency for the fleet to approach a cost minimization strategy. The main impact explored here is whether the harvester retains the profits of reducing costs, or whether processors are able to pull those potential profits from the harvesting sector by negotiating ex-vessel prices to the processors favor.

In general, making an initial allocation to processors will tend to have a downward effect on ex-vessel prices compared to a case where no initial distribution of QSs is made to processors because processors can use quota as leverage when negotiating with harvesters. It is unclear whether an allocation to processors will decrease prices relative to Alternative 1, though it likely depends on the amount of quota allocated to processors. An initial allocation of quota to processors will also have a geographic effect on harvesters. This is because QSs allocated to processors will tend to be landed in ports where those processors are located. Vessels in ports with processors may have access to more QSs than if an initial allocation was made to permits. Inversely, harvesters in ports without processors may end up with less access to quota than if an initial allocation was made to permits. In other words, vessels fishing in ports where processors are located may be impacted differently than vessels in ports without processors because of their access to processor-held fishing quota.

Since Alternatives 2b and 2c do not create a link between harvesters and processors (harvesters with quota are free to deliver to any processor, and processors with QSs can lease to any LE-trawl-permitted vessel), it is possible that harvesters and processors will self-divide themselves into those with quota and those without quota. Since price negotiation tends to favor those holding quota, harvesters holding quota may elect to sell to processors without quota. They would do this because of their relative negotiation power and the fact that selling to processors without quota will enable them to negotiate higher ex-vessel prices. Conversely, processors with quota may elect to lease their quota to harvesters without quota because they can bid ex-vessel prices downward against those harvesters. If harvesters and processors with QSs attempt to work together, both sides would likely come to a compromise on ex-vessel prices. But if both sides know that they can get a better price by dealing with an entity without QSs, then a relationship between harvesters with QSs and processors with QS may become unstable.

Like an initial allocation to processors, an adaptive management provision may have an impact on ex-vessel prices. Depending on how the adaptive management provision is set up, an AMP may tend to limit the number of potential processors to which harvesters can deliver catch. This could occur if adaptive management is allocated to processors, and processors entice harvesters with that quota, conditional on the fact that those harvesters deliver to those processors. If harvesters are not harvesting

adaptive management groundfish, there may be no limitations on the number of potential buyers. In cases where harvesters have elected to prosecute adaptive management quota held by processors, the harvester and processor may engage in behavior that represents a bilateral monopoly with each entity being dependent on the other. The harvester cannot fish and deliver catch without the processor being willing to do accept it, and the processor cannot process fish without the harvester being willing to do provide catch. This is a case where both the harvester and processor are in an equally strong negotiation position and the result is one where profits are shared between the two entities. This outcome is likely to be different compared to a case where no adaptive management or initial allocation of QS is given to processors. If there is no adaptive management and no initial allocation of QSs to processors (as in Alternative 2a), harvesters are likely to be in a relatively strong negotiation condition. This is because the holder of the QSs tends to have the strongest negotiation position and can use that position in his or her favor—in this case, higher ex-vessel prices.

Nonwhiting trawl fishery

Under Alternatives 2b and 2c, it is unlikely that processors will acquire much additional quota in the nonwhiting sector because of the control limits. The 3 percent control limits specified for the nonwhiting sector make it difficult for the processing sector as a whole to acquire additional quota, unless, over time, that sector becomes composed of multiple small producers. This means that, over time, ex-vessel prices in the shoreside and mothership whiting sectors may fall to some degree since processors have the ability to acquire additional quota, but it is not likely that ex-vessel prices will fall much over time in the nonwhiting sector because processors have limited ability to purchase quota.

An initial allocation of 25 percent of nonwhiting quota to processors (Alternative 2c) is much larger than a 10 percent set aside of nonwhiting quota outlined in Alternative 2b. Depending on the species, 25 percent of the nonwhiting quota may equate to the majority, if not all, of the current market demand for those species meaning that an initial allocation of 25 percent to processors is akin to a 100 percent allocation of some species to processors unless the market expands for those species. It is not unreasonable to expect that processors receiving an initial allocation of quota will elect to prosecute their own quota first before looking to independent harvesters to fill their remaining need. In cases where 25 percent of the quota fills market demand, processors may not need additional fish from harvesters, meaning nonwhiting harvesters specializing in these species may be made substantially worse off if processors receive 25 percent of the initial allocation compared to Alternatives 1, 2a, and 2c. Those harvesters specializing in species where 25 percent does not represent the majority of the sector allocation may still be made better off by this alternative compared to status quo. To illustrate this effect,

Table 4-28 was constructed. This table shows the allowable catch level of several representative species, the amount represented by 25 percent of the trawl allocation, and the amount currently landed in the fishery. What is apparent from this information is that, unless markets for several groundfish stocks expand, a 25 percent allocation to processors may equal the majority, or all, of the current market demand for those species. This will have negative consequences to nonwhiting harvesters as it is likely that processors will prosecute their own quota first as doing so would tend to be more advantageous for reasons discussed previously in this section.

Table 4-28. Tonnage of select species allocated to processors with 25 percent initial allocation against 2007 mortality.

	Nonwhiting Trawl Allocation Applied to 2010 OY (mt)	2007 Bottom Trawl Catch (mt)	25% of Trawl Allocation (mt)
Dover sole	15,260	9,824	3,815
English sole	8,979	839	2,245
Other Flatfish	4,275	1,443	1,069
Arrowtooth Flounder	9,430	2,769	2,358
Shortspine Thornyheads North	1,482	980	371
Longspine Thornyheads North	2,039	890	510
Sablefish North	2,971	2,607	743
Pacific cod	1,088	55	272
Petrale sole	2,172	2,286	543

The size of the adaptive management provision at 10 percent will mean less quota reserved for processors than the 25 percent allocated to processors in Alternative 2c. Still, 10 percent of the trawl allocation for several underutilized species represents a relatively substantial portion of the catch under status quo conditions (Table 4-29). However, reserving this 10 percent for adversely impacted processors is not likely to have the same negative implications to harvesters as a 25 percent processor allocation for a variety of reasons. One reason is simply that 10 percent is less than 25 percent, but also that if the adaptive management quota is used for adversely impacted processors, those processors may have different characteristics and different market inroads than processors deemed to be not adversely impacted by rationalization. Assuming that relatively large processors are not deemed to be adversely impacted (which is logical given that larger processors tend to also be permit owners, which means they will receive an initial allocation of quota, and are distributed across a relatively wide geographic area), then these relatively large processors will still be in need of fish from independent harvesters to fulfill their market demand for groundfish species. This differs from adversely impacted processors who may use their adaptive management quota to fill their market demands. Therefore, both the size of the adaptive management quota amount at 10 percent and the way in which the quota is directed will tend to affect the impact harvesters experience from a 10 percent adaptive management provision for adversely impacted processors. It is likely that the effect on harvesters from a 10 percent AMP for processors will result in a lower impact to nonwhiting harvesters than what may be expected to occur under Alternative 2b with a 25 percent allocation to processors.

Table 4-29. Tonnage of select species allocated to processors with 10 percent adaptive management quota against 2007 mortality.

	Nonwhiting Trawl Allocation Applied to 2010 OY (mt)	2007 Bottom Trawl Catch (mt)	10% of Trawl Allocation
Dover sole	15,260	9,824	1,526
English sole	8,979	839	898
Other Flatfish	4,275	1,443	428
Arrowtooth Flounder	9,430	2,769	943
Shortspine Thornyheads	1,482	980	148
Longspine Thornyheads	2,039	890	204
Sablefish North	2,971	2,607	297
Pacific cod	1,088	55	109
Petrale sole	2,172	2,286	217

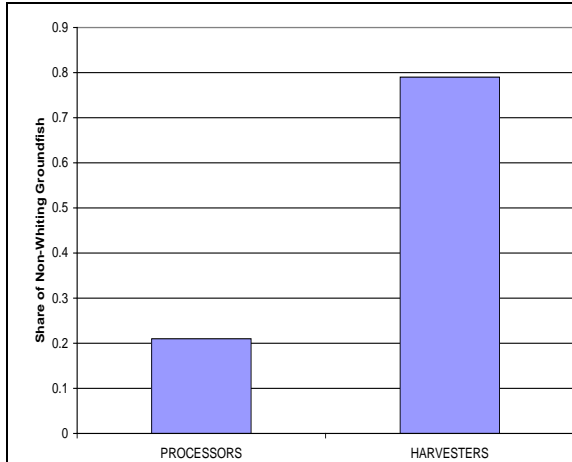


Figure 4-22. Share of nonwhiting groundfish allocated to harvesters and processors under Alternative 2b.

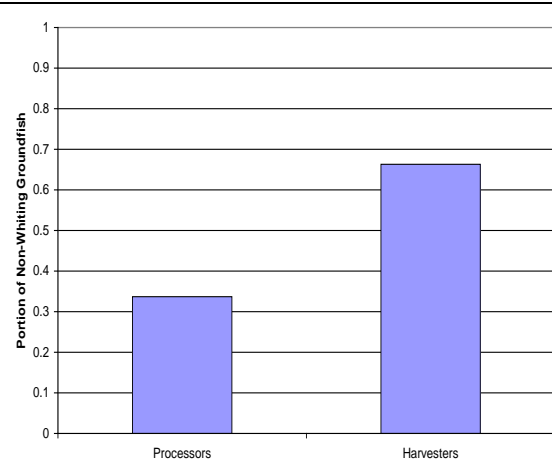


Figure 4-23. Share of nonwhiting groundfish whiting allocated to harvesters and processors under Alternative 2c.

Shoreside whiting trawl fishery

Over the long run, processors may continue purchasing Qs in the whiting sectors, because of the relatively large size of the control limit. For comparison purposes, this is less likely in the nonwhiting sector where the control limits are smaller. Smaller control limits tend to favor harvesters as the average harvester deals with less volume than the average processor. Therefore, smaller control limits make it less likely that a processor could acquire enough Qs to meet the full needs of the processing operation, making it necessary for processors to enter into agreements with harvesters. Inversely, relatively large control limits make it possible for processors to vertically integrate to a larger degree, reducing the need for processors to enter into agreements with independent harvesters.

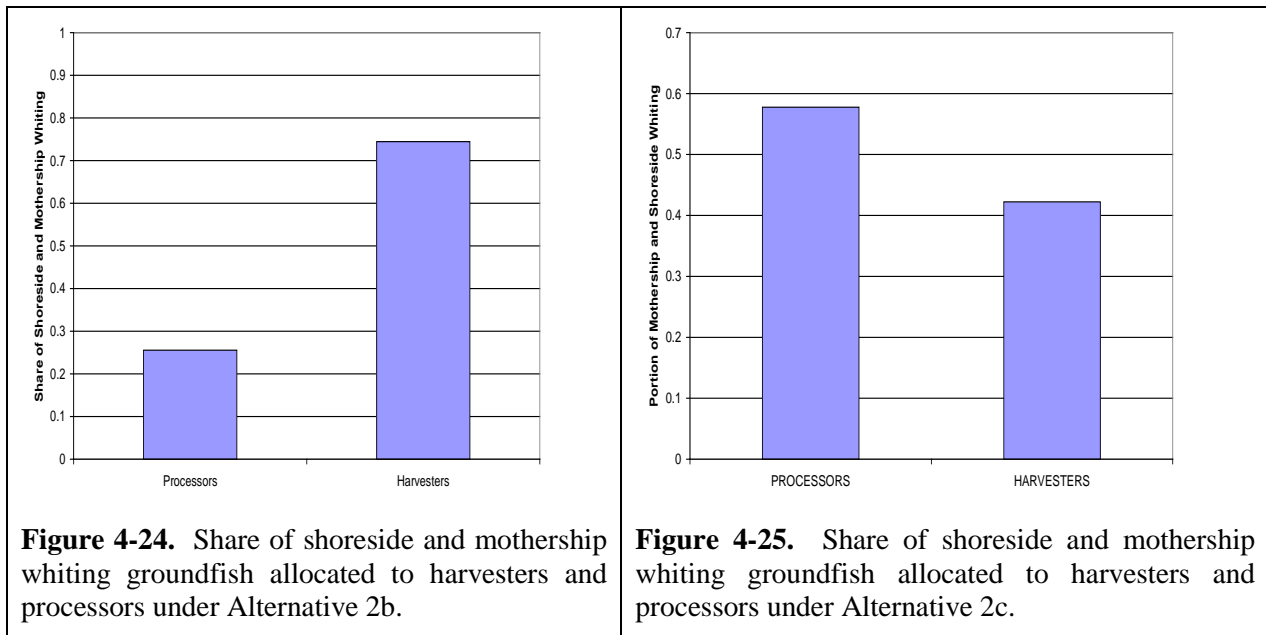
Many of the effects described above under the section describing impacts to nonwhiting harvesters also hold true for shoreside whiting harvesters. However, the comparison between 50 percent initial allocation for whiting versus 10 percent adaptive management is much more straightforward for the whiting fishery. To a large degree the Pacific whiting resource is fully utilized (or in most years nearly so) and is readily marketable, unlike some species of flatfish, so assessing the effect of a 50 percent allocation compared to a 10 percent allocation is much more straightforward. Therefore, it is also relatively straightforward to say that 50 percent to processors will have a greater negative impact on harvesters than a 10 percent adaptive management provision for a couple of reasons. One reason is that 50 percent initial allocation is simply larger than 10 percent, but also because the adaptive management quota is likely to be directed in a conscious manner toward adversely impacted processors.

The principal difference for shoreside whiting harvesters between Alternatives 2b and 2c may be best described in terms of short term versus long term impacts. Allocating Qs to processors (as described in Alternative 2c) grants processors some leverage in negotiations and other matters at the start of the program, and those processors can transfer Qs in such a way as to be most advantageous to them. This may result in relatively smaller ex-vessel prices paid to harvesters in the short run. Under Alternative 2b, processors receive adaptive management QPs, yet it is still a distinct possibility that whiting processors will acquire additional Qs via transfer over time. The amount of quota processors acquire over time may be relatively large because the accumulation limits allow for a single entity to control 12 percent of the Qs. The incentive for processors to purchase Qs over time is based on the notion that vertical integration is generally more efficient, and, therefore, processors may acquire Qs over

time to attain that efficiency. Over the longer term—as processors acquire Qs—the outcome of Alternative 2c on harvester revenues may be very similar to that of Alternative 2b. However, in the short term, Alternative 2b may result in slightly higher ex-vessel prices on average than Alternative 2c.

Mothership whiting trawl fishery

Harvesters in the mothership whiting trawl fishery are expected to be impacted in a similar fashion to shoreside whiting harvesters. However, as the mothership fishery is characterized by much greater degrees of vertical integration under status quo than either the nonwhiting or shoreside whiting fisheries, the magnitude of change is likely to be relatively watered-down. Higher degrees of vertical integration mean that independent harvesters are likely to have more trouble negotiating relationships with motherships in their favor. However, the effect of allocating 50 percent of the mothership whiting to motherships is likely to have a greater downward effect on prices than using a 10 percent adaptive management provision. In addition, like the impact on shoreside whiting harvesters, the difference between Alternatives 2b and 2c for harvester revenues may be largely limited to impacts in the short run. Over time, motherships and harvesters may continue vertically integrating as the control limits appear to allow for continued vertical integration (control limits in the mothership sector are 25 percent under Alternatives 2a, 2b, and 2c).



In summary, both Alternatives 2b and 2c are likely to result in lower ex-vessel prices on average than Alternative 2a. In either case, it is likely that processors can use adaptive management quota or their initial allocation of Qs to negotiate prices to their favor. Over the longer term, Alternatives 2a, 2b, and 2c may all begin to have a similar effect on harvester revenues if it is strategic for processors to vertically integrate by acquiring Qs. This is possible under Alternatives 2a, 2b, and 2c because the accumulation limits are relatively large, allowing processors to acquire quota in volumes sufficient to cover large portions of their fish input needs. As processors acquire Qs, harvester leverage over prices will tend to decline.

Table 4-30. Effect on harvesters from an adaptive management provision to mitigate against harm to adversely impacted processors or initial allocation of Qs to processors.

Effect of Adaptive Management on Harvester Revenues	Effect of Processor Initial Allocation on Harvester Revenues
<ul style="list-style-type: none"> • Downward effect on prices compared to the Alternative with no initial allocation to processors. <ul style="list-style-type: none"> ○ Profits still expected to improve relative to Alternative 1, but expected to be similar to prices received in Alternatives 2a and 2b over the long term. • Will likely have a geographic effect that directs harvest to areas where processors are adversely impacted. This geographic effect is expected to be different than the geographic effect found in Alternative 2c. 	<ul style="list-style-type: none"> • Downward effect occurs on ex-vessel prices compared to a case with no initial allocation to processors. • Ex-vessel price effect is likely to be felt by all harvesters. <ul style="list-style-type: none"> ○ Profits are still expected to be greater than Alternative 1, but are expected to be similar to prices received in Alternatives 2a and 2c over the long term. • Geographic effect directs harvest to areas where processors are located.

The distribution of profits under Alternatives 2b and 2c

An initial allocation to processors and an adaptive management provision will have differing distributional effects. Both an initial allocation to processors and an adaptive management provision will have geographic implications. If adversely impacted processors are located in distinct areas of the coast, a distribution of shares in a manner that benefits those processors would tend to have corollary geographic impacts that favor some harvesters. Those harvesters located in ports where there are adversely impacted processors may stand to have access to more quota than would otherwise be the case if no adaptive management quota was available. An initial allocation to processors would also have geographic implications because processors are located in distinct areas of the coast.

The distribution of Qs across entities under Alternative 2c is different than under Alternative 2a because of the allocation to processors. There are 121 entities who are expected to receive Qs of nonwhiting groundfish under Alternative 2c, and 3 of these entities exceed the control limit (but still receive the full amount due to the grandfather clause) (Figure 4-26). Under this option, the majority of receiving entities receive less than 1 percent of the nonwhiting allocation of groundfish, while a handful of entities receive over 2 percent.

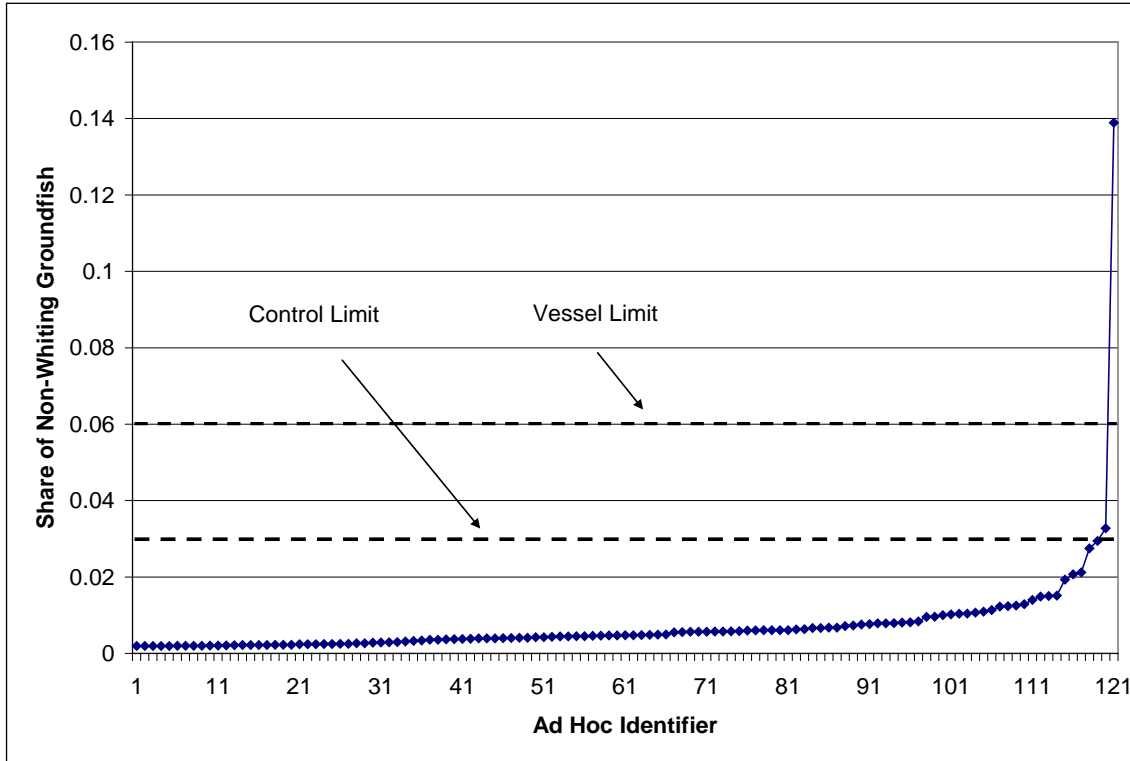


Figure 4-26. Distribution of aggregate nonwhiting QS and accumulation limits under Alternative 2c.

In the whiting sectors, there is also a different distributional effect, though the difference between Alternatives 2a and 2b is relatively lower for the whiting sectors than the nonwhiting sectors. Interestingly, by including shoreside processors in the initial allocation, the initial distribution of shoreside whiting becomes relatively more equal than in Alternative 2a. As shown in Figure 4-27, the largest recipient of shoreside whiting QSs receives less than 10 percent of the shoreside whiting quota, while, under Alternative 2a, the largest recipient receives almost 12 percent. The total number of entities that are estimated to receive shoreside whiting QSs under this alternative is 67.

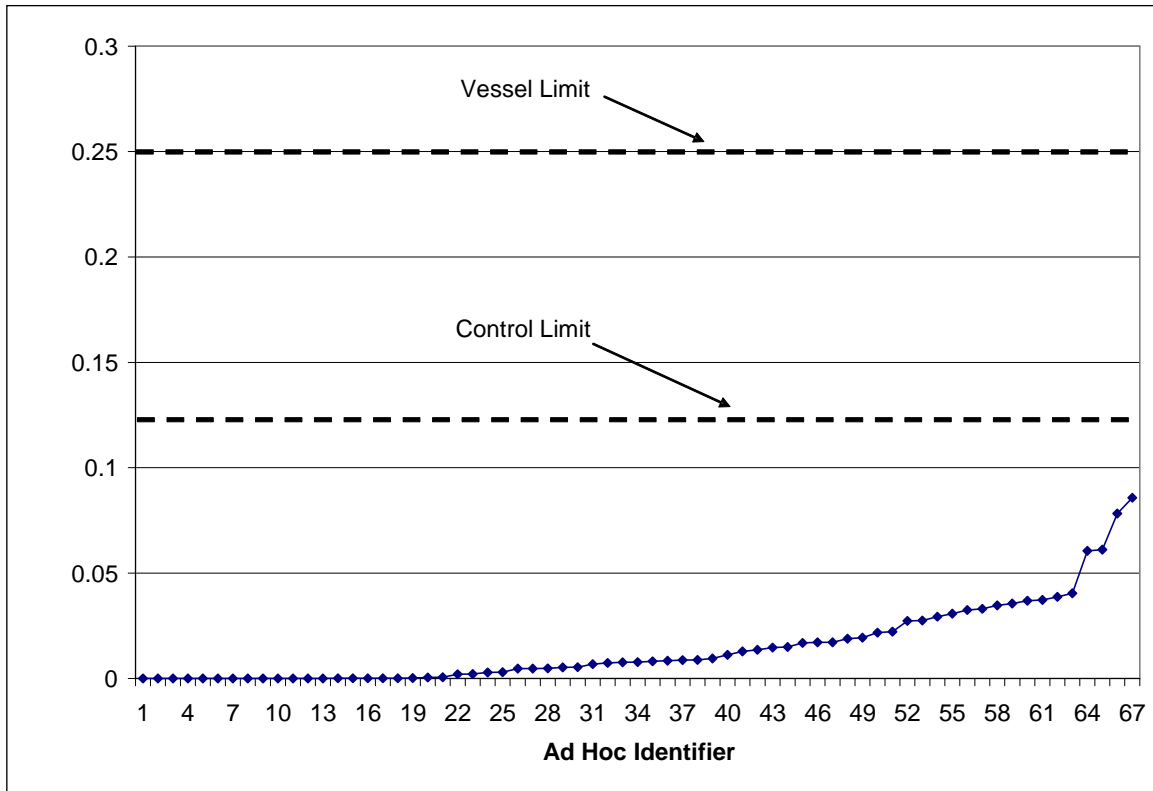


Figure 4-27. Distribution of shoreside whiting QSs and accumulation limits under Alternative 2c.

In the mothership sector, an initial allocation to processors shifts the distribution of whiting somewhat, but less than in the nonwhiting sector, as shown in Figure 4-28. Contrary to the shoreside sector, by making an initial allocation to processors, the largest entity receives approximately 13 percent of the mothership whiting quota compared to Alternative 2a, where the largest entity receives approximately 10 percent. The total number of entities receiving mothership whiting QSs is 30 under this alternative.

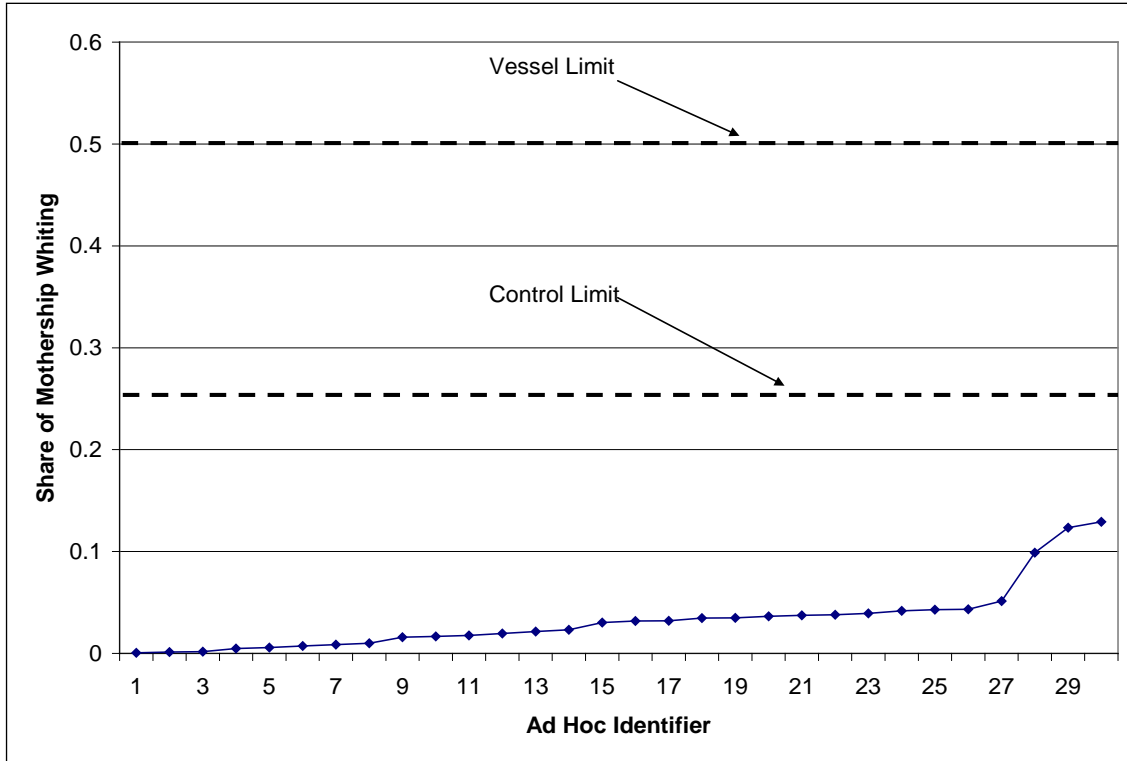


Figure 4-28. Distribution of mothership whiting QSs and accumulation limits under Alternative 2c.

The number of QS recipients under Alternative 2b is the same as the number of recipients under Alternative 2a. Alternative 2c has a much larger number of QS recipients (Table 4-31). In particular, the number of entities receiving nonwhiting QSs under this alternative is 297 compared to 116 in Alternatives 2a and 3a. The number of entities receiving shoreside whiting QSs is 67, and the number of entities receiving mothership QSs is 30. The total number of entities receiving QSs under this alternative is 305.

Table 4-31. Number of QS recipients under Alternative 2b versus 2c.

Sector	Number of QS Recipients under Alternative 2b	Number of QS Recipients under Alternative 2c
Nonwhiting	116	297
Shoreside Whiting	47	67
Mothership	28	30
Unique Number of QS Recipients (NonCP Sectors)	120	305

Fishing vessel safety

Alternatives 2b and 2c are expected to result in similar effects as the other action alternatives. These effects include increased flexibility in harvest timing and the potential to generate higher revenues through cost efficiencies. The possibility that Alternative 2c will make some nonwhiting trawl harvesters worse off due to the initial allocation to processors is likely to translate into those vessels moving to another set of species where they can be made better off, or simply dropping out of the

fishery. Other vessels are likely to be made better off by this alternative. On the whole, harvesters should find safety conditions improve for reasons outline previously.

Table 4-32. Summary of the effect of Alternatives 2b and 2c on safety.

Nonwhiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance.
Shoreside Whiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance. The elimination of the Olympic fishery and enhanced operational flexibility should also improve safety conditions because the fleet no longer feels the need to compete and to fish in hazardous conditions.
Mothership Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance. The elimination of the Olympic fishery and enhanced operational flexibility should also improve safety conditions because the fleet no longer feels the need to compete and to fish in hazardous conditions.

4.6.3.5 Alternative 3

The effect of Alternative 3 on nonwhiting harvesters differs somewhat from Alternatives 2a, 2b, and 2c. For Pacific whiting harvesters, the effect of Alternative 3 differs to a much greater degree. Harvesters in the nonwhiting trawl sector face risks because of low allocation and thin market species. Harvesters also face risks because of the lack of a carry-over provision and the establishment of four trawl sectors and the resulting sector-specific allocations. Finer sector-specific allocations can reduce flexibility and impose greater restrictions on harvest activity compared to a case where quota can be traded between sectors. One element of this alternative that increases the potential that nonwhiting harvesters will effectively deal with risk is the manner in which IFQ is allocated—particularly for overfished stocks. The distribution of overfished species quota based on a bycatch rate creates a more balanced distribution of negotiating power between harvesters compared to a case where allocations are based purely on catch history; this increases the likelihood of risk pools forming among harvesters and staying together over the long term. The impact of an area management provision is somewhat unclear, though it may reduce gross revenues and overall harvest volume. This could occur if area management isolates available harvest from the location of the fishery, or if large scale gear switching occurs in a certain area (such as off the central California coast, as has been hypothesized). Such gear switching may mean several species of flatfish are not fully harvested due to the inaccessibility of those species to fixed gear and because area management would restrict that quota from moving to another area where trawl gear may be more prevalent. Other elements differ in Alternative 3, but do not appear to result in changes to profitability or risk.

Individual harvesters face risks in the nonwhiting trawl fishery because of low trawl allocation species and the presence of thin markets. These same risks are not apparent in the Pacific whiting sectors, although there are other risks for these harvesters. The fact that there is a common bycatch limit for all three whiting sectors imposes risk to all harvesters in the whiting fishery and creates a potential that a de facto race for fish could develop among the Pacific whiting sectors as those harvesters compete for catch before a bycatch limit is reached that can shut down all three sectors. Such an outcome would tend to eliminate the gains in profit and safety conditions typically expected of rationalization. The presence of this common bycatch pool is likely to result in a fishery that resembles Alternative 1 conditions, even though harvesters receive allocations of Pacific whiting and form cooperatives.

The effect of Alternative 3 on vessel profits and fleet efficiency

Vessel profits are highly influenced by the risk factors (discussed in more detail in the next sub-section) present in this alternative. In the nonwhiting trawl fishery, fleet consolidation and the associated cost efficiency are expected to occur to the same degree as that described under the broad-level effects section (Section 4.6.2). This improvement in cost efficiency is likely to be substantial, and the outcome is likely to be an improvement in the profitability of nonwhiting harvesters even in the face of risks posed by thin markets and low allocation species. The aforementioned potential for a race for fish, due to fishery-wide bycatch limits for Pacific whiting harvesters, is likely to erode the majority—or all—of the gains typically expected from rationalization of the whiting fishery.

Nonwhiting trawl fishery

The individual accountability associated with Alternatives 2b and 2c (and for all alternatives for that matter) is expected to result in modifications to behavior and gear, which should decrease bycatch of constraining overfished stocks. This reduction in bycatch should lead to higher catch levels of currently underutilized target species, which provides a further source of profit (in the form of gross revenues) in addition to that which occurs because of fleet consolidation. This effect was described in more detail under broad-level effects (Section 4.6.2), and also in Appendix C.

Ex-vessel prices received by harvesters in the nonwhiting trawl fishery in this alternative are expected to be lower than Alternative 2a, but similar or equal to those received under Alternative 2c. This is because 25 percent of nonwhiting groundfish is allocated to processors. Such an initial allocation is expected to reduce prices paid to harvesters compared to Alternatives 2a, 2b, and 4a where no initial allocation is made to nonwhiting groundfish processors; however, it is unclear how this initial allocation compares to prices paid under Alternative 1 conditions. In the long run, the balance of ex-vessel prices is expected to remain relatively unchanged. That is, ex-vessel prices are expected neither to change in favor of harvesters, nor for processors compared to prices in the period immediately following the allocation of Qs. This is because of the accumulation limits specified under this alternative, which are small enough so as to act as a de facto limit to the amount of quota that processors are able to acquire. The 1.5 percent control limit over all nonwhiting groundfish Qs, without a grandfather clause provision, means that the amount of quota allocated to processors will have to be divided among 17 processing companies at a minimum. Several processors who qualify for an initial allocation have their initial allocations truncated by the lack of a grandfather clause, arguably reducing the leverage some processors have compared to Alternative 1 conditions.

For some species, an initial allocation of nonwhiting quota of 25 percent to processors may equate to most, if not all, of the current market demand for some groundfish species, meaning that an initial allocation of 25 percent to processors could be akin to a 100 percent allocation of some species to processors, unless the market expands for those species. It is not unreasonable to expect that processors receiving an initial allocation of quota will elect to prosecute their own quota first before looking to independent harvesters to fill their remaining need. In cases where 25 percent of the quota fills market demand, processors may not need additional fish from harvesters, meaning nonwhiting harvesters may be made substantially worse off if processors receive 25 percent of the initial allocation compared to alternatives where there is no initial allocation made to processors of nonwhiting groundfish. To illustrate this effect, Table 4-33 was constructed. This table shows the allowable catch level of several representative species, the amount represented by 25 percent of the trawl allocation, and the amount currently caught in the fishery. What is apparent from this information is that, unless markets for several groundfish stocks expand, a 25 percent allocation to processors may equal the majority, or all, of the current market demand for those species. For species for which 25 percent is close to recent harvests, such as arrowtooth, English sole, other flatfish and Pacific cod, the current harvest levels are

already at levels generally comparable to or above those of the mid-1990s, indicating the possibility that expanding markets might be more challenging than for species that are well below historic harvest levels. This will have negative consequences for nonwhiting harvesters, as it is likely that processors will prosecute their own quota first, since doing so would tend to be more advantageous for reasons discussed previously in this section. Even without an initial allocation, processors will be able to acquire Qs. but will be limited by the control limits.

Table 4-33. Tonnage of select species allocated to processors with 25 percent initial allocation against 2007 mortality.

	Nonwhiting Trawl Allocation Applied to 2010 OY (mt)	2007 Bottom Trawl Catch (mt)	25% of Trawl Allocation (mt)
Dover sole	15,260	9,824	3,815
English sole	8,979	839	2,245
Other Flatfish	4,275	1,443	1,069
Arrowtooth Flounder	9,430	2,769	2,358
Shortspine Thornyheads North	1,482	980	371
Longspine Thornyheads North	2,039	890	510
Sablefish North	2,971	2,607	743
Pacific cod	1,088	55	272
Petrale sole	2,172	2,286	543

The fact that historically large producers have their initial allocation truncated by the lack of a grandfather clause means that the prices received by harvesters could be different than those prices that would be received under Alternative 2c where some large producers receive relatively large amounts of quota. Regardless of the ex-vessel prices received, cost savings expected in the nonwhiting fishery because of consolidation are expected to be substantial because the vessel limits do not appear to restrict the amount of fleet consolidation predicted and described in Section 4.6.2.1. For these reasons, harvesters in this sector should see profits improve over Alternative 1 conditions.

The presence of an area management provision that divides species north and south of 40°10' N. latitude may influence overall gross revenue and harvest volume. As discussed previously, central California harvesters may switch to nontrawl gear. As noted, if this occurs on a large scale, fewer flatfish could be harvested, resulting in a reduction in harvest volume and gross revenue compared to what would be expected to occur if they continued to use trawl gear.

The presence of an adaptive management provision under Alternative 3 may tend to depress profits compared to a case without an adaptive management provision. This is because such a provision would presumably be used in a manner that is contrary to an outcome driven by market conditions. Imposing measures that run contrary to a market outcome should, in turn, have a downward effect on profits since profits are a motivating factor behind market outcomes. However, since this provision uses 10 percent of the available quota, the effect is likely to be minor.

Shoreside whiting trawl fishery

In general, a system of harvest cooperatives should allow harvesters in the Pacific whiting sectors to generate higher levels of profit than Alternative 1. The reasons for expected profit improvements

include flexibility in harvest timing, opportunities for more optimal business planning, and fleet consolidation. Collective institutions, like harvest cooperatives, also tend to foster greater communication among harvesters (as explained in Section 4.3.3), and, given the correct set of incentives, such communication may lead to more successful bycatch reduction and a greater potential that harvesters will fully attain their allowable catch of target species.⁹⁷ The ability for harvesters in a cooperative structure to share catch among themselves provides a framework for harvesters to consolidate, like in an IFQ program, with some harvesters potentially choosing to opt out of harvest activity and allow another harvester to catch his/her quota, or catch history, assignment. Catch history assignments (like an IFQ) in the shoreside and mothership sector provide a form of assurance that individual harvesters have access to a given amount of resource, making short and long-term business planning decisions easier to make in comparison to Alternative 1.

The relationship between shoreside whiting harvesters and processors that is formed in this alternative is different from that relationship established by issuing both shoreside whiting harvesters and processors IFQs. The ex-vessel prices that develop through a harvester-processor linkage could very well be different from the ex-vessel prices that arise when both harvesters and processors receive IFQs under Alternatives 2a and 2c. Harvesters and processors who own IFQs are not limited in who they can buy from and sell to; however, if harvesters and processors are tied to one another with harvester-processor linkages harvesters are limited in terms of to whom they can deliver fish (though the linkage can be broken with some effort). This linkage means that negotiation and relationships that exist between the harvester and processor are likely to have a large influence over ex-vessel prices in the short term. In many respects, the relationships that develop in this arrangement may begin to resemble a vertically integrated firm with both the harvester and processor in a relatively strong negotiation position. The outcome is likely to be one where prices are negotiated to a place where profits are shared between the harvester and processor.

Over the long term, harvesters and processors can break that arrangement if the harvester fishes in the noncooperative portion of the fishery, though this fishery is a competitive, race-for-fish fishery, which makes it unattractive and arguably less profitable. This means that over the longer term, harvesters can break linkages and establish a linkage to another processor with a more favorable ex-vessel price. However, breaking that linkage may come at a cost, meaning that harvesters may elect to maintain the existing linkage and agree to suboptimal ex-vessel prices if the perceived cost of breaking the linkage and participating in the noncooperative fishery is too great. That aside, it is unlikely that harvesters would agree to ex-vessel prices that compromise their ability to generate profits, since they have the opportunity to break linkages, and this plays to their favor to some degree.

In the shoreside whiting fishery, the linkage of harvesters to (potentially) multiple processors can create problems in negotiations with processors over deliveries and delivery timing. For example, if one harvester begins fishing at the start of the year and delivers that catch to processor A, but then is preempted by bycatch constraints before making deliveries to processor B, then an argument can be made that the harvester did not meet his/her obligation to deliver to processor B, and in fact delivered 100 percent of his/her catch to processor A, which may appear to violate the processor linkage provisions. Such complexities may lead to difficulties negotiating with processors over harvest timing and may create strategic arrangements and negotiations that tend to complicate harvest activities. These types of arrangements may not exist if a harvester is only connected to a single processor.

The accumulation limits specified for this alternative do not include a limit on vessels. Therefore, the limits specified for this alternative are not expected to restrict cost savings possible through fleet

⁹⁷ However, as will be discussed in later sections, the fishery-wide bycatch limits specified in this alternative make successful bycatch management on the part of industry uncertain, and perhaps even unlikely.

consolidation. However, the control limits specified do restrict ownership of shoreside whiting catch history to 15 percent. This amount appears large enough to accommodate a relatively large degree of consolidation of catch history ownership into a handful of entities. This may result, over time, in processors acquiring multiple permits with catch history if vertically integrating is to their favor. As such processors vertically integrate, this may tend to reduce the ability of harvesters to negotiate prices to their favor even with a processor harvester linkage provision simply because the processor will have a reduced need to secure deliveries from independent harvesters if that processor can acquire necessary fish through the catch history and permits held by that processor.

The presence of an adaptive management provision would tend to reduce overall profit, for reasons discussed previously. The concept of an adaptive management provision implies that it be used in a manner contrary to a market-driven outcome. Since market-driven outcomes are motivated by profit, such provisions would tend to reduce profit in the fishery. However, since the adaptive management provision is 10 percent, this effect is likely to be minor.

While the above factors speak generally to the fact that profits should be generated (and are likely to improve) for harvesters under a cooperative structure, the common bycatch limit that exists in this alternative may very well eliminate the gains expected from the implementation of harvest cooperatives. This effect is discussed in more detail in the following section.

Mothership whiting trawl fishery

The effect on mothership catcher vessels is similar to the effect on shoreside whiting vessels. Because of this similarity, we provide a relatively condensed analysis on the effects on mothership catcher vessels under this alternative and concentrate mostly on the places where the effect on mothership catcher vessels differs from shoreside catcher vessels.

The cooperative structure created under this alternative grants mothership catcher vessels a defensible resource access privilege if they elect to join a cooperative. As a result, mothership catcher vessels can develop business plans, engage in economically optimal harvest timing and other behaviors, and perform fleet consolidation to capitalize on economic opportunities through cost reductions created by fleet consolidation. The linkage created to a mothership creates a condition that begins to resemble a vertically integrated firm, and both the harvester and mothership are in a similar negotiation position in this case. The result is likely to be one where profits are shared between the mothership and catcher vessel.

The collective institution, or harvest cooperative structure, created through this system will tend to foster greater degrees of communication than a comparable IFQ system, but only if the participants in the fishery have a set of characteristics such that they can operate collectively (Section 4.3.3 has more information on this point). Such enhanced communication will tend to result in more collective action to manage bycatch, and the result may tend to be more successful avoidance of overfished stocks on a fleet-wide basis, increasing the possibility that the Pacific whiting allocation will be attained before the fishery is shut down via attainment of a bycatch limit. However, as outlined in a subsequent section describing risks to profitability, the three-sector-wide bycatch limit that exists in the alternative creates incentives that may lead to a race for fish via a race for bycatch across the three different whiting sectors. This circumstance creates the possibility that the economic gains expected as a result of a cooperative structure will be eroded, or lost.

The accumulation limits in this alternative establish a 20 percent limit on the amount of catch history with which a mothership can be linked and a 10 percent mothership catcher vessel limit that restricts the amount of catch history any one entity can own. Neither of these limits restrict the amount of fleet

consolidation, meaning that there appear to be no barriers to potential cost savings as a result of fleet consolidation. With the 10 percent CV limit, there appear to be opportunities for the relatively small entities to consolidate, but some limited opportunities for the largest entities to consolidate. The 20 percent mothership limit means that at least five motherships will have to be present in the fishery in any given year if the allocation is to be attained. This is a relatively large number of motherships compared to the number in the fishery over the past 10 to 15 years. Guaranteeing a minimum number of motherships will provide options for catcher vessels should relationships between a catcher vessel and a mothership become unfavorable. As the number of motherships declines, the ability for harvesters to find favorable relationships with motherships may tend to decline simply because there are fewer options available to those catcher vessels, and both the mothership entities and the harvesting entities are aware of that fact. In the most extreme case, a mothership may be able to use the lack of other mothership opportunities against the harvester when negotiating over long term relationships.

Table 4-34. Summary of the effect of Alternative 3 on profits.

Nonwhiting Catcher Vessels	Fleetwide profit is expected to increase as a result of increased target species catch and fleet consolidation. Ex-vessel prices are expected to be lower than Alternative 2a because of the initial allocation made to processors, however, gear switching and flexible harvest timing provide opportunities to capitalize on favorable market conditions. Area management may result in lower ex-vessel revenue than would otherwise occur if large-scale gear switching occurs in certain areas of the coast because flatfish catch may be foregone. An adaptive management provision will tend to have a minor, downward effect on profit because it works counter to a market system. The risk associated with managing some species with IFQs makes profit expectations uncertain. Accumulation limits do not appear to restrict consolidation.
Shoreside Whiting Catcher Vessels	Cooperative structure should theoretically improve profitability in the fishery, but the risks posed by the level of bycatch management specified in this alternative jeopardize profits to a great degree.
Mothership Catcher Vessels	Cooperative structure should theoretically improve profitability in the fishery, but the risks posed by the level of bycatch management specified in this alternative jeopardize profits to a great degree.

The distribution of vessel profits under Alternative 3

The distribution of harvest opportunities under a cooperative structure with harvester-processor linkages is similar to an IFQ distribution that allocates 100 percent of the initial allocation to permits. This is because, under a cooperative system with processor linkages, the harvester still controls the opportunity to harvest the available quantity. That quantity is not made available to processors (unless they, too, hold permits), as would be the case if IFQs was allocated to processors.

In addition to the distribution of profits seen as a result of the initial allocation, harvesters fishing around areas with a relatively high presence of overfished stocks are likely to be disadvantaged and be less able to access their target species, like in Alternative 2a. Other factors play into the distribution of profits—namely the presence of area management. The division of species at 40°10' N. latitude maintains a separation of catch north and south of that boundary. While harvesters are free to travel across the boundary to access the northern and southern quotas (so long as they hold QPs for northern and southern species), such area management will likely tend to direct profits to harvesters located in different geographic areas to a greater extent than if there was no area management because harvesters are more likely to fish in an area near their location.

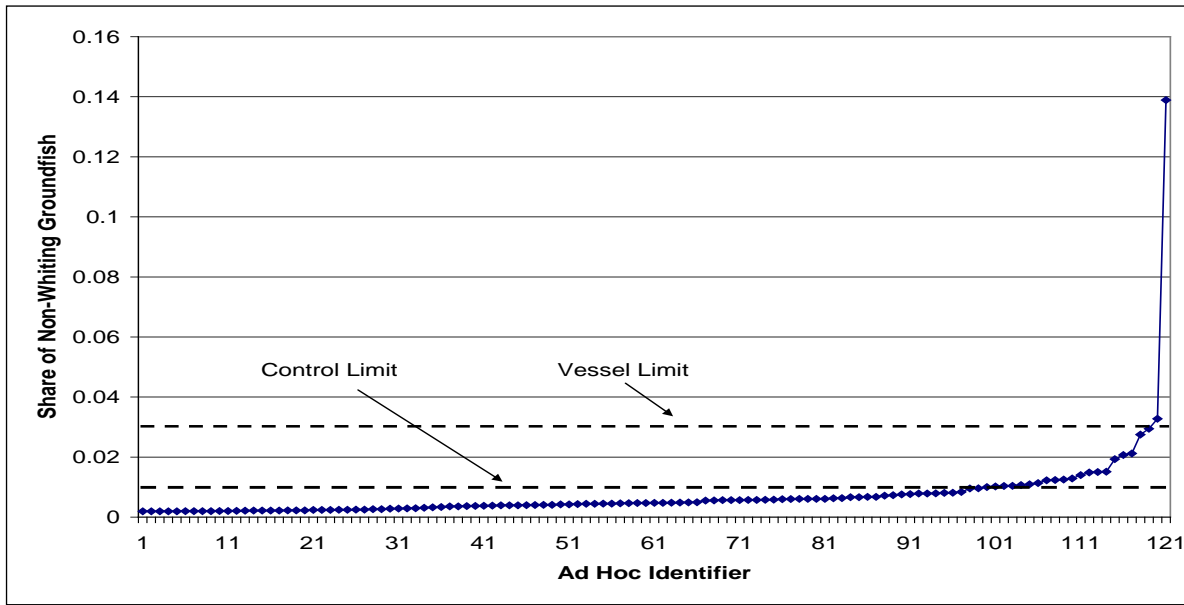


Figure 4-29. Distribution of aggregate nonwhiting QS and accumulation limits under Alternative 3.

In the shoreside whiting fishery, 37 entities are estimated to receive catch history designations under this alternative. All of the entities receive less than the accumulation limit, but the largest entity receives more than twice as much as the second largest entity. A handful of entities stand to receive catch history designations that are close to zero percent of the shoreside whiting quota.

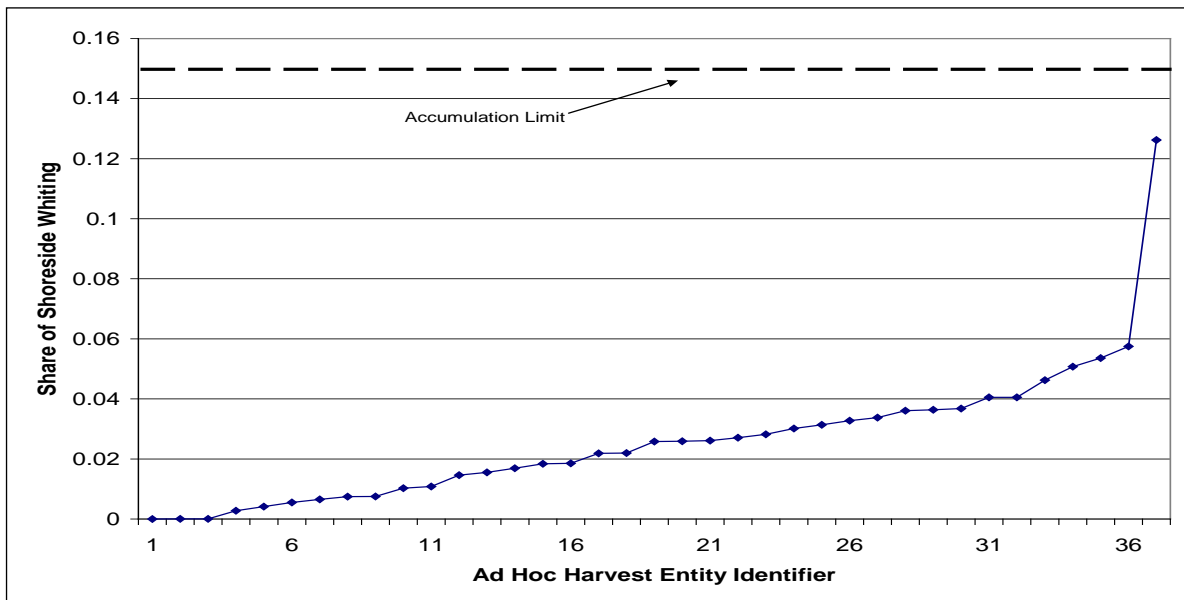


Figure 4-30. Distribution of shoreside whiting catch history and accumulation limit in Alternative 3.

In the shoreside whiting fishery, several harvesters are connected to more than one processing company. Thirty-six shoreside whiting harvesters are connected, at least in part, to the three largest processing companies. Those companies are linked to more than 80 percent of the shoreside whiting catch history.

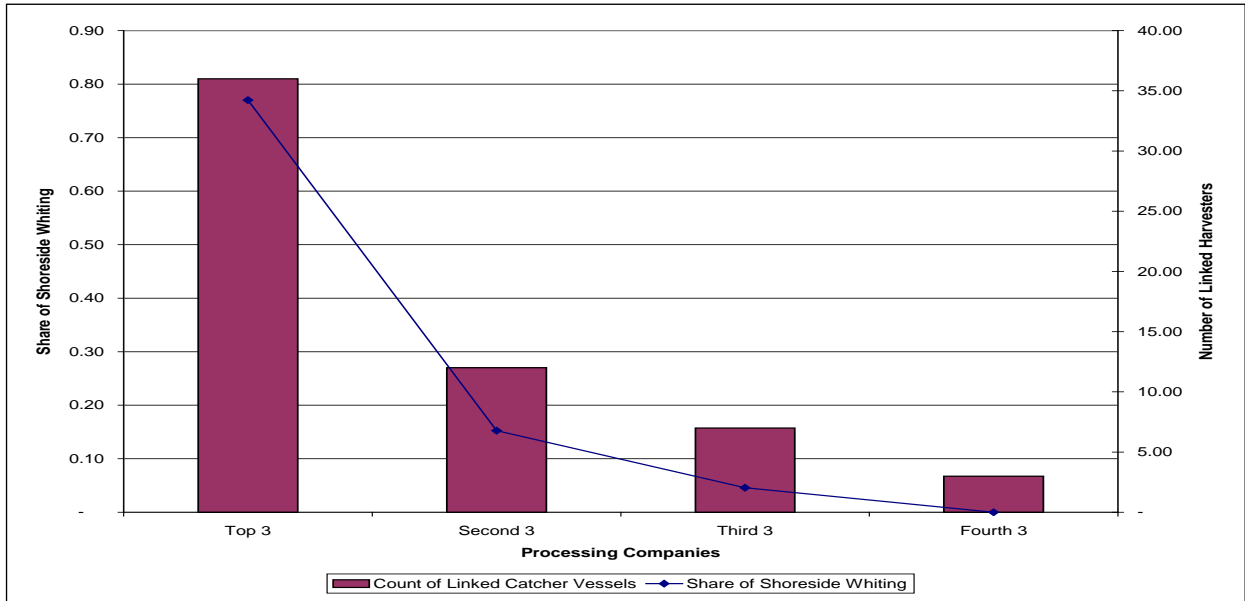


Figure 4-31. Harvester-processor linkages in the shoreside whiting sector under Alternative 3.

In the mothership sector, 29 entities stand to receive catch history designations of mothership whiting. The largest entity receives just over 10 percent of the catch history designation, while the second largest entity receives close to 7 percent. Many entities receive between 3 percent and approximately 6 percent of the designation. The smallest entity receives approximately 0.5 percent.

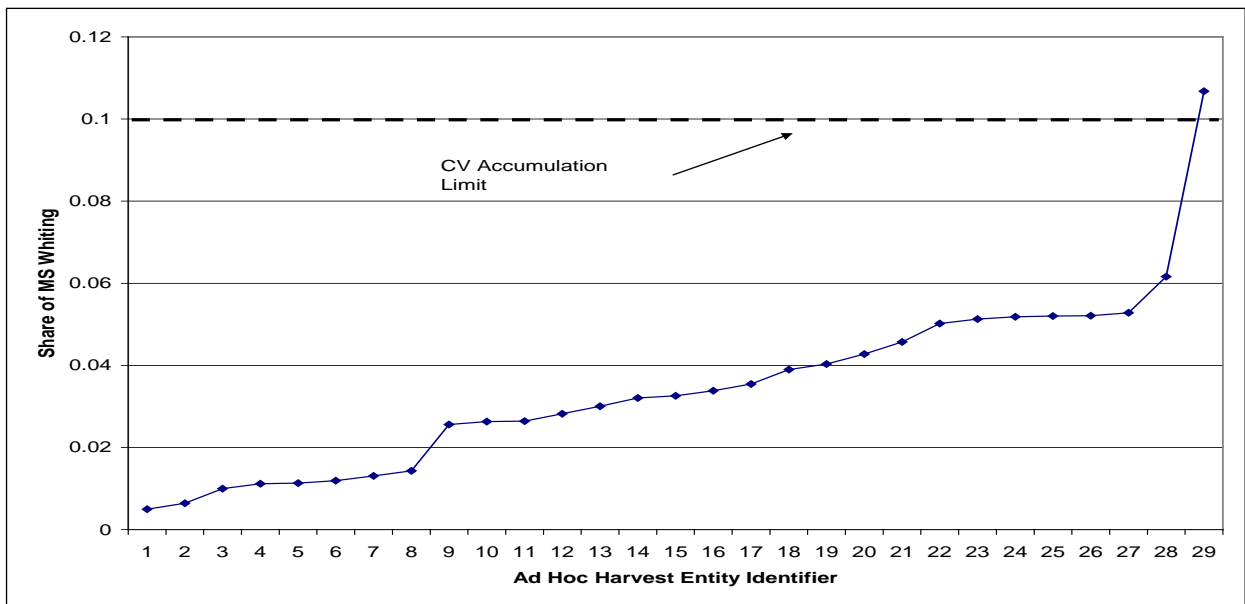


Figure 4-32. Distribution of catcher vessel mothership catch history under Alternative 3.

Mothership catcher vessels are connected to six different mothership companies through the MS linkage provision. One mothership company is connected to eight catcher vessels, while the smallest company is connected to two catcher vessels. These connections assume the most recent delivery year prior to 2007 is the basis for establishing the mothership linkage.

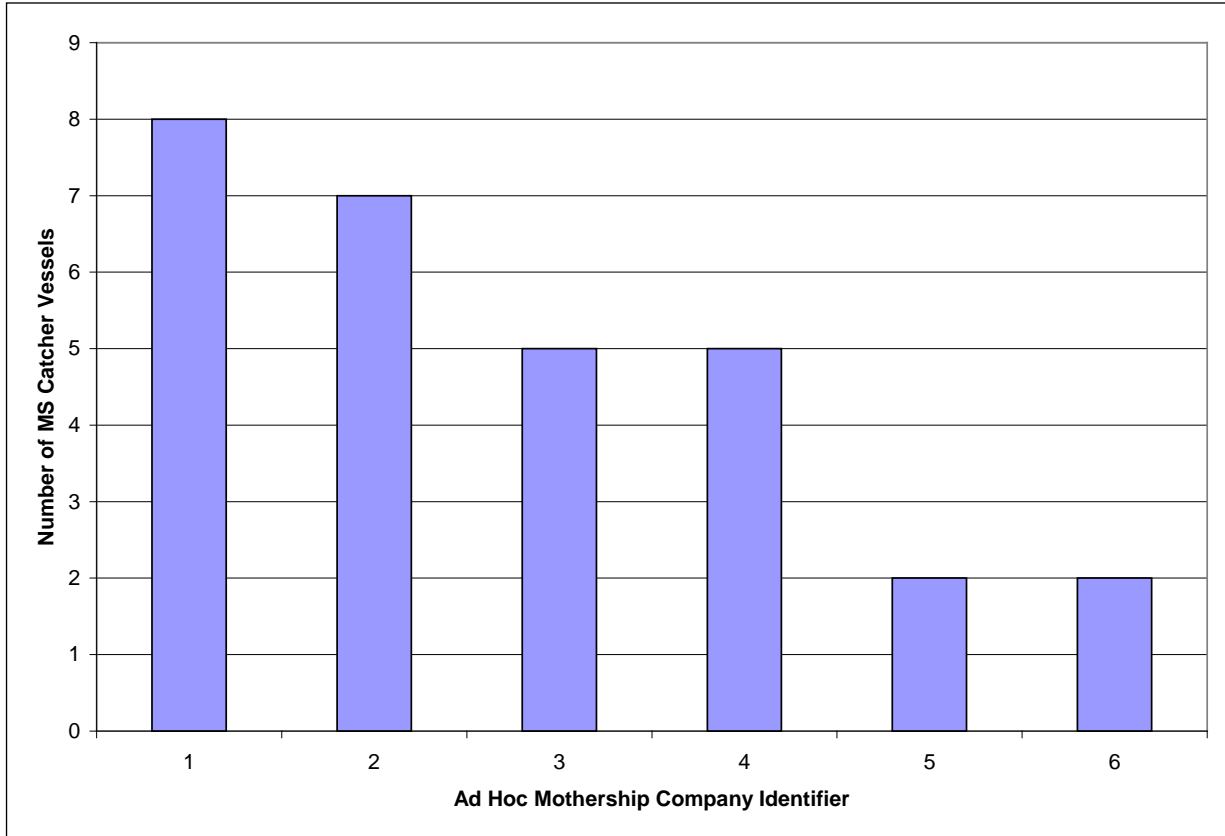


Figure 4-33. Catcher vessel mothership linkages under Alternative 3.

The risk to profits posed by Alternative 3

Nonwhiting trawl fishery

Under this alternative, the risk to harvester profits in the nonwhiting sector from species with low trawl allocations and the presence of thin market conditions is largely the same as under Alternatives 2a, 2b, and 2c. Alternative 3 differs from Alternatives 2a, 2b, and 2c in the initial allocation rules specified for this alternative, the lack of a carry-over provision, and the establishment of four trawl sectors.

In order to manage risk, it is likely that harvesters in the nonwhiting sector will form voluntary risk-sharing arrangements, or pools, where harvesters are expected to transfer quota among themselves to cover unexpected catch events—particularly for low OY or thin market species for which quota may be expensive or difficult to find. In comparison to all other alternatives, the initial allocation rules specified under this alternative, and the lack of a grandfather clause, are arguably the most conducive to the development of such risk sharing arrangements. This is because the initial allocation of overfished stocks is more responsive to need than in Alternatives 2a, 2b, and 2c. This is true for overfished stocks because the initial allocation is made on a basis that is relative to the allocation of target species and the fishing locations and practices of individual vessels (referred to as a bycatch rate allocation approach).

While the amount of overfished species allocated to individual permit holders varies widely depending on the species, the reason for such wide variation is—in short—due to data indicating which permits need more or less overfished species to prosecute target strategies. This approach places harvesters on a relatively even playing field in terms of the amount of overfished species quota each permit holder needs and makes permit holders more likely to enter into sharing agreements as individual permit holders are not likely to be in a strong position, which can upset such voluntary sharing arrangements. The lack of a grandfather clause limits the amount of overfished stocks any one entity can hold. As discussed in previous sections, this facilitates the formation of voluntary risk pools that are stable over the long term.

The lack of a carry-over provision in this alternative increases risk to individual harvesters. Since harvesters cannot carry over a deficit from one year to the next, harvesters would have to purchase QPs to cover an unexpected catch event that puts them into a deficit condition or face an enforcement action. Both of these outcomes could prove quite costly, and this potential cost increases the risk of fishing in areas where low allocation species and thin market species are found. This increases the likelihood that harvesters will forego harvest opportunities for some target species associated with overfished and nearshore rockfish species to avoid such risks.

Finally, the establishment of four trawl sectors rather than three increases risk because the shoreside nonwhiting and shoreside whiting harvesters cannot transfer needed quota to one another. The result is that the nonwhiting sector may be constrained or may shut down prematurely even if quota is available in another sector. In the nonwhiting sector, species such as Pacific whiting (which is commonly caught as bycatch) may inadvertently constrain or shut down nonwhiting harvest opportunities even if substantial amounts of Pacific whiting quota are available in the shoreside whiting sector. This increases the risk that available harvest volumes will not be attained in the nonwhiting sector.

Shoreside and mothership whiting trawl fishery

Under this alternative, Pacific whiting is allocated to shoreside and mothership harvesters, but no other species are so allocated. Bycatch species are covered through a common bycatch limit that stretches across harvesters in all three Pacific whiting sectors. This means that there is no individual accountability for bycatch species (except through peer pressure), and transfers of bycatch species quota cannot occur. A quota market for those species cannot develop under this alternative, and the risk to individual harvesters posed by markets for low allocation and thin market species is low because they will not face the possibility of purchasing costly quota due to unexpected catch events. However, there is a collective risk, which can impact many, or all, harvesters in the Pacific whiting sectors.

The fact that all three sectors of the whiting fishery are likely to close if one or more bycatch limits is reached creates the conditions necessary for a de facto race for fish via a race for bycatch species, as described previously. Under such conditions, more capital is likely to be employed than necessary (increasing costs in the fishery), and the greater business planning typically associated with rationalization is likely to be compromised. Under such conditions, gross revenues in the fishery are put at risk, and the cost efficiencies expected because of fleet consolidation are not likely to be realized. When combined with the lack of business planning possible under such race for fish conditions, the end result of this alternative on Pacific whiting harvesters is likely to be highly similar to Alternative 1 conditions with higher harvesting costs than necessary, harvest timing that is less than optimal, and the possibility that several harvesters could see their catch opportunities preempted by other harvesters because of the common bycatch limit.

Whether harvesters engaged in Pacific whiting harvest opportunities are able to agree on a strategy to successfully manage bycatch to the benefit of all the harvesters involved in the fishery will determine

the success of this common bycatch limit. If existing conditions serve as a guide, the number of harvesters engaged in the whiting fisheries is sufficiently large to limit the ability that these harvesters will agree to successful bycatch management conditions.

The establishment of four trawl sectors does not necessarily impose risks to individual shoreside Pacific whiting harvesters under this alternative like occur in the nonwhiting sector. Nontarget catch in the shoreside whiting fishery is bundled with the at-sea whiting fisheries through a bycatch limit that is common to all three whiting sectors. If the shoreside whiting fishery was separated from the nonwhiting fishery through the establishment of four sectors and was accountable for its own sector-specific catch, then the establishment of four sectors would impose risks like those in the nonwhiting sector, because of the hard allocations and the resulting limited flexibility.

Table 4-35. Summary of the effect of Alternative 3 on risk to profits.

Nonwhiting Catcher Vessels	High level of risk is created by thin market conditions and by individual accountability of low OY and low trawl allocation species. The initial allocation of overfished species Qs based on a bycatch rate, combined with the lack of a grandfather clause—particularly for overfished species—creates the most favorable conditions for forming risk pools among all alternatives. The presence of four trawl sectors may jeopardize the ability of harvesters to achieve the full trawl sector allocation of some target species.
Shoreside Whiting Catcher Vessels	The risk associated with setting a fishery-wide bycatch limit is likely to erode, or eliminate, the gains expected of rationalization if bycatch limits are constraining. This may lead to a fishery that resembles Alternative 1, Olympic fishery conditions, even though cooperatives form among harvesters.
Mothership Catcher Vessels	The risk associated with setting a fishery-wide bycatch limit is likely to erode or eliminate the gains expected of rationalization if bycatch limits are constraining. This may lead to a fishery that resembles Alternative 1, Olympic fishery, conditions, even though cooperatives form among harvesters.

Fishing vessel safety

Safety conditions in the nonwhiting sector are expected to be very similar to those in Alternative 2c. In the nonwhiting sector, safety improvements should occur because of the increase in profitability expected with this alternative. Such improvements in profitability are expected to improve maintenance on vessels, and this improved maintenance should lead to less hazardous conditions. In addition, enhanced harvest flexibility created by rationalization decreases the potential that harvesters will feel the need to fish during unfavorable weather conditions.

Because of the bycatch management conditions in the whiting fishery under this alternative, harvesters in the mothership and shoreside whiting sectors are not likely to see an improvement in safety conditions over Alternative 1. The incentives given to harvesters under this alternative encourage Olympic-like behavior that adversely impacts potential profit and provides incentives for harvesters to fish during unfavorable weather conditions. However, in the event that harvesters are able to form successful bycatch management pools, revenues should be expected to increase and fishing patterns should be expected to be more rational; therefore, safety conditions should improve.

Table 4-36. Summary of the effect of Alternative 3 on safety.

Nonwhiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance.
Shoreside Whiting Catcher Vessels	No change from Alternative 1.
Mothership Catcher Vessels	No change from Alternative 1.

4.6.3.6 Alternative 4a

The effect of Alternative 4a on harvesters can be described as falling between the effects seen in Alternatives 2a through 2c and Alternative 3. The way in which Alternative 4a differs from the other alternatives is predominately the result of the initial allocation formula, the presence of a grandfather clause, the lack of an initial allocation to processors, the combination of both shoreside sectors into one, bycatch management at the co-op level in the at-sea fisheries, and the presence of an adaptive management provision. The presence of an area management provision may have an effect on ex-vessel revenue if large-scale gear switching occurs off specific areas of the coast. Other elements of this alternative differ, but do not appear to have a noticeable effect on the outcome.

Shoreside whiting and nonwhiting harvesters are expected to see profits improve under this alternative, but encounter risks associated with low allocation and thin market species as in other IFQ alternatives. The presence of a carry-over provision reduces this risk somewhat, as does the bundling of both shoreside sectors into one sector. This merging of the two shoreside sectors provides the opportunity that harvesters focusing on nonwhiting species can trade quota with harvesters focusing on shoreside whiting when necessary to achieve such outcomes as the covering of catch deficits. Combining the two sectors into one expands the pool of quota available, reducing risk.

Harvesters in the mothership sector see profits improve under this alternative. Risks to individual harvesters are higher than under Alternative 1 because individual cooperatives are held accountable for bycatch, but risks to the collective fleet (risk of a race for bycatch) are minimal. The individual risk posed by this alternative can be overcome by allowing inter-cooperative agreements to manage bycatch and their subsequent development. Such agreements allow cooperatives to share bycatch, thereby spreading the risk of unexpected catch events.

The effect of Alternative 4a on vessel profits and fleet efficiency

Nonwhiting trawl harvesters

The profits that nonwhiting harvesters make under this alternative are expected to be largely similar to those seen in Alternative 2a. This profit comes from fleet consolidation, higher catch of under-utilized target species, and from increased negotiation power over ex-vessel prices with processors compared to Alternative 1. Higher ex-vessel prices are the result of the initial allocation being made to LE trawl permit holders. Over the long run, the negotiation power is expected to remain in the harvester's favor because of the accumulation limits. These accumulation limits result in a de facto limit on the amount of quota that the processing sector can acquire over the longer term. Since scale economies tend to result in a fewer number of processors than there are harvesters, small accumulation limits make it difficult for the processing sector to acquire much quota in the aggregate. While these accumulation limits appear to restrict the amount of quota that the processing sector may acquire over the longer term, they do not appear to restrict fleet consolidation, and, therefore, they do not appear to restrict the cost

savings associated with the expected degree of fleet consolidation. The minimum number of vessels remaining in the fishery under this alternative is 23.

Gear switching provides another source of potential revenue because it allows vessels to capitalize on market conditions that may be more favorable for nontrawl caught groundfish. However, gear switching in combination with an area management provision included under this alternative may mean that catch and ex-vessel revenues are lower than expected. If large-scale gear switching occurs off one particular area of the coast, the catch of flatfish stocks may be foregone because fixed-gear is relatively less effective at catching those species. Since the area management provision does not allow the harvest of that quota in another area, trawl vessels may find it difficult to access those stocks because of long transit distances to fishing grounds where area-specific IFQ could be used. For example, trawl vessels in the north may, at times, travel south to harvest available flatfish, but the large travel cost involved may act as a financial deterrent, meaning that much of the harvest of flatfish in the southern area is foregone.

The adaptive management provision would have the same effect as described for Alternatives 2b and 3: it tends to put downward pressure on profits. As noted previously, since adaptive management only uses 10 percent of the quota, the effect should be minor.

The accumulation limits for nonwhiting quota are not substantially different from the other alternatives. Fleet consolidation and associated cost savings do not appear to be encumbered by the vessel limits. Furthermore, the control limits appear to make it difficult for a large amount of quota to leave the harvesting sector, meaning that an erosion of ex-vessel price negotiation power is not expected to occur over time in this alternative. As under all the other alternatives, while increased levels of profit are expected, there is some uncertainty associated with the level of profit because of the presence of low allocation and thin market species, and the response that harvesters will have to such conditions.

Shoreside whiting trawl harvesters

Pooling of a common IFQ for shoreside whiting and nonwhiting trawl harvesters and the initial allocation formula will make the effects of this alternative different from Alternatives 2 and 3. As discussed under the section describing the expected effects of alternative elements, establishing four trawl sectors may make it difficult to attain the full trawl allocation, while establishing three trawl sectors will allow quota trading and enhanced opportunities between both shoreside sectors. Shoreside whiting harvesters should see profits improve over Alternative 1 conditions because of fleet consolidation, enhanced operational flexibility, and enhanced opportunities for business planning. Because 50 percent of the shoreside whiting allocation is made to processors, ex-vessel prices for shoreside whiting harvesters should be lower than under Alternatives 2a and 2b where there is no initial allocation to processors. Furthermore, many harvesters will see their harvest opportunities reduced with a 50 percent processor initial allocation, unless they are able to enter into agreements with processors to harvest some of the quota allocated to those processors.

As noted previously, some processors hold LE trawl permits, and those processors will receive quota allocated both to permits and to processors, resulting in an allocation to the processing sector that exceeds 50 percent. The following figure shows the estimated share of shoreside whiting that would be allocated to processors and harvesters under Alternative 4a.

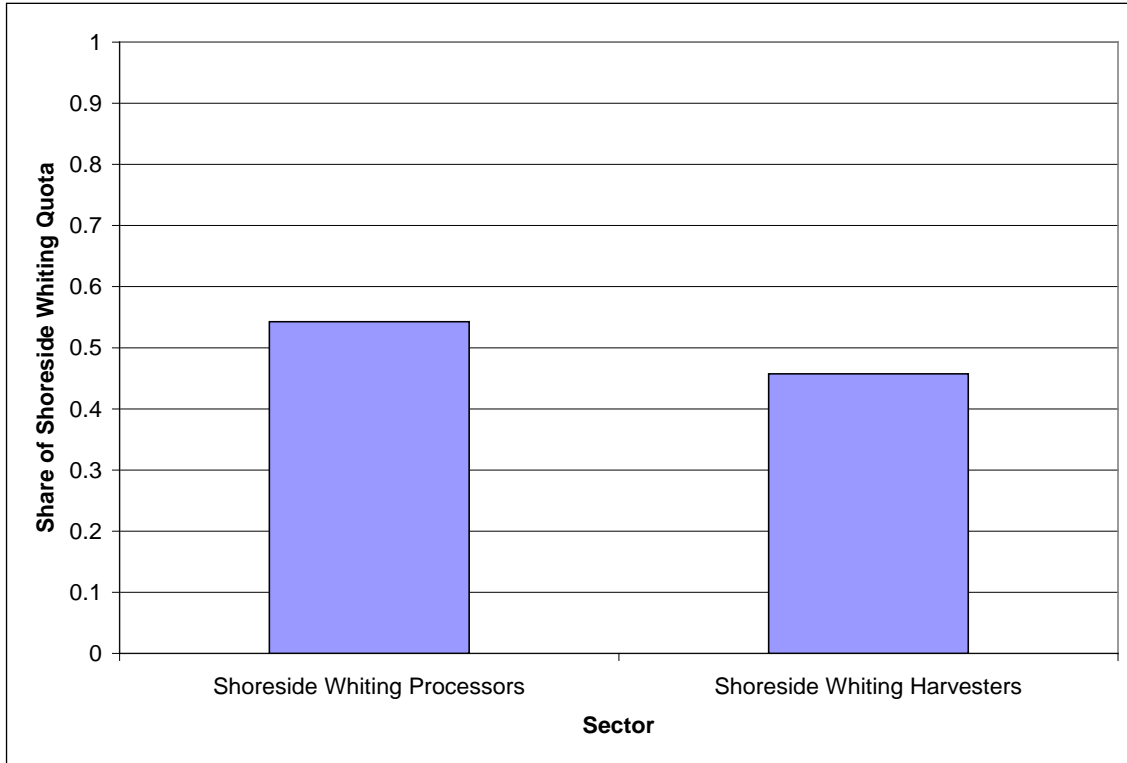


Figure 4-34. Allocation of shoreside whiting quota to harvesters and processors under Alternative 4a.

The same risks when IFQ is applied, of thin market and low allocation species, described earlier in Section 4.6.2.4, may cause shoreside whiting harvesters to fish further out along the continental shelf and slope and incur higher costs than under Alternative 1. These higher costs will put downward pressure on profits.

The accumulation limits in this alternative do not appear to restrict vessel consolidation, meaning that cost efficiencies that may be gained through consolidation are likely to occur in this alternative. However, the control limits allow entities to consolidate the ownership of shoreside whiting quota to a relatively large degree. The control limits are set at 25 percent for shoreside whiting under this alternative, the highest shoreside whiting control limit of any alternative. If processors find efficiencies through vertical integration, processor ownership of Qs may continue to grow with time as processors acquire additional shoreside whiting quota, resulting in a decreasing price paid to independent harvesters. If such vertical integration occurs, this alternative is likely to result in the lowest ex-vessel prices received by shoreside whiting harvesters of any of the alternatives.

Mothership trawl harvesters

Harvesters in the mothership sector see profits improve under this alternative because of fleet consolidation and because of enhanced flexibility in harvest timing and business planning. The certainty of these greater profits is highest under this alternative compared to all other alternatives, because the combined individual and collective risks associated with this alternative result in the lowest overall risk compared to all other alternatives, including Alternative 1. This concept is discussed in more detail in Section 4.6.2.4 (page 301), describing risk.

This alternative includes the harvesters-processor linkage, but, unlike Alternative 3, only 50 percent of the catcher vessel catch history is obligated to the linked processor. This partial linkage allows harvesters to shop around and use the market for half of their catch history, thus providing harvesters with a mechanism to attain higher ex-vessel prices than under Alternative 3. Establishing only a partial linkage injects strong market mechanisms into the relationships between motherships and catcher vessels. This will tend to change the way negotiations occur over the linked catch history, since harvesters can leverage those negotiations with the unlinked catch history. Therefore, it is reasonable to expect that the ex-vessel prices for linked processor deliveries would be higher than under Alternative 3 where a full linkage exists. Ex-vessel revenue would also be higher than under Alternative 2c where 50 percent of the IFQ is given to processors. Under Alternative 2c, processors have the ability to find a harvester willing to prosecute their quota at prices that the processor finds favorable. Under this alternative, where only a portion of the catch history is connected to motherships, those processors/motherships do not have control over catch history and, therefore, have a more limited ability to negotiate prices. This would tend to work in the harvesters' favor.

Table 4-37. Summary of the effect of Alternative 4a on profits.

Nonwhiting Catcher Vessels	Fleetwide profit is expected to increase as a result of increased target species catch and fleet consolidation, though actual estimates are uncertain because of the risks posed by thin market and low allocation species. Ex-vessel prices are expected to be higher than Alternative 1 because of the initial allocation made to permits and the resulting negotiation power harvesters will have over ex-vessel prices. Gear switching and flexible harvest timing also provide opportunities to capitalize on favorable market conditions. Area management may result in lower ex-vessel revenue for the fleet as a whole than would otherwise occur if large-scale gear switching occurs in certain areas of the coast, because flatfish catch may be foregone from those areas. An adaptive management provision will tend to have a minor, downward effect on profit because it works counter to a market system. Accumulation limits do not appear to restrict fleet consolidation and will tend to result in QS remaining with harvesters.
Shoreside Whiting Catcher Vessels	Fleetwide restructuring is expected to occur through fleet consolidation and improvements in harvest timing flexibility. Ex-vessel prices are expected to be the lowest under this alternative compared to all other alternatives because of the amount of quota allocated to processors and the relatively large control limits which allow processors to acquire more QSs over time. The risks posed by thin market and low allocation species may force harvesters to incur greater costs as they travel further in order to avoid areas where these species are found.
Mothership Catcher Vessels	Fleetwide profit is expected to increase as a result of fleet consolidation and improvements in harvest timing flexibility and because of the ability to use unlinked catch history to negotiate favorable prices. There is some limited uncertainty regarding potential profits because of risk associated with bycatch management at the cooperative level, and because of the presence of a noncooperative fishery. That risk is relatively small.

The distribution of profits under Alternative 4a

As in the other alternatives, the effect of individual accountability will tend to encourage those harvesters who have historically fished in areas where constraining stocks are more abundant to move to another area, or to sell their quota. This may distribute trawl activity toward those harvesters who fish in areas where such stocks are less abundant and away from harvesters who fish in areas where they are

more abundant. This concept was discussed in more detail in Section 4.6.2 (page 289) under broad level effects.

In the nonwhiting trawl sector, the distribution of harvest privileges is similar to that of Alternative 2c; however, in contrast to Alternatives 2b and 3, because the adaptive management provision is used for more than just adversely impacted processors in this alternative, the geographic distribution of these shares is expected to be different. In cases where adaptive management is used to encourage the use of bycatch-friendly gear, the distribution of adaptive management quota may go toward harvesters who would use bycatch-friendly gear regardless of the presence of adaptive management. For example, those harvesters who are located off central California and northern Washington may elect to switch to fixed-gear because of public relations issues, market conditions, and bycatch reasons. Allocating adaptive management to these harvesters would allow them to harvest more groundfish than otherwise would be the case, but may not induce additional vessels to switch to fixed-gear. In areas where the aforementioned incentives for vessels to switch to fixed-gear are not present, the use of adaptive management quota may create another incentive for gear switching. This redistribution of shares would tend to provide access to higher amounts of groundfish to those harvesters who are recipients, and may in turn provide a redistribution of profits toward those harvesters.

In the shoreside whiting fishery, the use of adaptive management quota to encourage bycatch-friendly gear is not likely to induce gear switching from trawl gear to another type of gear because Pacific whiting harvesters rely on high volume. It may, however, encourage the modification of midwater trawls so that they successfully reduce the bycatch of overfished stocks or salmon. Distributing adaptive management quota to those harvesters who alter their midwater trawls may provide benefit to those harvesters, but it is likely to reduce overall, fleetwide profit because the use of adaptive management encourages an outcome that is contrary to the one purely driven by the market. If a modified midwater trawl gear has a lower catch rate of whiting, but also reduces salmon bycatch, harvesters may only use that gear as long as they are recipients of adaptive management quota. If that adaptive management quota is redirected to another use, those harvesters may revert to the unmodified, higher bycatch gear. Therefore, the effect that an adaptive management provision has on profits in this case is only as permanent as the location/distribution of that adaptive management quota.

The initial allocation of Qs (applicable to the shoreside sectors only) with equal sharing of trawl buyback catch history will allot shoreside whiting to harvesters in the nonwhiting trawl fishery who have not historically participated in the whiting fishery and allocate nonwhiting groundfish to shoreside whiting harvesters who have not historically participated in the nonwhiting fishery. Figure 4-35 and Figure 4-36 show that there would be 121 nonwhiting quota recipients (compared to 116 when no buyback history is shared). The number of shoreside whiting quota recipients is 139, though approximately 90 of these recipients receive close to zero Qs while the largest five recipients receive 47 percent of the Qs. The distribution of quota/catch history in the mothership sector under this alternative is the same as in Alternative 3 (except for the accumulation limit) and is, therefore, not repeated here.

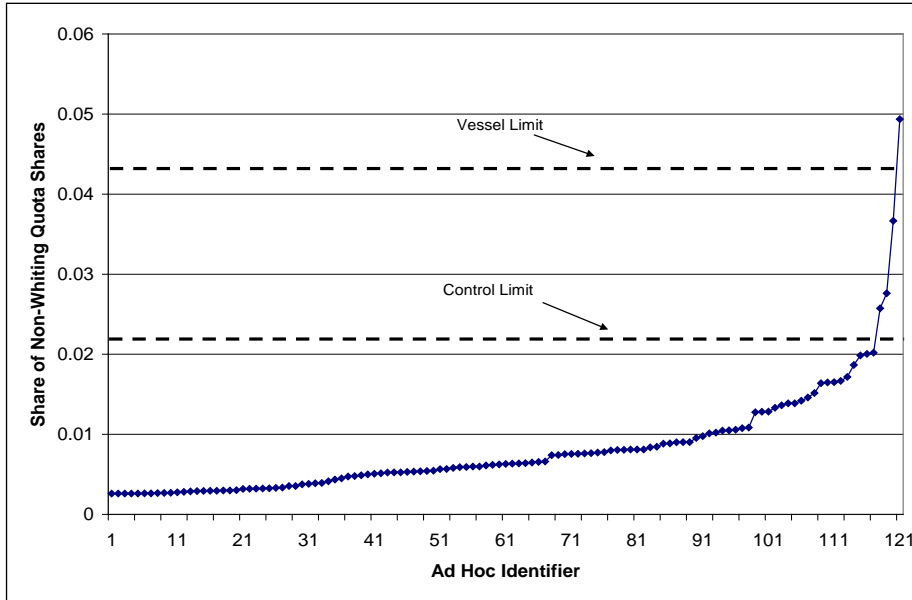


Figure 4-35. Distribution of aggregate nonwhiting QSs and accumulation limits under Alternative 4a.

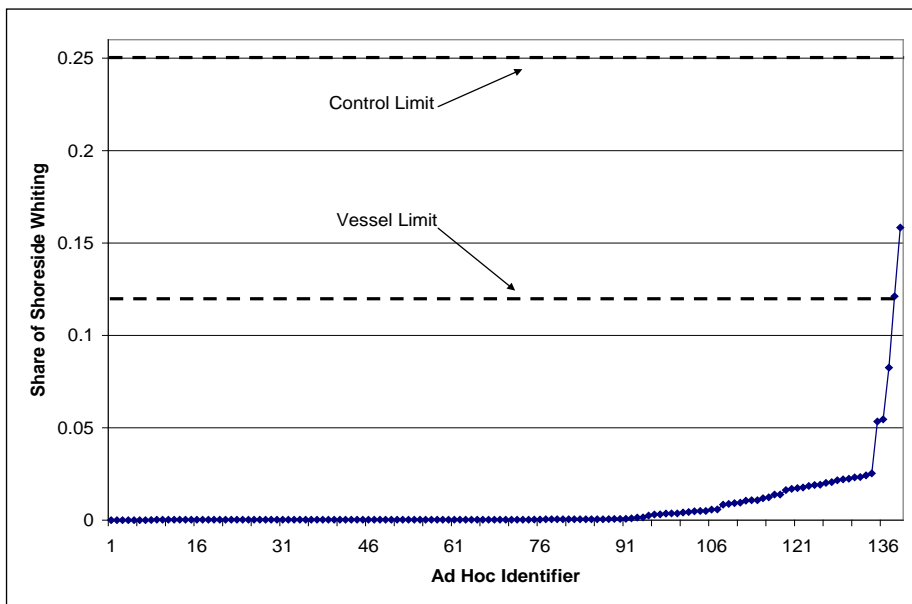


Figure 4-36. Distribution of shoreside whiting quota under Alternative 4a.

The distribution of catch history to mothership catcher vessels under Alternative 4a is the same as under Alternative 3, but with higher accumulation limits (see Figure 4-37). In addition, only half of the catch history is linked to a mothership. Under this alternative no catcher vessels would be constrained by the accumulation limit.

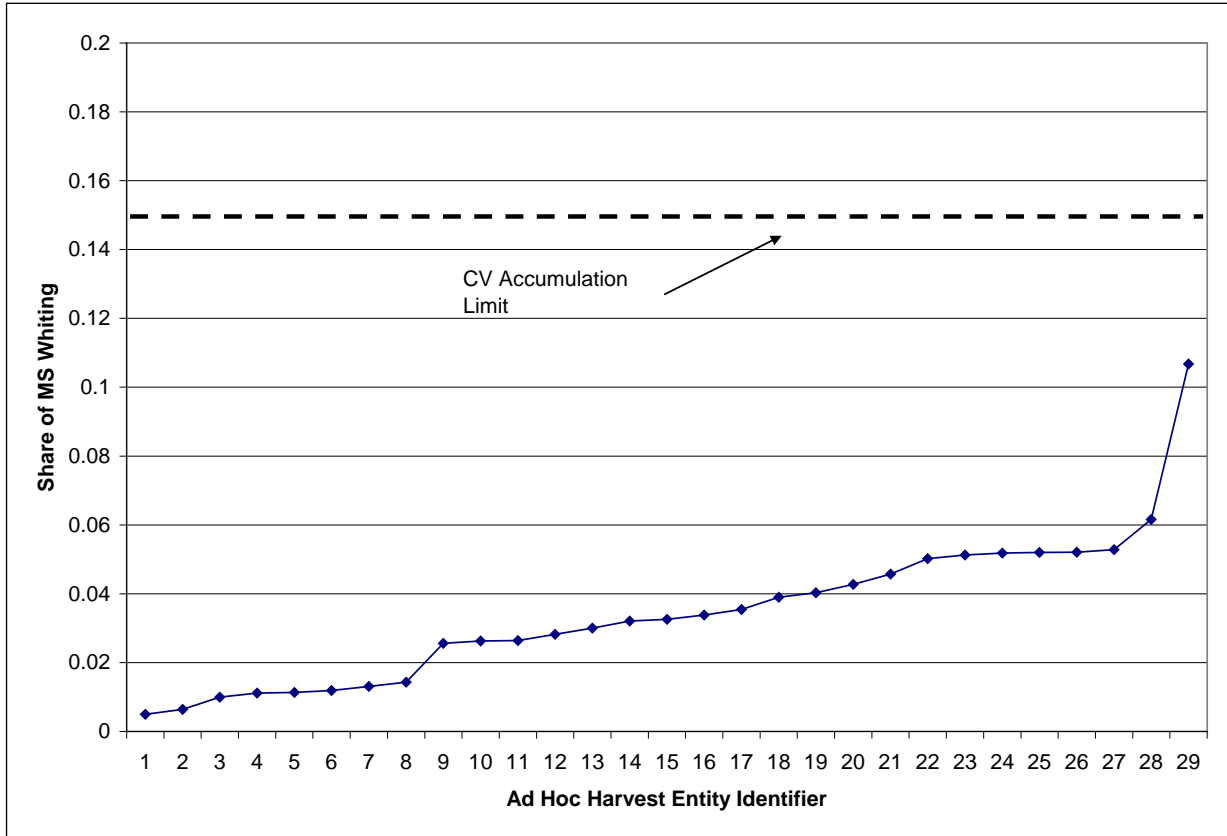


Figure 4-37. Distribution of mothership catcher vessel catch history under Alternative 4a.

The risk to profits posed by Alternative 4a

Nonwhiting trawl harvesters

As under Alternatives 2a through 3, because of the presence of thin market and low allocation species, harvesters may avoid fishing in nearshore and continental shelf areas, thus foregoing the harvest of target species in these areas. This disincentive may be counterbalanced by the ability for nonwhiting trawl harvesters to form and maintain risk pools, which is much greater in this alternative compared to Alternatives 2a, 2b, and 2c, but is lower than Alternative 3. The allocation of overfished stocks based on a bycatch rate results in a more equitable distribution of QSs for these species. The equal sharing of buyback catch history has the same effect for non overfished species. Overall, these two provisions tend to put individual harvesters in a more equal negotiation stance, thus fostering the ability of harvesters to form mutually beneficial risk pooling arrangements. However, in contrast to Alternative 3, the inclusion of a grandfather clause (particularly for constraining stocks) counterbalances more equitable distribution of QSs; that is why this alternative is judged to be less conducive than Alternative 3 for the formation of risk pools.

Like Alternatives 2a through 2c, three trawl sectors makes it more likely that harvesters will be able to attain the full trawl sector allocation than under Alternative 3, where there are four trawl sectors. The catch of sablefish in the shoreside whiting sector, in particular, varies fairly substantially from year to year. Since this alternative has three trawl sectors (one shoreside sector), it is likely that this alternative has a higher probability of attaining the trawl sector allocation than Alternative 3.

Shoreside whiting trawl harvesters

The presence of low allocation and thin market species creates risk to individual harvesters in the shoreside whiting fishery. This risk would have similar effects on the geographic distribution of fishing as described for other sectors that are managed with IFQs. These effects include possible avoidance of areas where constraining species are found, and longer travel distances to reach low bycatch areas. These risks are the same under this as under Alternatives 2a through 2c. Like Alternatives 2a through 2c, three trawl sectors create a single IFQ pool for shoreside whiting and nonwhiting harvesters and give harvesters the flexibility to transfer quota as needed through the market. This allows harvesters to be relatively adaptable to changes in catch conditions from year to year.

Mothership trawl harvesters

In contrast to Alternative 3, collective risk (the risk of a race-for-fish because of bycatch) to harvesters in the mothership sector is minimal under this alternative because the allocation of bycatch species to co-ops insulates harvesters in separate co-ops from one another. The presence of the noncooperative fishery poses some risk to harvesters in the cooperatives because the noncooperative fishery is structured in a manner that creates the incentives necessary for an Olympic fishery to develop. Harvesters fishing under such conditions are less likely to fish in a manner that effectively reduces bycatch, thus increasing the potential of a disaster tow occurring. This risk posed to the cooperatives can be overcome through the establishment of provisions like a noncooperative fishery bycatch buffer or through more stringent area management conditions. For example, a bycatch buffer placed on the noncooperative portion of the fishery would insulate the cooperatives if a disaster tow occurs in the noncooperative fishery that causes that portion of the fishery to exceed its bycatch amount.

Individual risk to mothership harvesters (the risk to individuals posed by unexpected catch amounts of bycatch species) is lower in this alternative than in Alternatives 2a through 2c (IFQs) because of the lack of individual quota for thin market and low allocation species and the associated costs and/or penalties associated with deficit conditions associated with an IFQ program. However, there are some risks to individual harvesters—and harvesters associated with one another in a cooperative—through the bycatch limits that are set at the cooperative level. Bycatch limits established at this level reduce the spreading of individual risk that occurs if bycatch limits apply to the whole whiting sector as under Alternative 3 and, as a result, impose more burden—and risk—to the individual harvesters in a cooperative. This risk is imposed on other harvesters in that cooperative. If one harvester has a disaster tow of a bycatch species, the entire cooperative may be shut down, and other harvesters in that cooperative may have their fishing opportunity preempted by that event. Such an event can be avoided through the presence of inter-cooperative agreements to manage and share bycatch. This type of an agreement would tend to develop among cooperatives that find it mutually beneficial to do so. This agreement would spread the risk of unexpected catch events across more participants, thus reducing the likelihood that harvesters will have their opportunities preempted by the unexpected catch of another harvester because the larger collective bycatch limit established through the inter-cooperative agreement may be able to absorb such events. In addition, bycatch limits set at the cooperative level will most likely lead to the development of cooperative agreements that impose a high degree of individual accountability of bycatch on harvesters within that cooperative. This will likely occur because cooperatives will have to internalize the management of bycatch, and the likelihood of one cooperative forming an inter-cooperative agreement with another cooperative may likely depend on the strength and success of the bycatch management plan contained in the individual cooperative agreements.

Table 4-38. Summary of the risk to profits posed by Alternative 4a.

Nonwhiting Catcher Vessels	High level of risk to profits is posed by the presence of thin market and low allocation species. The allocation of overfished stocks on a bycatch rate creates conditions that are conducive to the forming of risk pools. But this alternative is less conducive to the forming of such pools than Alternative 3 because of the presence of a grandfather clause (particularly for overfished stocks) allowing entities to hold in excess of accumulation limits. The existence of three trawl sectors minimizes risk associated with unexpected catch events because of a larger pool of available quota.
Shoreside Whiting Catcher Vessels	High level of risk to profits is posed by the presence of thin market and low allocation species. The bycatch rate allocation approach is conducive to the formation of risk pools. The existence of three trawl sectors minimizes risk because of a larger pool of available quota.
Mothership Catcher Vessels	There is relatively low risk to individuals and relatively low collective risk (risk of a race for bycatch). Individual risk can be further minimized by allowing intercooperative agreements to develop to manage bycatch across co-ops. Collective risk can be minimized by establishing provisions on the noncooperative fishery such as bycatch buffers and area management.

Fishing vessel safety

Fishing vessel safety is expected to improve for all harvesters under this alternative, except possibly those harvesters who elect to participate in the noncooperative portion of the mothership fishery. While Alternative 3 has a noncooperative portion of the fishery, these alternatives differ because of the manner in which bycatch is managed. Under this alternative, higher profits would tend to lead to better maintenance, which would enhance harvester safety. Safety is also improved because of the flexibility in harvest timing that occurs as a result of rationalization and the fact that a successful rationalization program will eliminate the perceived need to fish during hazardous conditions. Those harvesters who participate in the noncooperative fishery may not see safety improvements because of the Olympic conditions that exist in this portion of the fishery. Such conditions provide incentives to fish during times of unfavorable weather, eroding potential safety gains. However, assuming that the time spent in the noncooperative portion of the fishery is temporary, harvesters in the mothership sector should see safety improve, except perhaps during times when they are participating in the noncooperative fishery.

Safety conditions in the nonwhiting sector are expected to be the same as under Alternatives 2a and 2b.

Table 4-39. Summary of the effect of Alternative 4a on safety.

Nonwhiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance.
Shoreside Whiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance. Rationalization expected to eliminate Olympic conditions, thus allowing harvesters flexibility and eliminating the incentive to fish in hazardous conditions.
Mothership Catcher Vessels	With the exception of those harvesters who spend time in the noncooperative portion of the fishery, harvesters should see safety conditions improve because of improved vessel maintenance and elimination of the incentive to fish in hazardous conditions.

4.6.3.7 Alternative 4b (Council Preferred)

Alternative 4b is intended to reflect the Council's preferred alternative for rationalization of the LE trawl fishery. The Council's preferred alternative includes several measures not part of Alternatives 2a through 4a, but includes other measures that are similar, if not the same, as many other measures included in Alternatives 2a through 4a.

Several distinct differences exist between Alternative 4b and the other alternatives. These differences include a divestiture period for which QS holders may transfer QSs to comply with accumulation limits, a mothership-catcher vessel declaration requirement that has some similarities but some noteworthy differences from a linkage, a distinct set of groundfish species and Pacific halibut being covered with the rationalization program rather than all groundfish, a 10 percent AMP set aside of nonwhiting species that goes into effect in year three of the trawl rationalization program, a carry-over that declines if a groundfish OY declines, an initial allocation of 20 percent of shoreside whiting to shoreside processors, and a catcher vessel usage limit for the mothership cooperative program that acts similarly to a vessel accumulation limit in an IFQ fishery. Also, the Council's preferred alternative for trawl rationalization intersects with the Council's preferred alternative for Intersector Allocation. Alternative 4b uses the Council's preferred alternative for Intersector Allocation in the analysis, and these sector level allocations result in some noteworthy effects on the fishery.

Many effects of Alternative 4b are similar to the other alternatives. Nonwhiting trawlers are expected to receive an ex-vessel price from processors that is similar to that received in Alternative 4a because of the amount of QSs allocated to processors and because the nonwhiting control limits are similar to other alternatives, restricting the ability for processors to acquire QSs over time and reduce ex-vessel prices over time. Consolidation in the fishery is expected to occur in a manner that is the same as in other alternatives because vessel limits do not appear to be specified at a level that would restrict the amount of consolidation estimated to occur in a free-market condition. However, the control limits will restrict the influence that any given entity can have over the fishery, and these control limits may impact some entities (those entities will have to divest of their quota within four years of the start of the trawl rationalization program). The risk faced by harvesters is less in Alternative 4b than in Alternatives 2a, 2b, 2c, 3, and 4a because some rarely encountered species are not managed with IFQs or catch history as may be the case with harvest cooperatives. However, risk is greater than in Alternative 1 because vessels are held individually accountable for total catch of most groundfish in the ABC/OY table, including constraining/rebuilding species, which can be caught in unexpectedly large volumes. Since harvesters in Alternative 1 are only held accountable for landed catch (and can, thus, discard unexpectedly high volumes of catch), imposing accountability for landings and discard imposes risk due to the uncertain nature of fishing and the fact that larger volumes of catch can occur than what is expected. If that unexpected catch puts a vessel into a deficit condition, the cost of acquiring quota to cover that deficit can prove quite costly, especially in the case of depleted, constraining, species. However, imposing such individual accountability creates opportunities that are arguably greater than under Alternative 1 conditions. Such individual accountability encourages vessels to modify gear and behavior to access target species to a greater degree than allowed under the existing command and control conditions. This potential was discussed under the section describing broad level effects on trawl harvesters.

The fact that both shoreside sectors are combined into a single sector under Alternative 4b alleviates some of the potential that a species may become unexpectedly constraining to one of the shoreside sectors. If one shoreside sector encounters unexpectedly high amounts of a certain species, that sector can compensate by purchasing quota of that species from the other shoreside sector. This provides a form of alleviation of risk compared to a case where hard allocations are set up between sectors. If hard allocations are specified across sectors, and one sector experiences higher than expected catch of one or

more species during a year, there are fewer mechanisms available for dealing with that unexpected catch rate, and the result (in the worst case alternative) may mean premature closure of that particular fishery.

Since Alternative 4b allocates overfished stocks on a bycatch rate, the formation of risk pools is more likely to occur and remain intact over the longer term. It is expected that overfished stocks will continue to play a major role in the access to target species, meaning that those who hold overfished species quota could control much access to the entire fishery. Since overfished species are allocated in a manner that responds to what individual permits will need based on their target species quota and where they prefer to fish, it is less likely that a single entity will play a dominate role, making the formation of mutual agreements necessary for the formation of risk pools more likely. This concept was described previously in the discussion contrasting cooperative-based systems and individual-based systems. While a voluntary risk pool designed to work as an insurance mechanism is not formally a harvest cooperative, it does have many similarities.

Harvesters in the shoreside whiting portion of the fishery are expected to generate higher profits under Alternative 4b when compared to Alternative 1 and Alternative 4a. Ex-vessel prices received for shoreside whiting should be somewhat higher than Alternatives 2c, 3, and 4a because 20 percent of the shoreside whiting is allocated to processors, whereas Alternatives 2c, 3, and 4a allocate more than 20 percent to shoreside processors. Furthermore, ex-vessel prices paid to shoreside harvesters may remain higher over time under Alternative 4b than Alternatives 4a, 3, and, to some extent, Alternatives 2a, 2b, and 2c because the control limits are smaller. Smaller control limits will tend to restrict the ability of processors to acquire Qs over time. If such acquisition occurred, it would tend to result in lower ex-vessel prices over time. Ex-vessel prices received for nonwhiting should be somewhat higher than for Alternatives 2c, 3, and 4a because processors do not receive an initial allocation of nonwhiting species. This effect should remain largely intact over the long term as the accumulation limits are specified at a level that would tend to make it difficult for processors to vertically integrate to an appreciable degree.

Harvesters in the mothership portion of the fishery are expected to have greater revenues under this alternative compared to Alternatives 2c, 3, 4a and Alternative 1 (status quo). It is not clear how they fare relative to Alternatives 2a and 2b. If there is a notable difference, though, harvesters will likely be somewhat worse off under Alternative 4b compared to Alternatives 2a and 2b since a catcher vessel in a cooperative must deliver to a single mothership during the course of a year. The fact that Alternative 4b does not require a mothership linkage, but does require an annual mothership declaration, means that harvesters would likely to find it easier to switch motherships, similar to what happens under Alternative 1 conditions and Alternatives 2a and 2b. Furthermore, the fact that mothership catcher vessels will not have to participate in a noncooperative fishery to switch motherships means that participation in the noncooperative portion of the fishery should be minimized. This, in turn, reduces the risk of a disaster tow occurring as a result of race for fish conditions that may be present in a noncooperative fishery and also provides more certainty to individual harvesters that they will have access to their catch history instead of competing with other vessels in the noncooperative fishery, which could be the case if they switched motherships under a linkage provision.

The effect of Alternative 4b on vessel profits and fleet efficiency

Nonwhiting trawl harvesters

Vessel profits under Alternative 4b are expected to improve relative to Alternative 1 for a variety of reasons. As in the other alternatives, the amount of catch in the fishery is generally expected to increase because of a reduction in the bycatch rate of overfished species which, in turn, allows vessels to leverage higher catch amounts of under-utilized target species. This increased catch should lead to greater ex-vessel revenues attributed to harvesting activity relative to Alternative 1. In addition to

greater catch quantities, the vessel accumulation limit specified for this alternative does not appear to restrict fleet consolidation; therefore, the amount of cost savings possible as a result of consolidation does not appear to be encumbered by the vessel limits. Lower harvesting costs combined with greater ex-vessel revenues are expected to result in an improvement in the economic status of nonwhiting harvesters, assuming ex-vessel prices remain somewhat constant, or increase. Other reasons for expected increases in revenues come from the gear switching provisions made part of the action alternatives (Alternatives 2a through 4b). Such gear switching allows harvesters to capitalize on higher prices paid for nontrawl harvested species (such as sablefish) and also allows harvesters to change relative catch ratios and therefore balance catch accounts. As illustrated previously, each gear type has a different relative rate of capture. Allowing harvesters the opportunity to use different gears provides them the opportunity to change capture rates to their advantage, and this may mean avoiding overfished stocks and harvesting some groundfish species more selectively.

Unlike Alternatives 2a through 4a, the amount of risk associated with fishing activities on continental shelf areas may not induce harvesters to forego the harvest of some target species. As shown previously in Section 4.6.2.4, the layers of risk associated with overfished species, minor nearshore rockfish, cabezon, and other species with small trawl sector allocations may, at some level, induce harvesters to avoid fishing activities in certain areas to circumvent the possibility that a chance encounter with one of these species could occur. A chance encounter with these species could put that harvester in a deficit condition, which may prove quite costly to get out of since limited quota poundage will be available on the market. Since Alternative 4b does not require that nonwhiting harvesters cover several types of rarely encountered species with IFQ (which is the source of one kind of risk), it is less likely that harvesters will avoid continental shelf areas where nearshore species and many types of target species are found. This makes it more likely that the expected amount of revenue associated with nonwhiting fishing activity will be realized because harvesters are not as likely to forego shelf target species.

Ex-vessel prices under Alternative 4b are expected to be similar to Alternatives 2a and 2b. It is unclear how ex-vessel prices will compare to Alternative 1, though it is possible that they will increase somewhat compared to Alternative 1 (under several assumptions). This is because 90 percent of the nonwhiting IFQ is allocated to permits, and 10 percent is reserved for an AMP (starting in year three) with no initial allocation to processors (except to the extent that processors are also owners of trawl permits). This may tend to increase the negotiation power of harvesters as they have a longer time in which to hold out against processors when negotiating over prices compared to Alternative 1 conditions where harvesters must do so within a two-month window. Furthermore, the control limits specified for this alternative will make it difficult for processors to acquire Qs and vertically integrate to an appreciable degree, thus leading to a retention of ex-vessel price negotiation power in the harvesting sector over the long term. The following figure illustrates the share of nonwhiting quota allocated to processing entities and harvesting entities under Alternative 4b. Several processing entities hold LE permits, thus making the allocation of Qs to processing entities larger than zero. This figure does not include an adaptive management quota.

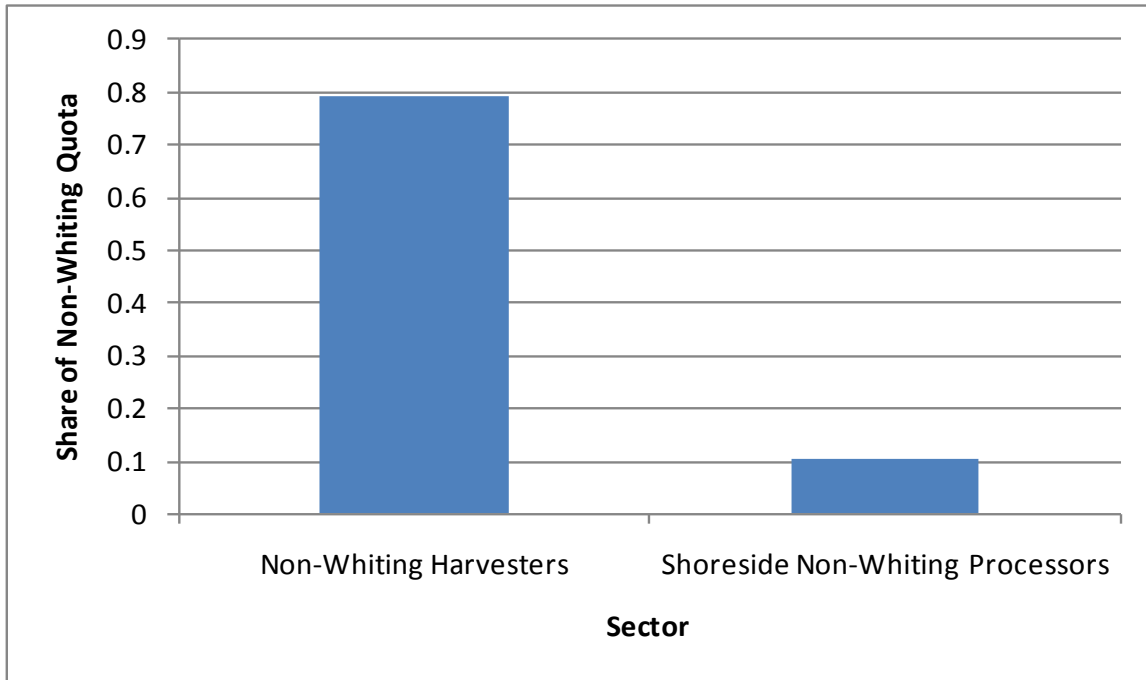


Figure 4-38. Share of nonwhiting groundfish allocated to harvesters and processors in Alternative 4b.

Adaptive management has the potential to reduce overall revenues in the fishery, while redistributing revenues in a fashion that some may consider more equitable. Because the adaptive management provision may work in a manner that is counter to a market-driven outcome (it is likely that an adaptive management quota will be distributed based on a Council action or framework rather than a market signal), the outcome may be one that generates less revenue (assuming a more market-driven outcome is one that tends to maximize economic gains). Based on this notion, the inclusion of an adaptive management provision under Alternative 4b may result in lower revenues at the fishery level compared to a case where adaptive management does not exist. However, since the adaptive management provision is up to 10 percent of the available quota, the effect of the adaptive management provision on total harvester revenues is likely to be small.

Adaptive management has the potential to distribute profits toward some harvesters who may be more marginal producers, or to distribute profits toward those harvesters who may not be initial recipients of Qs (second-generation fishermen or new entrants). For those harvesters who may lease quota (and may be considering the purchase of Qs in the future), the AMP may help those harvesters generate enough profit that they can purchase Qs over time. Alternatively, the lack of an AMP would require quota-leasing harvesters or second-generation harvesters to pay the going rate to lease quota, and research has indicated that this cost can be quite high, creating conditions that make it difficult to save enough money to purchase Qs and become independent owner-operators (Pinkerton and Edwards 2009). Therefore, the AMP acts as a tool to help distribute profits to harvesters who are not initial recipients of Qs and to help those harvesters to become Qs owners. This concept was discussed in the section describing the effect of the AMP on harvesters above.

Shoreside whiting trawl harvesters

Shoreside whiting harvesters are affected similarly, in many respects, under Alternative 4b as they are under Alternative 4a. The fact that both shoreside sectors are bundled into one means that shoreside

whiting harvesters can use market mechanisms to trade quota with nonwhiting harvesters. This combination of sectors means that there are fewer hard barriers between sectors, which may mean fewer restrictions on harvesting activity. Under a four sector option, hard allocations would be made between sectors. In some instances those hard allocations may mean that certain species end up being constraining to one or both sectors. With both sectors combined into one, there is a larger pool of quota from which to draw. In the event that midwater whiting trawlers encounter more of a certain type of species than expected, they can purchase quota from nonwhiting trawlers. This ability to trade enhances the possibility that catch will be realized by whiting trawlers compared to a case where hard allocations are drawn between the two trawl sectors, as such hard allocations may at times become constraining. This effect is also true for nonwhiting harvesters. This is explained in more detail under the subsequent section on risk to profits.

Ex-vessel prices under Alternative 4b are expected to be higher for shoreside whiting trawlers than under Alternatives 3 and 5, principally because of the amount of quota allocated to processors. Since processors receive 20 percent of the allocation under Alternative 4b, but they would receive 25 and 50 percent under Alternatives 3 and 5, respectively, harvesters have more negotiation power under Alternative 4b, leading to higher ex-vessel prices than Alternatives 3 and 5, but likely lower ex-vessel prices compared to a case where no allocation is made to processors. Furthermore, the control limits established under this alternative for shoreside whiting are lower than for any other alternative, meaning that the ability for processors to acquire shoreside whiting Qs and vertically integrate over time is limited. This, in turn, limits the ability of processors to bid down ex-vessel prices against other harvesters over time. The vessel limit specified for this alternative does not appear to restrict fleet consolidation, and, therefore, the amount of cost savings possible as a result of consolidation does not appear to be encumbered by the vessel limits.

The amount of revenue expected to be generated by shoreside whiting harvesters under Alternative 4b has a greater potential of being realized from year to year compared to Alternatives 2a through 4a, and possibly even compared to Alternative 1. This is due to a variety of factors that are also discussed under the section describing risk. The fact that shoreside whiting harvesters are not responsible for the catch of rarely encountered species, such as nearshore species, means a reduction in the possibility that a chance encounter with one or more nearshore species will constrain the shoreside whiting fishery. Not issuing IFQ for some rarely encountered species is also likely to lead to less of a risk aversion response on the part of harvesters. An aversion to risk may mean that harvesters travel longer distances (such as out to the deep shelf and continental slope areas) to avoid chance encounters with nearshore species. That risk aversion response would come at a cost because of the travel distance involved and would tend to reduce net revenues in the fishery as a result. Since shoreside whiting harvesters are not issued quota for such rarely encountered species, it is more likely that shoreside whiting harvesters would fish closer to shore and that costs would be lower than if they traveled further to prosecute whiting activity.

When considering the comparison between Alternative 4b and Alternative 1, it is possible that the expected catch level (the shoreside whiting allocation) may be harvested more frequently under Alternative 4b than under Alternative 1. Under Alternative 1, harvesters are constrained by bycatch limits and occasionally reach one of those limits prior to harvesting the shoreside whiting allocation (meaning the fishery is shut down prematurely). Since Alternative 4b eliminates race-for-fish conditions, harvesters in the shoreside sector may elect to change their fishing timing if incidental catch rates of nontarget species are too high and wait for a time when those incidental catch rates are lower. It is more difficult to take those types of actions under Alternative 1 because of the race-for-fish conditions present in the fishery and the fact that if one harvester elects not to fish, another harvester may catch the fish that would otherwise be caught by that first harvester. This makes it relatively more difficult for harvesters to undergo activities that may reduce the catch of incidental species under Alternative 1 (though collective actions have taken place under existing conditions).

The following figure illustrates the amount of quota allocated to harvesters and processors under this alternative. Several shoreside whiting processors are also owners of trawl permits with whiting catch history, thus making the initial allocation of whiting to shoreside processors greater than 20 percent.

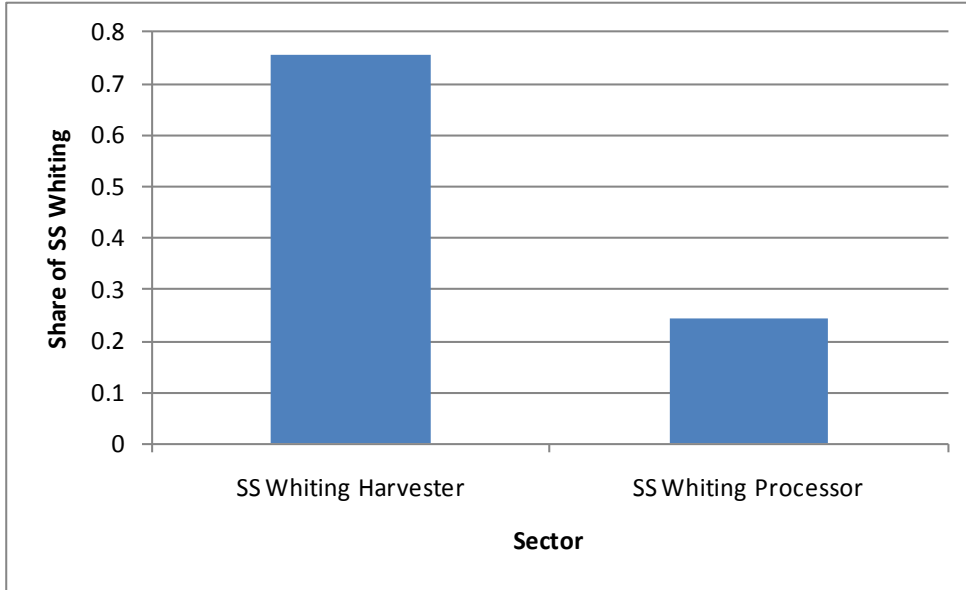


Figure 4-39. Share of shoreside whiting allocated to harvesters and processors in Alternative 4b.

Mothership trawl harvesters

Harvesters in the mothership trawl sector are expected to fare better under Alternative 4b than under Alternatives 1, 2c, 3, and 4a. Rationalization, in general, is expected to improve the revenues generated by harvest activity in the mothership sector for a variety of reasons, including the fact that harvesters no longer compete for a common quota. In addition, since bycatch is managed at a more refined level (the cooperative level), participants in the whiting sector will no longer compete for a common bycatch pool, which also has a race-for-fish effect. Since Alternative 4b manages bycatch at the cooperative level, the race for bycatch” is not as likely to exist under Alternative 4b compared to a case where bycatch is managed at a broader level. However, other risks are imposed on harvesters from managing at the cooperative level. If a member of a cooperative incurs a relatively large catch event, it is more likely that the other members of the cooperative may have their fishing opportunities shut down prematurely because they may be less able to collectively absorb that unexpectedly large catch event. Should the mothership sector become several cooperatives, this type of an effect can be alleviated if those multiple cooperatives form an inter-cooperative agreement to spread the risk of those unexpected catch events of nontarget species.

The added benefit of Alternative 4b is that harvesters do not have to fish in the noncooperative portion of the fishery to switch motherships. This means that participation in the noncooperative portion of the fishery is expected to be less frequent than a case where participation in the noncooperative portion of the fishery is necessary to break a mothership linkage. For those harvesters who wish to switch motherships, not having to participate in the noncooperative fishery makes it more likely that those harvesters can continue to fish in a manner in which they do not fear their catch opportunities will be preempted by someone else, and as a result, can fish in a way that is more economically beneficial.

Mothership harvesters declare a single mothership to which they will deliver in the coming season under Alternative 4b. Under this structure, the catcher vessel can enter into dialogs and negotiations with various motherships prior to the season starting. If that catcher vessel wishes to participate in a cooperative, it must declare a single mothership to which it will deliver in the coming season by a date certain. If that catcher vessel wishes to fish for a different mothership in the next year, it simply declares that it will fish for that other mothership in that next year. This is different than the linkage provision in Alternatives 3 and 4a that would require those catcher vessels to fish in the noncooperative fishery for a season in order to break that linkage. This added ease of switching motherships enhances the negotiation power that harvesters have over issues such as prices and/or profit sharing with motherships compared to a case with linkages that are difficult to break. However, since that catcher vessel must deliver to a single mothership during the course of a year, it is possible that the catcher vessel may not be in as advantageous a position in price negotiations compared to a case where a catcher vessel can freely deliver to any mothership during the course of the year. On the other hand, catcher vessels appear to be in a relatively advantageous position over price negotiations prior to the fishery starting, and the end result of negotiations taking place prior to the season may be very similar, if not identical, to a case where a catcher vessel is switching motherships mid-course during a season to take advantage of the highest price. The reason for this declaration requirement is to provide for some degree of certainty for business planning on the part of the mothership, and this effect is described under the section on the effect of rationalization on motherships.

Perhaps the largest benefit to harvesters in the mothership sector from the declaration requirement (rather than a linkage) arises when harvesters in a cooperative are considering a move to another mothership. An alternative where harvesters can switch motherships without going into the noncooperative portion of the fishery makes the switching of motherships easier for the catcher vessel, and arguably less punitive, since they do not have to participate in a competitive, race-for-fish fishery. This ease of switching motherships will also tend to give harvesters enhanced negotiation power over ex-vessel prices since they will find it easier to move to a mothership offering higher prices and will not have to participate in the noncooperative fishery to do so (the participation in which could come at a cost).

Table 4-40. Summary of the effect of Alternative 4b on profits.

Nonwhiting Catcher Vessels	Fleetwide profit is expected to increase as a result of increased target species catch and fleet consolidation. Some uncertainty is associated with these estimates due to the ability of the fleet to avoid overfished stocks and deal with the risk and uncertainty associated with unexpected catch events of overfished species. Uncertainty in these estimates is also present due to variations in groundfish allowable catch levels in the future. It is possible that ex-vessel prices will be higher than Alternative 1. Gear switching and flexible harvest timing also provide opportunities to capitalize on favorable market conditions. An adaptive management provision will tend to have a minor, downward effect on profit because it works counter to a market system, but may enable harvesters who are not initial recipients of Qs to generate higher levels of profit and make it relatively easier to become independent owner operators. Accumulation limits do not appear to restrict fleet consolidation.
Shoreside Whiting Catcher Vessels	Fleetwide profit is expected to increase as a result of fleet consolidation and improvements in harvest timing flexibility. Ex-vessel prices are expected to be lower than in Alternative 2a but higher than Alternative 3 and 5 because of the amount of quota allocated to processors.
Mothership Catcher Vessels	Fleetwide profit expected to increase as a result of fleet consolidation and improvements in harvest timing flexibility. There is some limited uncertainty regarding potential profits because of the type of risk associated with bycatch management at the cooperative level, and because of the presence of a noncooperative fishery. However, the ability to switch motherships without going into the noncooperative fishery reduces some of this risk.

The distribution of profits under Alternative 4b

The distribution of profits under Alternative 4b is highly similar to that of Alternative 4a. As in the other alternatives, the effect of individual accountability will tend to disadvantage those harvesters who have historically fished in areas where constraining stocks are more abundant. This may distribute the benefits of trawl rationalization toward those harvesters who fish in areas where such stocks are less abundant and away from harvesters who fish in areas where they are more abundant. This concept was discussed in more detail in Section 4.6.2 (page 289) under broad level effects.

One of the principal differences between Alternative 4b and the other alternatives is the allowance of a divestiture period for entities that receive an initial allocation in excess of the accumulation limits. This divestiture period is in years three and four of the trawl rationalization program. Entities over the control limit would be required to transfer their QSs to another entity in order to comply with the control limits by the start of year five. Allowing for a divestiture period, rather than automatically redistributing QSs that may otherwise be above a control limit, enables the entity above the control limit to have some measure of say in where those overage QSs go. It is not unreasonable to assume that those entities would transfer those shares in a manner that is beneficial to them. This may mean simply selling those overage shares to the highest bidder, and in this way capturing the rent associated with fishing that quota in the future, or it may mean transferring those QSs to another entity with whom that first entity is familiar or may have business relations. An example may be a case where a harvester who is over the control limit transfers the overage QSs to the processor to whom he delivers with the expectation that that processor may, at times, transfer the quota poundage associated with those shares to the vessel operated by that original harvester. Another example could be one where a harvester over the control limit transfers QSs to an association that acts on behalf of a community of which the overage harvester is a member. That harvester may see the activities of the association as beneficial and, in this way, benefit from the activities of that association. In any event, the distribution of those QSs through a divestiture provision should be expected to result in a distribution of fishing activities, and/or profits, in a manner that is more beneficial to the original recipient of overage QSs compared to a case where no grandfather clause and no divestiture clause exists.

Alternative 4b includes an ADP, like some other alternatives, but that program does not go into effect until year three of the trawl rationalization program. The fact that the AMP does not go into effect until year three means that some of the effects that the AMP may be designed to counter will occur in years one and two. This could mean that consolidation of the fleet will occur as if there is no AMP in the first two years and that ports and regions that may be at a relative disadvantage as a result of rationalization may feel relatively greater effects in the first two years. Vessels operating out of disadvantaged, or vulnerable, ports and regions that might be recipients of AMP QPs would, therefore, operate without those pounds during the first two years.

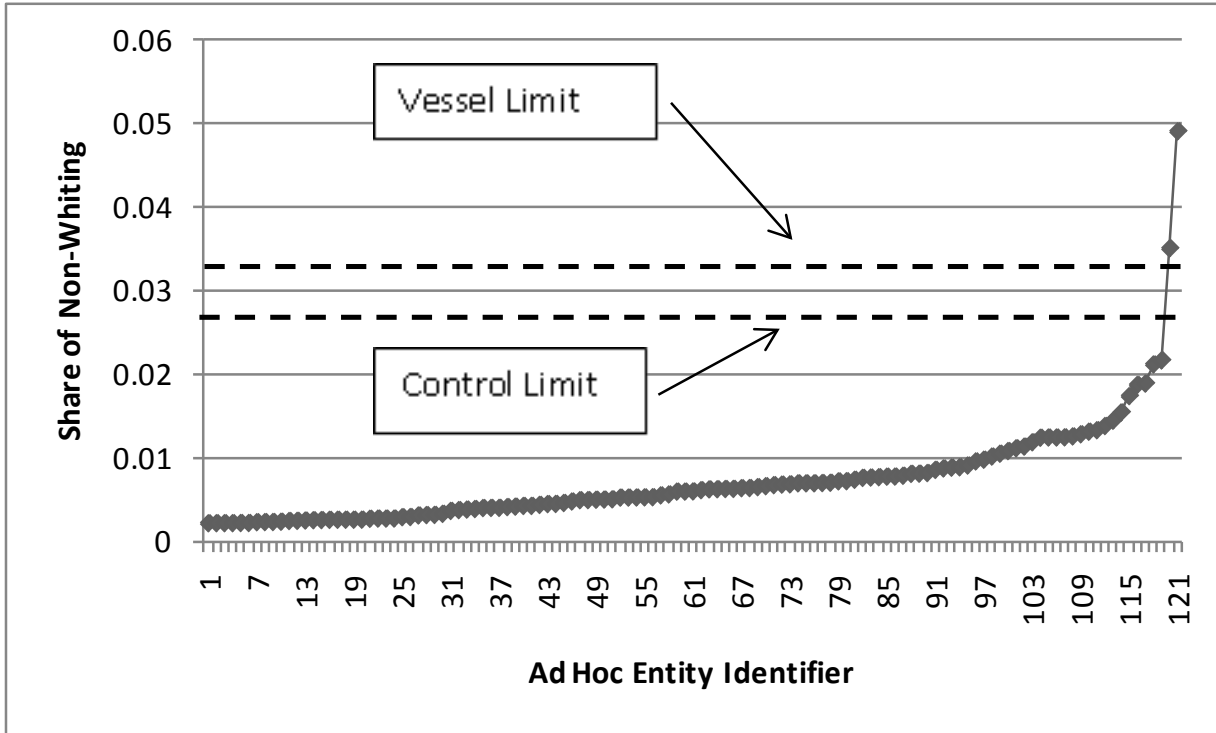


Figure 4-40. Distribution of Nonwhiting IFQ under Alternative 4b.

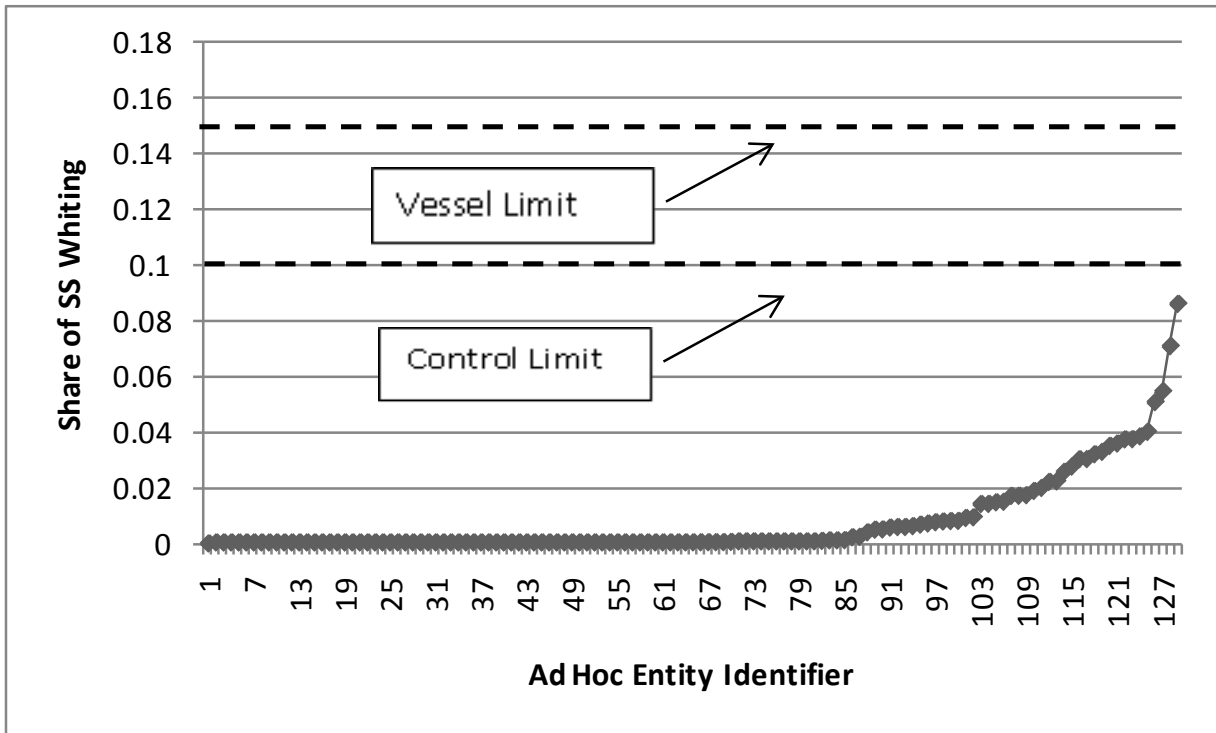


Figure 4-41. Distribution of Shoreside Whiting IFQ under Alternative 4b.

The distribution of catch history to mothership catcher vessels under Alternative 4b differs from alternatives 3 and 4a because the endorsement years include 1994 to 2003, whereas Alternatives 3 and 4a use 1997 to 2003. The year selection results in one additional permit being eligible to receive catch

history, and this additional permit, combined with the greater number of years included in the catch history calculation, alters the amount of catch history distributed to MS(CV) permits, though only slightly. When compared to entity activity over the 2004-to-2006 period, there are some noteworthy differences in what an entity will be allocated compared to the share of landings made during that same period. Though not shown, in general several entities that receive an initial allocation of MS(CV) catch history did not participate in the 2004-to-2006 period. Also, several entities caught substantially different (both larger and smaller) shares of the mothership sector allocation over the 2004-to-2006 period than would be allocated. The accumulation limits for mothership catcher vessels allow for some consolidation among entities in the mothership sector. The fact that the control limits are higher than would be initially allocated allows for some consolidation over catch history to occur among the entities with the largest production and initial allocation. This may mean growth that comes in the form of vertical integration (mothership companies purchasing catch history) or horizontal integration (catcher vessels purchasing the catch history of other catcher vessels). In addition, while the control limit is higher than all of the initial allocation estimates, it is similar to levels harvested by individual entities in recent years (some entities have increased catch levels since the qualifying years).

The usage limit specified as part of this alternative is a feature that does not exist in other alternatives. A usage limit in a cooperative program is similar to a vessel limit in an IFQ program. The difference is that a usage limit restricts the amount of catch one vessel can harvest, while a vessel limit restricts the amount of QPs that can be registered to a vessel in an IFQ program. The difference between the two is out of necessity. Agencies do not track inseason catch history transfers in a cooperative program—such inseason, annual transfers are wholly internalized by the cooperative institution. Therefore, there is no mechanism for agencies to impose a vessel limit. Agencies can, however, track catch at the vessel level in a cooperative program; therefore, it is possible to restrict the amount of catch that any one vessel catch harvest. This is referred to as a “usage limit.” The usage limit specified as part of this alternative is set at 30 percent, and this percentage appears to allow vessels to harvest more than has been taken under recent conditions. This means that fleet consolidation is able to occur under the size of the usage limit specified for this alternative.

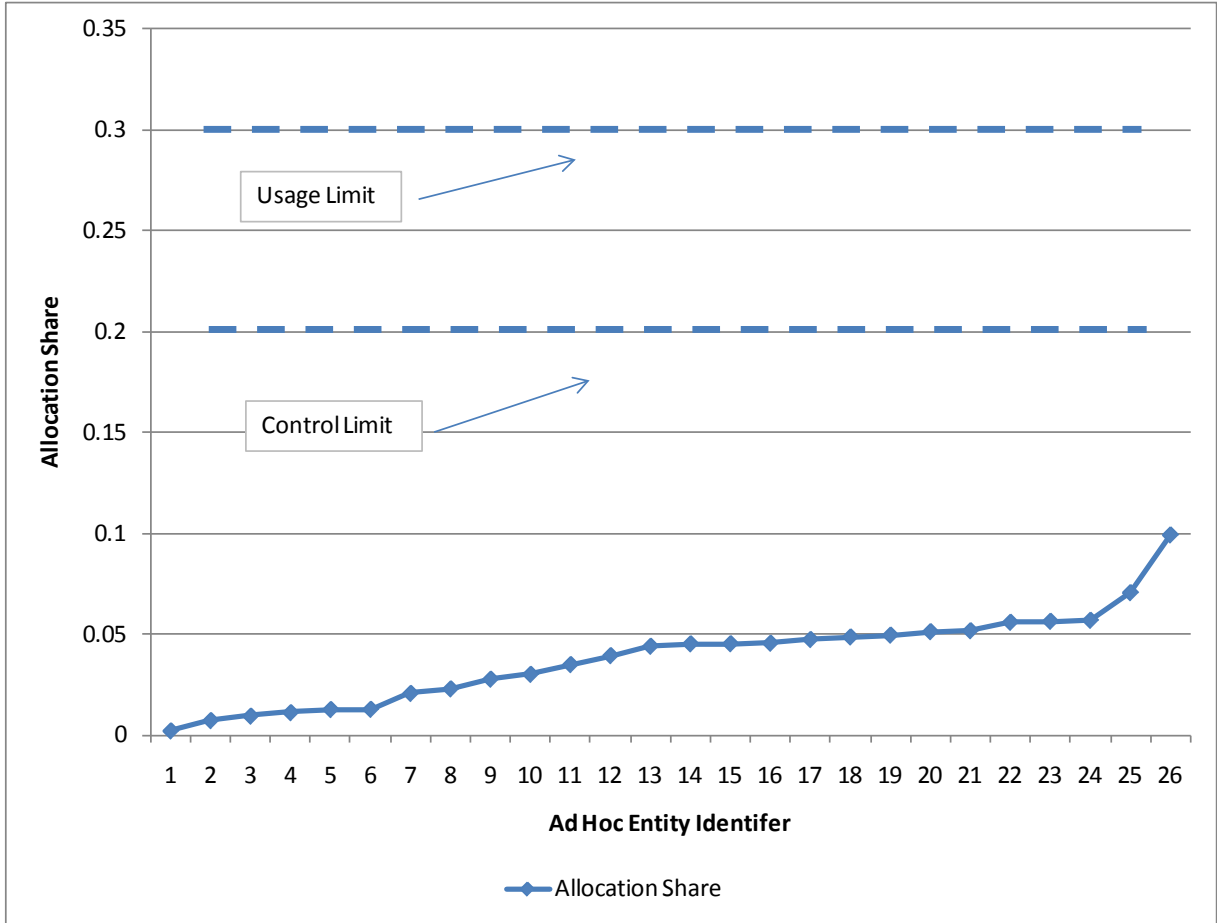


Figure 4-42. Distribution of mothership catcher vessel catch history under Alternative 4b.

The risk to profits posed by Alternative 4b

Nonwhiting trawl fishery

The risk to harvester profits in the nonwhiting sector under this alternative from species with low trawl allocations and the presence of thin market conditions is lower than for other alternatives, except for Alternative 1. The fact that rarely encountered species are not managed with IFQs reduces the chances that an unexpected catch of such species could put a harvester into a deficit condition. Alternative 4b also differs from other alternatives because of the initial allocation rules specified for this alternative, in the lack of a grandfather clause and establishment of three trawl sectors.

To manage risk, it is likely that harvesters in the nonwhiting sector will form voluntary risk-sharing arrangements, or pools, where harvesters are expected to transfer quota among themselves to cover unexpected catch events—particularly for low OY or thin market species for which quota may be expensive. This tool can be described as a type of insurance mechanism to protect against unexpected catch events. In comparison to other alternatives, the initial allocation rules specified under this alternative, and the lack of a grandfather clause, are arguably the most conducive to the development of such risk sharing arrangements. This is because the initial allocation of overfished species is done in a manner that allocates based on relative need and should, therefore, place harvesters in a relatively similar position when negotiating terms that might govern a risk pool. As discussed in previous

sections, an initial allocation that does not allow an entity to operate in a relatively strong position facilitates the formation of voluntary risk pools that are stable over the long term.

Shoreside whiting trawl harvesters

The presence of low allocation and thin market species creates risk to individual harvesters in the shoreside whiting fishery. This risk would have similar effects on the geographic distribution of fishing as described for other sectors that are managed with IFQs. These effects include possible avoidance of areas where constraining species are found and longer travel distances to reach low bycatch areas. These risks are similar as under other alternatives, but the fact that IFQ is not required to cover the catch of some rarely encountered species reduces this risk somewhat. The fact that overfished species are allocated to harvesters pro rata to their holding of whiting creates conditions that tend to foster the development of risk pools. A pro rata distribution means that harvesters receive a proportion of overfished species that is equivalent to their proportion of whiting, thus placing individual entities on a similar status, in terms of holdings of overfished species QSs. This tends to help foster and maintain risk pools as described in previous sections. Like Alternatives 2a through 2c, having three trawl sectors creates a single IFQ pool for shoreside whiting and nonwhiting harvesters and gives harvesters the flexibility to transfer quota as needed through the market. This allows harvesters to be relatively adaptable to changes in catch conditions from year to year.

Mothership trawl harvesters

In contrast to Alternative 3, collective risk (the risk of a race for fish because of bycatch) to harvesters in the mothership sector is minimal under this alternative because the allocation of bycatch species to co-ops insulates harvesters in separate co-ops from one another. The presence of the noncooperative fishery poses some risk to harvesters in the cooperatives because the noncooperative fishery is structured in a way that creates the incentives necessary for a race for fish to develop. However, because harvesters do not have to participate in the noncooperative fishery to switch motherships, the risk posed by this noncooperative fishery is minimized since participation in that fishery is expected to be lower than in an alternative where harvesters may more frequently participate in the noncooperative fishery. Theoretically, harvesters fishing under race-for-fish conditions are less likely to fish in a manner that effectively reduces bycatch, thus increasing the potential of a disaster tow occurring. However, the characteristics created by the noncooperative fishery resemble Alternative 1 conditions. Bycatch avoidance efforts routinely occur under Alternative 1 conditions, and, given that the noncooperative fishery will likely be a small portion of the entire sector, the risk of bycatch events under Alternative 4b is lower than under Alternative 1 where the entire sector can be described as a noncooperative fishery. Furthermore, the risk posed by the noncooperative fishery under Alternative 4b is lower than in Alternatives 3 and 4a because participation in the noncooperative fishery is expected to be lower than in those other alternatives. This is because harvesters are not required to fish in the noncooperative fishery to break a linkage with a mothership. Rather, harvesters can simply declare their intention to fish for a different mothership in a subsequent year without penalty if conditions become unfavorable. This will tend to reduce participation in the noncooperative fishery.

Individual risk to mothership harvesters (the risk to individuals posed by unexpected catch amounts of bycatch species) is lower in this alternative than in Alternatives 2a through 2c (IFQs) because of the lack of individual quota for bycatch species and the associated costs and/or penalties associated with deficit conditions associated with an IFQ program. However, there are some risks to individual harvesters—and harvesters associated with one another in a cooperative—through the bycatch limits that are set at the cooperative level. Bycatch limits established at this level reduce the spreading of individual risk that occurs if bycatch limits apply to the whole whiting sector and as a result impose more burden—and risk—to the individual harvesters in a cooperative. This risk is imposed on other

harvesters in that cooperative. If one harvester has a disaster tow of a bycatch species, the entire cooperative may be shut down, and other harvesters in that cooperative may have their fishing opportunity preempted by that event. Such an event can be avoided through the presence of inter-cooperative agreements to manage and share bycatch. This type of an agreement would tend to develop among cooperatives that find it mutually beneficial to do so. This agreement would spread the risk of unexpected catch events across more participants, thus reducing the likelihood that harvesters will have their opportunities preempted by the unexpected catch of another harvester because the larger collective bycatch limit established through the inter-cooperative agreement may be able to absorb such events. In addition, bycatch limits set at the cooperative level will most likely lead to the development of cooperative agreements that impose a high degree of individual accountability of bycatch on harvesters within that cooperative. This will likely occur because cooperatives will have to internalize the management of bycatch. The likelihood of one cooperative forming an inter-cooperative agreement with another cooperative may likely depend on the strength and success of the bycatch management plan contained in the individual cooperative agreements.

Table 4-41. Summary of the risk to profits posed by Alternative 4b.

Nonwhiting Catcher Vessels	Moderate risk to profits is posed by the presence of constraining species, but there is less risk than Alternatives 2a through 4a because rarely encountered species are not covered. The allocation of overfished stocks on a bycatch rate creates conditions that are conducive to the forming of risk pools. The existence of three trawl sectors minimizes risk associated with unexpected catch events because of a larger pool of available quota.
Shoreside Whiting Catcher Vessels	Moderate risk to profits is posed by the presence of constraining species, but less risk than Alternatives 2a through 4a because rarely encountered species are not covered. The pro rata allocation of overfished species is conducive to the formation of risk pools. The existence of three trawl sectors minimizes risk because of a larger pool of available quota.
Mothership Catcher Vessels	There is relatively low risk to individuals and relatively low collective risk (risk of a race for bycatch). Individual risk can be further minimized by allowing inter-cooperative agreements to develop to manage bycatch across co-ops.

Fishing vessel safety

Fishing vessel safety is expected to improve for all harvesters under this alternative. While Alternative 4b has a noncooperative portion of the fishery, this alternative differs because of the manner in which bycatch is managed, and because it is not necessary for harvesters to participate in the noncooperative fishery to switch motherships, thus reducing participation in the noncooperative fishery under this alternative. Under this alternative, higher profits would tend to lead to better maintenance, which would enhance harvester safety. Safety is also improved because of the flexibility in harvest timing that occurs as a result of rationalization and the fact that a successful rationalization program will eliminate the perceived need to fish during hazardous conditions. Those harvesters who participate in the noncooperative portion of the mothership fishery may not see as many safety improvements because of the Olympic conditions that exist in this portion of the fishery. Such conditions provide incentives to fish during times of unfavorable weather, eroding potential safety gains. However, assuming that the time spent in the noncooperative portion of the fishery is temporary and less frequent than in the other cooperative alternatives, harvesters in the mothership sector should see safety improve in general.

Table 4-42. Summary of the effect of Alternative 4b on safety.

Nonwhiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance.
Shoreside Whiting Catcher Vessels	Vessels in this sector of the fishery are expected to generate higher profits, which are expected to lead to improvements in the level and type of maintenance. Rationalization expected to eliminate Olympic conditions, thus allowing harvesters flexibility and eliminating the incentive to fish in hazardous conditions.
Mothership Catcher Vessels	With the exception of those harvesters who spend time in the noncooperative portion of the fishery, harvesters should see safety conditions improve because of improved vessel maintenance and elimination of the incentive to fish in hazardous conditions.

4.6.3.8 Comparative Summary of the Effects of the Alternatives

Alternative 1	<ul style="list-style-type: none"> Continuation of depressed status and overcapitalization of fleet. Minimal individual and collective risks.
Alternative 2a	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Highest ex-vessel prices of any Alternative. Higher individual risk, lower collective risk compared to Alternatives 1, 3, and 4a.
Alternative 2b	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Similar ex-vessel prices as Alternative 2a, perhaps somewhat lower. Higher individual risk, lower collective risk compared to Alternatives 1, 3, and 4a.
Alternative 2c	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Lower ex-vessel prices than Alternatives 2a, 2b, and 4a in nonwhiting sector. Higher individual risk, lower collective risk compared to Alternatives 1, 3, and 4a.
Alternative 3	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Similar ex-vessel prices in nonwhiting sector as Alternative 2c (relatively low). Ex-vessel price negotiations in SS and MS whiting unclear. May lead to profit-sharing arrangements. Individual risk high, collective risk low in nonwhiting (equal to Alternatives 2a through 2c). Individual risk in SS and MS whiting lower than Alternatives 2a through 2c. Collective risk relatively high and similar to Alternative 1.
Alternative 4a	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Similar ex-vessel prices in nonwhiting sector as Alternative 2a (relatively high). Lowest shoreside whiting ex-vessel prices of all alternatives over the long run. Ex-vessel price negotiations in MS whiting unclear but may be higher than Alternative 3. May lead to profit-sharing arrangements. Individual risk in SS whiting and nonwhiting high, but collective risk low. Individual risk in MS whiting moderate. Lower than Alternatives 2a through 2c, but higher than others. Collective risk somewhat moderate.
Alternative 4b	<ul style="list-style-type: none"> Fleet consolidation accompanied with increased gross revenue per boat and decrease in harvesting cost. Similar ex-vessel prices in nonwhiting sector as Alternative 2a and 3.a. Similar ex-vessel prices in SS whiting sector as Alternative 3. Ex-vessel price negotiations in MS whiting similar to a case with no linkages and no mothership processor allocation of QS Individual risk in SS whiting and nonwhiting somewhat less than other Alternatives but still higher than Alternative 1. Collective risk low. Individual risk in MS whiting moderate, same as in Alternative 4a. Collective risk somewhat moderate.

4.6.4 Cumulative Effects on Limited Entry Trawl Harvesters

The effect of the alternatives on LE trawl harvesters is combined with past actions, current and future trends, and RFFAs to derive the cumulative effect. In some respects, the effect of rationalization on trawl harvesters can be viewed as a replacement to present conditions rather than an action that is additive to present conditions. Rationalization is intended to change the system in which the trawl fishery operates and allow outcomes to be based more on market forces and individual accountability than on command and control mechanisms. In other words, rationalization removes a structure that is responsible for much of the past and present trends, condition, and status of trawl harvesters and replaces it with another. Taken in the context of the additive model for assessing cumulative effects (described earlier in Chapter 4), imposing rationalization on the trawl sector is in some ways subtractive, while in other ways may be additive. In this additive model of cumulative effects, we identify factors that may be seen as beneficial or adverse to trawl harvesters and use this assessment to determine the overall, cumulative effect of the alternatives.

4.6.4.1 Overview of Past Actions and Trends Affecting Limited Entry Trawl Harvesters

Limited entry trawl harvesters have been subject to a wide array of past actions and trends that continue to play a role in their status. Many of these actions and their effects on trawl harvesters were discussed in Chapter 3; however, in order to aid in the analysis and understanding of cumulative effects, these actions and trends are summarized here.

Since the 1980s, trawl harvesters have been subject to increasingly stringent catch restrictions. These catch restrictions came about for several reasons including the need to rebuild depressed stocks and the SFA. In the early 2000s, MPAs were implemented (called trawl RCAs), which closed off wide areas of the ocean to bottom trawl vessels to protect depleted groundfish. On one hand, these closed areas allowed greater fishing opportunity in areas remaining open than would otherwise have been the case; on the other hand, vessels were forced into areas that were often not as productive. Trawl harvesters were required to carry and pay for VMS to verify compliance with the RCAs.

Revenues in the nonwhiting portion of the fishery have declined through time, leading to the depressed status of many trawl harvesters remaining in the fishery. In the late 1990s and early 2000s, nonwhiting trawl harvesters found it difficult to generate enough revenue to pay crew and many vessel owners crewed for other vessel owners and vice versa. In late 2003, a trawl vessel buyback occurred, and average revenues per vessel improved. However, recent cost earnings information from 2004 indicates that the average nonwhiting trawl vessel generates enough revenue to cover wages and expenses, but nothing more.

Over this same period, Pacific whiting emerged as a target species in the domestic fishery. This species historically had been targeted by foreign and joint venture operations, but was not targeted by domestic producers until product quality innovations were developed on the west coast that allowed domestic producers successfully to produce surimi from Pacific whiting. The Pacific whiting industry took a downturn in the early 2000s as the Pacific whiting stock was declared overfished and because of the scare over Mad Cow disease (Pacific whiting surimi producers used beef plasma in the production of surimi). These events led to a downturn in revenues attributed to harvest and a downturn in revenues as a result of depressed prices. Shortly thereafter, Pacific whiting was declared rebuilt. In addition, surimi producers substituted egg ingredients for beef plasma to produce surimi (avoiding issues associated with Mad Cow disease) and also began selling more head-and-gut and fillet products from Pacific whiting. These efforts increased the value of Pacific whiting. In recent years, the market for Pacific whiting (and many other whitefish species) improved, resulting in higher ex-vessel prices and causing increased

participation in the fishery. This led to the Council's action to implement Amendment 15, which limited access to specific sectors of the whiting fishery.

4.6.4.2 Trends and Actions Influencing Vessel Profits and Fleet Efficiency

The effect of rationalization (and the reasons for those effects) on vessel profits and fleet efficiency was described previously. Factors exogenous to rationalization are listed here. Several trends and actions not associated with rationalization are expected to continue, or be implemented in the future, and they are expected to have an effect on vessel profits and fleet efficiency. These include the following:

- Implementation of Amendment 21 (intersector allocation)
- Vessel monitoring systems
- Relatively high cost of inputs (such as fuel)
- Increased competition for ocean space (state MPAs, wave energy, offshore resource exploration and development)
- Increased global demand for protein
- Rebuilding of depleted groundfish stocks
- Consumer awareness and scrutiny of the fishing industry
- Ongoing harvest specifications process and OY setting
- Provisions in Amendment 20 (trawl rationalization) supplant Amendment 15
- Implementation of Amendment 10 (maximized retention for shoreside Pacific whiting)
- Climate change and the effect on species abundance and location
- The possibility that a stock is unexpectedly declared as “rebuilt” or “overfished”
- The development and implementation of CFAs

These considerations are combined with the effect of rationalization to derive the overall, or cumulative effect, of rationalization on vessel profits and fleet efficiency using the additive model for assessing cumulative effects described earlier in Chapter 4.

Rationalization of the west coast trawl fishery implies that Amendment 21 (intersector allocation) is implemented. Intersector allocations are a necessary component to rationalization because issuing QPs relies on there being a known quantity of fish to distribute across QS holders. Because Amendment 21 determines the amount of fish available to trawl harvesters, it has a direct effect on the amount of revenue that can be generated in the fishery. If allocations are relatively small, it is possible that overall revenue in the fishery could be lower than under Alternative 1. However, because rationalization allows fleet consolidation to occur, harvest capacity may still be more in line with available harvest, even if available harvest is lower than under Alternative 1 (status quo), and this is likely to result in increased levels of fleet efficiency. If the trawl sector allocation under Amendment 21 allows for harvest that is greater than under Alternative 1 conditions, then it is likely that catch, gross revenue, and fleet efficiency will be greater under a rationalized fishery than under the Alternative 1.

Rationalization of the LE trawl fishery is likely to require that LE trawl harvesters bear some additional costs in addition to those already being borne to meet various requirements. Because of the need to monitor compliance with closed areas (such as trawl RCAs and EFH closures) trawl vessels are required to carry and pay for VMS under the Alternative 1 regime, and it is expected that this will continue into the future independent of the decision to rationalize the fishery. Implementing a rationalization program is likely to mean that LE trawl harvesters will have to carry and pay for additional observation systems, which may come in the form of a human observer who monitors catch, or a camera that verifies whether discard has occurred on the vessel. These requirements will add to the cost of participating in the LE trawl fishery, and recent estimates have indicated the daily cost of carrying an observer may be

approximately \$350 per day (this is a direct effect of the proposed action).⁹⁸ When combined with the cost of carrying VMS and other trends expected to exist in the future, the cost of participating in the trawl fishery is expected to be higher than in past years.

Trends expected to affect the cost of trawling (that are independent of rationalization) in the future include the expectation that resource inputs will remain high relative to prices seen throughout the 1980s, 1990s, and early 2000s. These include the expectation that steel, fuel, and many other inputs necessary to operate and maintain a trawl vessel will remain high in the future because of increased global demand for such inputs. Exogenous factors (such as higher fuel prices) may have an effect on the degree of fleet consolidation and the type of species harvested. Relatively high fuel costs should induce harvesters to spend more time prosecuting more valuable fish and/or species with a relatively high CPUE. The rationale for this effect is that harvesters must continue to generate positive revenues per hour of fishing. If the cost for an hour of fishing increases, harvesters may find it necessary to increase the revenues generated per hour of fishing. If fuel prices remain high, or increase, it is reasonable to expect harvesters to forego some harvests of less valuable species (such as arrowtooth flounder), or of species with relatively low CPUE (such as thornyheads) because the cost of harvesting those species may end up being greater than the revenue associated with harvesting them. As harvest of these lower revenue species is foregone, the amount of capital necessary to prosecute fishing activities will decline, leading to more fleet consolidation than would be expected with lower fuel costs.

Other factors expected to continue into the future, which influence the cost of fishing, include increased competition for space in ocean areas (because of wave energy projects, marine reserves, and offshore nonrenewable resource exploration and development). These types of projects will tend to decrease the amount of area to which trawl harvesters may have access, potentially affecting where harvesters can operate and making it more costly to fish. When combined with rationalization, the ability of harvesters to respond under rationalized fishery conditions will be easier than if Alternative 1 (status quo) management remains in place. The possible elimination of fishing grounds for another use will mean that harvesters must move to another area to fish. Under a rationalized condition, harvesters will be able to move or transfer harvest privileges to another harvester and in this way adapt to those conditions fairly readily while maintaining fishing activity. While harvesters have the opportunity to move and adapt under Alternative 1, much of the opportunity depends on regulations enacted by managers. Such a command and control approach can constrain the ability of harvesters to adapt in ways that may be more creative and favorable to their operations.

Rationalization has the effect of mitigating some of the expected increases in cost that may be exogenous factors as well as factors that are part of Council actions. Since rationalization allows vessels to time deliveries and fishing activity to take advantage of market conditions, rationalization has the effect of mitigating some of the cost burden by allowing opportunities to optimize revenues. Furthermore, because of the ability of the fleet to consolidate, many costs associated with fishing activities may be directly reduced by rationalization, especially fixed costs, thus mitigating cost increases expected elsewhere. When combined with higher gross revenues per vessel and other outside factors, the expectation is that net revenues should be higher for the average vessel under a rationalized fishery than under Alternative 1.

While various input costs (such as fuel) are generally expected to remain higher in the future compared to the average over the past several years, it is also expected that the value of fish products will escalate or remain relatively high on a global basis, and the supply of whitefish from sources such as the North

⁹⁸ As noted elsewhere, a cost estimate provided by the WCGOP just prior to release of the DEIS identified the daily observer cost as \$500. Lian, et al. (2008) used the \$350 figure in their study. Section 4.16 on page 574 includes additional discussion of cost estimates.

Atlantic will remain depressed. This increased demand is expected to result in higher prices for raw fish products, and this should offset the cost associated with relatively high fuel prices. However, the ability for harvesters to benefit from this expected increase is tied to harvester/processor negotiation power and the ability of harvesters to negotiate profits from processors. This concept is closely related to the decision over the amount of QSs that should be allocated to harvesters versus the amount of QSs allocated to processors. Those alternatives that allocate relatively more to permits (principally harvesters, recognizing that processors own some LE permits and may acquire more) will tend to allow harvesters to benefit from this demand compared to those alternatives where processors are allocated relatively more.

The implementation of individual accountability will tend to result in lower bycatch of rebuilding species, as described in earlier sections of Chapter 4. This bycatch reduction is expected to lead to higher catch of underutilized target species, which is expected to result in higher catch and gross revenue in the fishery. When combined with the expectation that depleted stocks will rebuild, it may be reasonable to expect that there are at least two factors leading to the potential for increased catch quantities in the future. Higher populations of rebuilding species may lead to greater catch of both rebuilding species and target species; however, this depends on the bycatch rate of rebuilding species as they rebuild relative to the OY of those species. If the bycatch rate increases at the same rate as the OY, then the rebuilding period is not likely to result in any increased fishing opportunity on target species constrained by rebuilding stocks. In fact, if the bycatch rate increases more quickly than the OY (which can happen for a variety of reasons, including the fact that stock assessments lag the conditions found in the present day by at least two years), rebuilding may actually lead to a larger constraint on fishing than experienced under present day conditions. This term is often called the “rebuilding paradox.” However, it is reasonable to assume that after rebuilding stocks are declared rebuilt, greater fishing opportunity will exist. It may require that multiple stocks become rebuilt before fishing opportunity can be liberalized to any great degree (because several stocks may simultaneously constrain fishing opportunity), but rebuilding is eventually expected to result in greater opportunities for harvesters.

One trend that is likely to continue in the future is increasing scrutiny of the fishing industry by the public, particularly scrutiny of bottom trawl gears. Such increased scrutiny may not necessarily lead to formal regulation changes, but it may affect the marketability of bottom trawl-caught groundfish and groundfish caught with nontrawl gear. One possible outcome of increased scrutiny is a relatively higher price for nontrawl caught groundfish than trawl-caught groundfish. When combined with the effect of rationalization, the net result is likely to mean increasing numbers of trawl vessels switching over to a nontrawl gear. On one hand, the price received for nontrawl caught groundfish may be relatively higher, but on the other hand the amount of fish landed in the fishery may decline as nontrawl gears are generally not as effective at catching some types of groundfish as trawl gear. Therefore, the overall effect on revenues is somewhat unclear.

Amendment 10 is expected to be implemented in the near future, establishing a maximized retention program for the shoreside portion of the whiting fishery. This program allows vessels to store their catch without having to sort and discard such things as prohibited species. One benefit of this amendment is expected to be the counting of all catch made by shoreside whiting vessels. This counting mechanism is expected to facilitate the needs of a total catch rationalization program and/or the continuation of bycatch limit management in the whiting fishery. On one hand, the implementation of Amendment 10 is expected to mean a cost that whiting vessels must bear to comply with the necessary at-sea monitoring requirements (which may come in the form of a camera). On the other hand, this type of a system is expected to help facilitate implementation of a rationalized fishery and/or the continuation of bycatch limit management; both of which are a performance-based management tool and can be expected to lead to greater revenues in the fishery than a command and control management tool.

Amendment 10 is expected to have a net positive impact on shoreside whiting vessels compared to a case where the provisions of Amendment 10 are not implemented.

Amendment 15 established a sector-specific LE program in three sectors of the nontribal whiting fishery. The Council took action to implement Amendment 15 because of increasing participation in certain sectors of the whiting fishery, or the possibility of new entry that appeared to be developing in other sectors of the whiting fishery. As part of this action, the Council stated its intent that the provisions of Amendment 15 would sunset upon implementation of a rationalization program. This means that the effect of Amendment 15 is expected to continue into the future, but be replaced upon rationalization of the fishery. The effect of Amendment 15 is expected to be positive to trawl harvesters in the whiting fishery as it restricts new entry and, therefore, protects profits being generated in the fishery and limits further overcapitalization.

Several additional factors that are largely exogenous to the effect of rationalization, but which may influence profits and fleet efficiency, include the possibility of a stock becoming declared as overfished, the unexpected removal of a stock from overfished status, and the effect of climate change and variability on species abundance and location. While these factors are largely factors related to uncertainty, they are best examined in the cumulative effects section because they are not directly related to rationalization, but may affect the profits and fleet efficiency in a rationalized fishery.

If a stock becomes overfished, and a lower OY is implemented, harvesters are likely to see lower revenues due to a loss in harvest of that species, or because that species constrains access to other stocks, or both.⁹⁹ The inverse is true if a stock is taken off the overfished list. Whatever the mix of overfished species in the short to medium term, the characteristics of the trawl rationalization program, including individual accountability providing an incentive to lower bycatch rates and more comprehensive catch monitoring, will tend to improve fishery performance from an economic and conservation perspective, compared to Alternative 1 (status quo). In the long term, these characteristics are expected to support eventual rebuilding of currently overfished species and reduce the risk that other species will become overfished.

The effect of climate change and variability on fish abundance and location also influences profit and fleet efficiency. If conditions are such that groundfish migratory patterns differ substantially from one year to the next, the ability of harvesters to make informed decisions about fishing location and the species caught at those locations will become compromised. This can have the effect of increasing the amount of effort (and cost) harvesters must exert in performing fishing activities and result in lower revenues. However it is not known if these types of climactic events on fish resources will actually occur, so the effect of climate change and variability on trawl harvesters is not known.

The final factor considered here that is expected to affect revenues and fleet efficiency is the development and implementation of CFAs. While it is difficult to predict the effect CFAs will have since they have not yet been formally defined, some assumptions can be made regarding what they will be allowed to do and how they may operate.¹⁰⁰ The first assumption is that a CFA will be allowed to

⁹⁹ At their November 2009 meeting, just before the DEIS was released, the Council adopted new proxy biomass and harvest rate reference points recommended by their SSC for petrale sole and other west coast flatfish species as follows: 1) a biomass target (i.e., B_{MSY}) of 25 percent of virgin biomass (i.e., $B_{25\%}$); 2) a minimum stock size threshold (the overfished designation threshold) of half that amount or $B_{12.5\%}$ percent; and 3) a harvest rate predicted to achieve MSY (i.e., F_{MSY}) of $F_{30\%}$. Given this decision and the adopted current biomass estimate of petrale sole of 11.6 percent of unfished biomass, it is likely that the Secretary (per the MSA) will designate the petrale sole stock as overfished, which will require development of a rebuilding plan. Adoption of a rebuilding plan will occur as part of the 2011-2012 biennial specifications process during 2010.

¹⁰⁰ The Council has identified establishing a framework for CFAs as a trailing amendment action to be

hold quota in excess of accumulation limits. It is also assumed that the goals and objectives of the CFA will take into account the needs of the community, and these goals and objectives may be somewhat different from the goals and objectives of a QS holder or harvester. Since commercial harvesters engage in fishing activity as a source of income, it is not unreasonable to expect that one of the primary goals of a harvester is to maximize profitability from harvesting operations. A CFA may not have that same goal, or it may not rank that goal as highly as a harvester may. A CFA may be more interested in ensuring that the broader community benefits from fishing related activity. If this is the case, the CFA may create a structure that tends to affect the revenues generated by harvesters. However, the way in which harvester revenue is affected may benefit some harvesters. Those harvesters who are positively affected may be harvesters who did not receive an initial allocation of Qs and work through the CFA to find quota at less than market rates. Some harvesters may also benefit by working through the CFA organization and having the CFA organization interact with NMFS and the Council. Using the CFA organization may decrease the amount of time individual harvesters spend interacting with agencies, and this may result in some positive effects. In any case, the possibility of these latter activities occurring is conditional on the way in which CFAs organize and the way the Council outlines the manner in which CFAs can form.

implemented after the current target implementation date for the trawl rationalization program of January 1, 2011.

Table 4-43. Trends and factors affecting revenues and fleet efficiency.

Trends and factors affecting revenues and fleet efficiency		Score
Due to Rationalization	• Fleet consolidation	
	▪ Increased gross revenue per vessel	+
	▪ Reduction in fixed costs	+
	▪ Increased operational efficiency	+
	• Reduction in bycatch rate as a result of rationalization and subsequent increase in catch of underutilized species	+
	• Additional cost of 100 percent observer and/or camera monitoring	-
	• Intersector allocations of groundfish	Conditional
Exogenous to Rationalization	• Increased global demand for food products	+
	• Rebuilding of depleted groundfish species	+
	• Relatively high cost of inputs (fuel)	-
	• Possibility that a stock unexpectedly becomes overfished	-
	• Possibility that a stock unexpectedly becomes rebuilt	+
	• Ongoing harvest specifications process	Unknown
	• Amendment 10	+
	▪ Cost of at-sea monitoring	-
	▪ Performance based management	+
	• Amendment 15	+
	• Climate change	Unknown
	• Increased public scrutiny of fishing industry	Conditional
	• Continued requirement to carry VMS	-
	• Continuation of relatively high fuel costs	-
	• Competition for ocean space	-
• Community Fishing Associations	Conditional	

Note: scores are intended to reflect directional change. A positive score means that the effect is viewed as being beneficial, while a negative score indicates an adverse effect.

4.6.4.3 Trends and Actions Influencing Individual and Collective Risk

Several trends and actions are expected to continue, or be implemented in the future, which affect the amount of risk harvesters face. These include the following:

- The presence of trawl RCAs
- The rebuilding of depleted groundfish stocks
- Climate change and the effect on species abundance and location
- The possibility that a stock is unexpectedly declared as rebuilt or overfished
- The development and implementation of CFAs

As described in Section 4.6.2, rationalization has the effect of imposing risk on harvesters. Some risks can be described as a collective risk, in which a group of harvesters can be affected by the actions of another, while others can be described as individual risk, in which the aspect of individual accountability, combined with catch uncertainty, creates the potential for individual harvesters to have

an overage, which can be costly if the quota for that species is expensive or if the harvester faces an enforcement action. The level of individual and collective risk largely depends on several factors, including the degree of catch uncertainty relative to the OY of each species, the type of species covered with IFQ, and the level of bycatch management in a cooperative program.

When combined with other actions and trends, the risk faced by harvesters is not expected to be much different than the incremental effect associated with rationalization of the fishery. Several management tools used under the Alternative 1 (status quo) are expected to remain in place in a rationalized fishery, which have the effect of mitigating some risk, including the presence of trawl RCAs. These areas effectively close sites where depleted rockfish are found and may minimize the effect of a disaster tow that may occur in the nonwhiting portion of the fishery. However, the fact that depleted species are expected to rebuild and become more abundant may actually increase the risk that harvesters will encounter these species and, in this way, increases the amount of risk harvesters in the fishery face when prosecuting fishing activity if increased abundance increases the potential for disaster tows.

When combined with elements of the alternatives, those alternatives that allocate groundfish stocks on a more even basis, have lower accumulation limits, and do not have a grandfather clause are likely to mean the formation and sustaining of risk pools among harvesters is more likely. This will influence the ability of harvesters to deal with risk conditions on an individual and collective basis, as previously described.

Several additional factors that are largely exogenous to the effect of rationalization, but that may influence risk, include the possibility of a stock becoming declared as overfished, the removal of a stock from overfished status, and the effect of climate change on species abundance and location. These factors were discussed in the preceding section on vessel profits and fleet efficiency. While these factors largely relate to uncertainty, they are best examined in the cumulative effects section because they are not directly related to rationalization, but may affect the degree of risk harvesters face in a rationalized fishery. If a stock becomes overfished, and a lower OY (ACL) is implemented, additional risk can be imposed on harvesters if catch uncertainty is high relative to that OY. However, the level of risk faced by harvesters depends on the level of uncertainty relative to the OY level that may be specified by the Council, which cannot be predicted here. The inverse is true if a stock is taken off the overfished list. The effect of climate change on fish abundance and location also influences the degree of risk harvesters face. If conditions are such that groundfish migratory patterns differ substantially from one year to the next because of changes in climate and oceanographic conditions, the ability of harvesters to make informed decisions about fishing location and the species caught at those locations could become compromised. This could increase the uncertainty associated with harvesting and influence the degree of risk associated with fishing activity. However, it is not known whether climactic events will affect groundfish resources in this manner; therefore, the effect of climate change is largely unknown.

The final factor considered is the effect of CFAs on individual and collective risk. While it is somewhat difficult to identify the specific manner in which CFAs may impact risk (primarily because CFAs have not been specifically defined at this time), we assume that CFAs are allowed to hold quota in excess of limits and that they work in a collective fashion, similar to a harvest cooperative. Under this assumption, a CFA organization acts to pool the quota of overfished species and may foster high levels of collaboration, cooperation, and communication, similar to what was discussed in earlier sections describing collective management systems. This type of activity can be expected to result in some benefits that may help in weak stock management conditions and in a way that helps to alleviate risk of disaster tows—the cost of which may otherwise be borne entirely by an individual. Since the CFAs are allowed to hold quota in excess of accumulation limits, such benefits to risk (both individual and

collective) may spread throughout more harvesters in the fishery compared to a case where CFAs do not exist.

Table 4-44. Factors affecting the degree of individual and collective risk faced by harvesters.

Factors affecting the degree of individual and collective risk faced by harvesters		Individual Risk	Collective Risk
Due to Rationalization	• Coverage of Infrequently encountered species with IQ	–	Conditional
	• Individual accountability for total catch in an IFQ program	–	+
	• Collective accountability for bycatch in a cooperative program	+	–
Exogenous to Rationalization	• Trawl rockfish conservation areas	+	+
	• Rebuilding of depleted groundfish stocks	Unknown	Unknown
	• Climate change	Unknown	Unknown
	• Possibility that a stock unexpectedly becomes rebuilt	+	+
	• Possibility that a stock unexpectedly becomes overfished	–	–
	• Community Fishing Associations	+	+

Note: Scores are intended to reflect directional change. A positive score means that the effect is viewed as being beneficial, while a negative score indicates an adverse effect.

4.6.4.4 Trends and Actions Influencing Vessel Safety

Safety conditions are largely related to profitability of vessels, the subsequent ability to pay for and conduct maintenance and the ability of harvesters to avoid fishing in hazardous weather conditions. As a result, many aspects affecting safety are the same as those factors affecting vessel profits and fleet efficiency. Rather than repeating the factors that are expected to result in changes in vessel profits and fleet efficiency, the reader is referred to the subsequent section describing the effect on profits and fleet efficiency. Factors improving profits and fleet efficiency should be beneficial toward safety conditions, while those that may adversely affect profits and fleet efficiency should be adverse toward safety conditions.

Factors that may lead to fewer occurrences of vessels fishing in hazardous weather conditions are limited to those directly related to the effects of rationalization. Therefore, the cumulative effects are the same as the incremental effect of rationalization.

4.6.5 Summary of the Effects on Trawl Harvesters by Alternative

In this section, we itemize cumulative effects by alternative. As stated previously, each action alternative (Alternatives 2a through 4b) is a replacement for the existing fishery management framework and does not necessarily add to the effects of past and current conditions. Rather, the action alternatives replace the system responsible for the effects of past and current conditions. This perspective is important in understanding the cumulative effect of the alternatives.

4.6.5.1 Alternative 1 (No Action)

The cumulative effect of Alternative 1 on harvesters can be described as the continuation of existing conditions in the fishery. Under these existing conditions, many trawl harvesters have seen a deterioration of their economic status. This has been caused by regulations crafted in response to declining stocks and the imposition of things such as VMS, which have required trawl harvesters to pay additional costs. When taken in the context of events, trends, and actions that are expected to occur in

the future, many trawl harvesters will have difficulty sustaining their operations and a gradual decline in the status of the fishery is expected to continue. This may take several forms, including vessels dropping out of the fishery, vessels falling into various states of disrepair, and vessel owners and operators who face general financial difficulty because of the relatively small amounts of revenue being generated by fishing activity. The exception may be the Pacific whiting fishery, assuming the status of the Pacific whiting fishery improves in the future, and prices for whiting remain relatively high. In other words, maintaining Alternative 1 is likely to mean that the status of nonwhiting trawl harvesters along the west coast continue to decline, while the Pacific whiting trawl harvesters maintain their existing status.

4.6.5.2 Alternative 2a

Alternative 2a replaces much of the management structure responsible for the past and current conditions affecting trawl harvesters. Taken in the context of past and current conditions, Alternative 2a improves the economic status of trawl harvesters. As indicated in previous sections, nonwhiting trawl harvesters do not make economic profits under existing conditions (on average). This is due to a handful of different factors including a decline in populations of many groundfish stocks and a management system that makes it difficult for harvesters to respond to such declines while remaining profitable. Alternative 2a replaces the existing management structure with one that allows for more flexibility in harvesting activities (such as harvest timing and fleet consolidation) and, therefore, allows the harvesting sector to adapt to changing allowable catch levels while remaining profitable.

Alternative 2a differs from other alternatives when viewed at an individual harvester level. The conditions created by this alternative impose a substantial amount of individual accountability on trawl harvesters for a wide array of species—many of which are rarely encountered in the trawl fishery. This level of accountability results in a risk to individual harvesters because fishing is in some ways an inexact method of extracting resources, and there is a possibility that harvesters will encounter some of these rarely encountered species, even when trying to avoid them. In such an event, individual harvesters may face substantial costs to acquire quota sufficient to cover that catch event, or may face substantial costs as a result of an enforcement action for being in a catch deficit. So, while trawl harvesters on the whole may see their status improve under Alternative 2a, some individuals may be substantially worse off should they incidentally encounter certain species for which the quota supply is limited.

4.6.5.3 Alternatives 2b and 2c

Alternatives 2b and 2c are very similar to Alternative 2a. As with Alternative 2a, Alternatives 2b and 2c replace much of the management structure responsible for the past and current conditions affecting trawl harvesters. Taken in the context of past and current conditions, Alternative 2b improves the economic status of trawl harvesters. As indicated in previous sections, nonwhiting trawl harvesters do not make economic profits under existing conditions (on average). This is due to a handful of different factors, including a decline in populations of many groundfish stocks and a management system that makes it difficult for harvesters to respond to such declines while remaining profitable. Alternative 2a replaces the existing management structure with one that allows for more flexibility in harvesting activities (such as harvest timing and fleet consolidation) and, therefore, allows the harvesting sector to adapt to changing allowable catch levels while remaining profitable.

Alternatives 2b and 2c respond to the Council's request to consider two different tools for responding to processor concerns. One tool is to use AMQ to help processors adversely impacted by rationalization, while another tool is to make an initial allocation of Qs to processors. The effect these differences

have on harvesters can be described in several different parts. First, the amount of AMQ used to address processor concerns is smaller than the amount of quota contemplated for initial allocation to processors (10 percent for AMP versus 25 to 50 percent for processor initial allocation). As the alternative to these elements is an allocation to permits, the 10 percent quota for AMP has a lesser effect on the amount of quota initially allocated to permits than an initial allocation to processors, meaning harvesters will stand to receive more quota if an AMP is used than if there is a 25 or 50 percent initial allocation made to processors. Second, the way in which the quota is used to address processor concerns will differ, and by extension, the effect on harvesters will differ. Using AMP to respond to adversely impacted processors implies that some processors will be recipients, while others will not. This differs from an initial allocation made to processors where all processors with history stand to be recipients of that initial allocation. The difference here is regional. Those harvesters in areas where processors are recipients of either AMP quota or an initial allocation to processors could stand to be impacted differently if those harvesters can enter into agreements with processors to prosecute that AMP quota (Alternative 2b) or the processor held QSs (Alternative 2c). Over the longer term, these two options may begin to look very similar to Alternative 2a because the control limits allow entities to acquire relatively large amounts of QSs. If processors purchase quota up to the control limit, over time, each Alternative 2 may begin to look the same, and this is likely to come in the form of similar regional impacts and similar impacts on ex-vessel prices.

When viewed in the context of other past, present, and future conditions/actions the impact of Alternatives 2b and 2c is the same as Alternative 2a, except with regard to harvester and processor relations in the short term. Over the long run, Alternative 2b and 2c will look similar to 2a. Furthermore, like Alternative 2a, Alternatives 2b and 2c provide harvesters with tools that will allow the fishery to restructure according to prevailing conditions. As stocks rebuild and the allowable harvest of groundfish species changes with each biennial harvest specifications process, the fishery can reorganize to capitalize on the opportunities provided by those different allowable harvest levels.

In addition to capitalizing on profit opportunities, Alternatives 2b and 2c may impact some harvesters at the individual level to a large degree, as in Alternative 2a. The risks posed by holding individual harvesters accountable for rarely encountered species means that, should a harvester incidentally encounter one of the infrequently encountered stocks, the cost burden to that individual could be substantial and may come in the form of high costs to purchase quota to cover that event, or costs in the form of an enforcement action if that individual is not able to find or purchase quota.

4.6.5.4 Alternative 3

Alternative 3 replaces much of the management system responsible for the current status of trawl harvesters. As stated in earlier portions of the analysis, many trawl harvesters have seen catches decline over the past several years in response to declining groundfish populations and the need to rebuild depleted stocks. However, in more recent years, the Pacific whiting fishery has grown in importance, and prices for that species have recently increased following a low in the early 2000s.

Alternative 3 implements a rationalization program that will allow harvesters in all portions of the trawl fishery to be more flexible with harvest timing and capital use, and this, in turn, will allow trawl harvesters to be more economically efficient than in current conditions. However, this flexibility in the whiting fisheries is dampened and possibly eliminated through the implementation of a set of common (whiting sector) bycatch limits. This common limit creates incentives that may lead to a race for fish via a race for bycatch species. This means that, even if a rationalization program is put in place for the whiting fishery, the outcome may be one resembling status quo conditions. Taken in the context of past, present, and future actions/conditions, this alternative may be similar to Alternative 1 (No Action).

In the nonwhiting portion of the fishery, the outcome is expected to be different. Mechanisms in the nonwhiting fishery appear to create a system without race-for-fish incentives, and, as a result, profits are generally expected to improve. Taken in the context of past, present, and future actions/conditions, Alternative 3 replaces the system responsible for the past and current conditions with a system that allows the nonwhiting sector to restructure into a more profitable fishery. The flexibility afforded to harvesters in this system allows for greater adaptability to changes occurring in the future through such events as changing OYs (ACLs) and the removal of species from the overfished list. However, at an individual level, the risks posed to nonwhiting harvesters are much greater than under current conditions. This is partially the result of imposing individual accountability (which also creates added flexibility and adaptability) but is also the result of holding individual nonwhiting harvesters responsible for infrequently encountered species and the fact that covering catch events of these species with quota could prove quite costly. Taken in the context of past, present, and future actions/conditions, this risk may create conditions where some harvesters are unable to participate in the fishery under this alternative, while they are able to participate under current conditions.

4.6.5.5 Alternative 4a

Alternative 4a is similar to other action alternatives in that it replaces much of the management system responsible for the current status of trawl harvesters. As stated in earlier portions of the analysis, many trawl harvesters have seen catches decline over the past several years in response to declining groundfish populations and the need to rebuild depleted stocks. However, in more recent years, the Pacific whiting fishery has grown in importance, and prices for that species have recently increased following a low in the early 2000s.

Alternative 4a allocates much of the shoreside quota to processors. When nonwhiting volumes under status quo conditions are compared to the amount allocated to processors under this alternative, the amount for some species is substantial. In some cases, the amount allocated to processors exceeds status quo catch levels for underutilized species. In cases where harvesters rely on such species, this outcome will tend to be adverse. In cases where harvesters do not rely on such species, the outcome may not be adverse, or may not be adverse to the same degree. Taken in the context of past, present, and future conditions/actions Alternative 4a has a mixed effect. The change imposed on the fishery is relatively substantial, allowing the fleet to restructure and improve efficiency, but some nonwhiting harvesters can be expected to be made worse off under this alternative, while others may be made better off.

In the case of whiting harvesters, the incremental effect of Alternative 4a is substantial, where the mothership and shoreside whiting fleets are able to restructure and capitalize on potential cost efficiencies and other revenue opportunities. The incentives created through this alternative do not result in an incentive to race for fish via a race for bycatch as in other alternatives. For these reasons, the harvesters in the shoreside and mothership whiting fisheries are expected to operate in a system that allows for added flexibility and adaptability under this alternative. Taken in the context of past, present, and future conditions/actions, this alternative is expected to result in an improvement in the status and efficiency of whiting harvesters compared to status quo conditions.

4.6.5.6 Alternative 4b (Council Preferred)

Similar to the other action alternatives, Alternative 4b replaces the existing management structure responsible for much of the past and current condition of the fishery with another management structure. Harvesters who focus on nonwhiting species see improvements in flexibility and conditions that allow for potential cost efficiencies and other sources of revenue to be realized. The amount of nonwhiting

quota allocated to processors under this alternative is zero, creating a noticeably different effect on nonwhiting harvesters compared to Alternative 4a. In comparison to Alternative 4a, harvesters focusing on some underutilized species are not made worse off by this alternative. Harvesters focusing on shoreside and mothership whiting fisheries also see enhanced flexibility and opportunities to realize potential cost efficiencies and other sources of revenue. Unlike some of the other action alternatives, the way in which bycatch, or nontarget species, are managed under this alternative does not create incentives for a race for fish among whiting harvesters via a race for bycatch.

Risks faced by harvesters in this alternative are reduced compared to some of the action alternatives due to a more refined set of species being covered with IFQ, or catch history as is the case with cooperatives. Removing some infrequently encountered species from the list of species that would be covered with these catch control tools reduces the risk that harvesters face from inadvertent catch events of these species that may be costly to cover with quota.

Taking into account past, present, and future actions/conditions, this alternative allows harvesters in all three non catcher-processor sectors to improve their economic status and to be more flexible and adaptable to conditions that may change in the fishery into the future.

4.7 Captain and Crew

In this section, we describe the impacts of rationalization on captain and crew employed on LE trawl groundfish vessels. This group consists of individuals who do not own groundfish trawl catcher vessels and who do not own LE trawl permits. In many cases, a vessel captain is also the owner of that vessel and the owner of a permit. These individuals are discussed in Section 4.6 above, describing impacts to harvesters. Under the alternatives being considered, captain and crew who do not receive an initial allocation of quota or catch history can purchase quota or catch history. While new entrants or second-generation fishermen may comprise individuals who are not necessarily captain and crew, new entrants and second-generation fishermen are covered under this section because a review of available literature indicates that most new entrants into fisheries began their careers as crewmembers.

We begin the section by providing a description of methods used to assess effects on captain and crew and the metrics used to illustrate those effects. Following the description of methodology, we discuss the effects of rationalization on captain and crew. Unlike the sections describing impacts to harvesters and processors, this section compares the general effects of trawl rationalization to Alternative 1; it does not include the effect of each alternative on captain and crew (page 392). This is because variations in the alternatives do not appear to noticeably change the impact to captain and crew. Specific elements may have an effect, in which case they are identified and assessed, but overall variations in the alternatives do not appear to noticeably change the outcome.

Finally, we assess cumulative effects. This cumulative effects section briefly summarizes the past and present actions with ongoing effects on captain and crew, and the RFFAs that are expected to have effects. The effect of these past, present, and RFFAs are combined with the effect of the alternatives to arrive at the cumulative effect.

4.7.1 Methods for Assessing Impacts

In this section, we describe the methodology for assessing the impacts of rationalization on captain and crew. This section summarizes the potential impacts, the reasons why those impacts occur (the mechanisms), and the way in which those impacts are analyzed and modeled (the metrics). Table 4-45 provides an overview of the approach used to estimate the impacts of rationalization on captain and

crew. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the potential impacts, 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis. This table shows that the expected impacts to captain and crew are changes in captain and crewmember compensation system, changes in the number of captain and crew jobs, changes in the hours worked, changes in the average income received by captain and crew members, and changes in safety conditions for captain and crew. The mechanisms that are driving changes to the number of captain and crew jobs include fleet consolidation and vessel crew size. Changes in the compensation system are driven by changes in the relationships between captain and crew and vessel/permit/quota owners. Changes in the number of hours worked are driven by fleet consolidation and the corresponding change in fishing effort exerted by each vessel. Changes in average income per captain and crewmember are driven by changes in revenue per boat and in the compensation system. Changes in the skill set required of captain and crew are largely driven by opportunities for gear switching. Changes in safety are driven by fleet size, vessel operational flexibility, and financial ability to invest in equipment and conduct vessel maintenance. Each of these mechanisms, which are drivers for the potential impacts, are measured through listed criteria (third column) that are estimated through the methods described in the final column.

Table 4-45. Overview of impacts, mechanisms, and metrics used to compare the effect of the Alternative 1 and the alternatives on trawl catcher vessels.

Potential Impacts	Reasons or Mechanisms for Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data, Models, and Methods used for Assessing Impacts
Changes in number of captain and crew jobs	Fleet consolidation and number of captain and crew per vessel	Number of vessels and crew per vessel	Fleet consolidation analysis, literature review, discussions with key informants
Changes in shares paid to captain and crew	Changes in the relationships between captain and crew and vessel/permit owners	Captain and crew share	Literature review
Changes in number of hours worked	Fleet consolidation and changes in effort per vessel	Number of vessels and catch/effort per vessel	Fleet consolidation analysis, change in target species catch analysis, and literature review
Changes in average income per captain and crew member	Changes in revenue per boat. Changes in captain and crew shares	Average catch per boat and shares paid to captain and crew	Fleet consolidation analysis and literature review
Changes in the skill-set required	Gear switching	Potential for gear switching to occur	Qualitative assessment and literature review
Ability to become new owners of quota	Changes in the cost of purchasing entry to the fishery	Cost of purchasing quota	Fleet consolidation model, literature review, and qualitative assessment
Changes to safety	Fleet size; vessel operational flexibility; and financial ability to invest in vessel maintenance and safety equipment	Occurrence of safety-related incidents	Qualitative assessment based on literature and expertise of analysts

4.7.2 Direct and Indirect Effects of the Alternatives on Captain and Crew

Rationalization is expected to impact captain and crew in a variety of ways. Captain and crewmembers are primarily affected indirectly through fleet consolidation, changes in the relationships between captain and crew and vessel/permit/quota owners, and changes in the status and profitability of trawl vessels.

Studies of existing IFQ programs have documented changing relationships between crew and captains and vessel/permit owners due to rationalization. For example, in some fisheries the shift to IFQs altered the compensation system from a share of profits system to a wage system. (Macinko 1997) discusses impacts on crew who were affected by rationalization when they were not allocated quota. In this study, which was conducted during the first year after implementation of the Alaska halibut/sablefish IFQ program, he noted that some crew benefit, and others do not. Those who benefit worked for entities who benefited from the system as a whole, while those who did not benefit worked for vessels that left the fishery due to rationalization. However, (Macinko 1997) notes that although some crew had lower crew shares, they still earned more under the IFQ program.

Another example is from the B.C. trawl fishery. In this fishery, the overall share paid to crew is estimated to have declined by 5 percent (from 40 to 35 percent) per vessel, while the overall wages paid to crewmembers is estimated to have increased by 137 percent, primarily because of increases in revenue per vessel (GSGislason & Associates Ltd.. 2008).

Wilen and Casey (1997) discuss other potential impacts on crewmembers. Consolidation of activities and elimination of vessels and crew will occur as the fishery restructures. Second, on remaining vessels, inputs, such as the need for crew labor, will be reconfigured, reflecting changes in fishing processes. Wilen and Casey write that (particularly in comparison to a derby fishery), demand for crew labor will likely fall at first. However, they note that as the fishery restructures, there may be new needs for labor not present before rationalization. They note that in virtually all IFQ fisheries, raw product quality became more important than it was prior to rationalization, leading to new skill requirements for handling and partial processing. Switching to new gear types (such as longlining instead of trawling) may also impact the need for crew labor.

4.7.2.1 Captain and Crew in the Nonwhiting Trawl Fishery

Fleet consolidation, in general, means that fewer captain and crewmember jobs will be necessary. Based on the fleet consolidation analysis, there may be 40 to 60 nonwhiting trawl vessels after the fleet is rationalized compared to current Alternative 1 with 100 to 120 vessels. According to industry representatives, the number of crewmembers currently on west coast nonwhiting trawl vessels is approximately two crew with one captain. Historically, the larger vessels had up to three or four crew (P. Leipzig, pers. comm., Executive Director, Fishermen's Marketing Association. May 2008). The following table outlines an order of magnitude estimate of number of crew under a rationalized fishery compared to Alternative 1 based on this information.

Table 4-46. Order of magnitude estimates of the number of captain and crew jobs in the nonwhiting trawl fishery.

	Number of Vessels	Approximate Number of Captain and Crew
Alternative 1 (No Action)	100 - 120	300-360
Rationalized Nonwhiting Fleet (low fleet size)	~40	~120
Rationalized Nonwhiting Fleet (high fleet size)	~60	~180

Based on the analysis in Appendix C, which illustrates how target species catch could be expected to increase as a result of bycatch avoidance, overall revenues in the fleet may increase by approximately 40 to 65 percent, and average catch per boat is expected to nearly triple as a result of fleet consolidation. This information suggests that any decrease in shares paid to crewmembers may be substantially outweighed by increases in revenue and catch per vessel as a result of rationalization. Increases in crew wages will likely be complimented by an increase in working hours. This increase in working hours is likely to mean that hired captain and crewmember jobs may become fulltime occupations.

Based on information from industry representatives, the type of crew compensation system varies somewhat across vessels. Many vessels compensate crew after calculating an adjusted gross revenue value that takes into account the cost of fees (to the OTC and FMA), the cost of fuel, and cost of groceries. The share paid to crew can vary from 8 percent of adjusted gross to 12 percent of adjusted gross, with exceptional crew fetching up to 15 percent of adjusted gross. Hired captains are also paid according to the adjusted gross revenue scale, but fetch higher shares. Captains may receive 17 to 25 percent (P. Leipzig, pers. comm. Executive Director, Fishermen's Marketing Association, May 2008). The following table illustrates information received from industry representatives that can be used to generate order of magnitude estimates regarding crew wages under Alternative 1 conditions and under rationalized fishery conditions. This information shows that the cost of fuel under current conditions may range from 30 to 40 percent of gross, the cost of FMA fees is 1.3 percent of gross, and the cost of OTC fees is 0.5 percent of gross, meaning adjusted gross revenues may be 68.2 to 58.2 percent of actual gross (before subtracting groceries, for which no information was readily available). Crew shares range from 8 to 15 percent of adjusted gross, and hired captain shares may range from 17 to 25 percent of gross.

Table 4-47. Select itemized costs incurred by trawl vessel owners.

	Low	High
Fuel	30%	40%
FMA	1.30%	1.30%
OTC	0.50%	0.50%
100% minus subtotal	68.2%	58.2%
Crew	8%	15%
Captain	17%	25%

Source: P. Leipzig, pers. comm., Executive Director, Fishermen's Marketing Association, 2008.

By assuming two crewmembers and one captain, the information shown above indicates the total share of unadjusted gross revenue received by captain and crew may range from approximately 20 percent to almost 40 percent. Captain and crew may receive 20 percent of unadjusted gross if the vessel incurs high fuel costs, but pays relatively low shares. Captain and crew may receive nearly 40 percent of gross if the vessel incurs low fuel costs, but pays relatively high shares.

Under rationalized fishery conditions, the shares paid to captain and crew may decline. Assuming total crew compensation declines by 5 percent under rationalized fishery conditions, we can illustrate changes in the overall compensation to captain and crew. This reduction is based on estimates from British Columbia, which illustrate a 5 percent aggregate reduction in crew wages. Table 4-48 shows the average revenue per boat based on the fleet consolidation model described in Appendix C. This analysis shows the effect of a rationalized fishery with no change in landings and a rationalized fishery with an optimistic change in the bycatch rate leading to increases in the catch of currently underutilized

target species (described in more detail in Appendix C). Results indicate that crew wages should more than double, even though the actual share may decline.

Table 4-48. Estimated compensation to hired captain and crew in the nonwhiting trawl fishery.

State	Avg Gross Rev/Boat	Total Captain and Crew Share (sum of all captain and crew per vessel)	Total Captain and Crew Wages (sum of all captain and crew per vessel)
Alternative 1	\$196,500	20% to 40%	\$39,300 to \$78,600
Rationalized Fishery (no reduction in bycatch rate)	\$575,000	15% to 35%	\$86,250 to \$201,250
Rationalized Fishery (high reduction in bycatch rate)	\$670,000	15% to 35%	\$100,500 to \$234,500

4.7.2.2 Captain and Crew in the Shoreside and Mothership Whiting Fishery

Crew size in the whiting fishery is likely to follow a similar pattern. Although fleet consolidation in the whiting fishery is not expected to occur to the same degree, some consolidation is expected. Based on the analysis of whiting fishery fleet consolidation in Section 4.6 above, describing impacts to harvesters, the number of shoreside whiting vessels may decrease from approximately 37 vessels to approximately 23 vessels, while the number of mothership catcher vessels may decline from 20 to approximately 14 vessels. This means that the number of captain and crew jobs may decline from approximately 111 to 69 in the shoreside whiting fishery and from 60 to 42 in the mothership sector (see Table 4-49). The following table shows the approximate number of crew under the Alternative 1 fishery size and compares that to the number of crew in a rationalized fishery. These figures assume the Pacific whiting OY is similar to 2006 and 2007 levels.

Table 4-49. Order of magnitude estimates of the number of captain and crew jobs in the shoreside and mothership whiting trawl fishery.

Sector	Approximate Number of Captain and Crew under Alternative 1	Approximate Number of Captain and Crew under a Rationalized Fishery
Shoreside Whiting	111	69
Mothership Whiting	60	42

The amount of ex-vessel revenue attributed to the average vessel in both the mothership and shoreside sectors is expected to increase due to fleet consolidation. Using 2007 ex-vessel price as an indicator, the average shoreside whiting vessel may generate slightly more than \$430,000 per year. After fleet consolidation takes place, the average vessel may generate approximately \$700,000. These figures assume whiting OYs (ACLs) that are similar to those set in 2007. These will undoubtedly vary, making the revenue per vessel estimates vary in concert. In the mothership sector, a similar pattern may hold. Under Alternative 1 conditions the average vessel may generate over \$460,000, while under a rationalized fishery with fleet consolidation, the average vessel may generate over \$650,000. Such changes for revenue generated by each vessel should change the compensation paid to hired captain and crewmembers. Assuming the adjusted gross revenue and crew share structure described in the nonwhiting fishery is similar to the whiting fishery, then crew wages in the shoreside sector may increase by over 60 percent even though the actual share declines (see Table 4-50). Crew wages in the mothership sector may increase by over 40 percent.

Table 4-50. Estimated compensation to hired captain and crew in the shoreside and mothership whiting trawl fishery.

Sector	Alternative 1 Captain and Crew Wages	Rationalized Fishery Captain and Crew Wages
Shoreside Whiting	\$69,000-\$161,000	\$97,500-\$227,500
Mothership Whiting	\$64,500-\$150,000	\$105,000-\$245,000

4.7.2.3 Ability to Become New Owners of Quota

Hired captain and crewmembers are likely to be the main source of new fishery entrants. New entry in this case is defined as those who were not initial recipients of quota, but subsequently obtain quota.¹⁰¹ These individuals may purchase quota, but continue to be hired captain and crewmembers and fish their quota on the same vessel, or they may elect to purchase quota and a vessel and fish their quota independently.

Entering the fishery may very well prove to be more costly under a rationalized program than under Alternative 1. In addition, entering into a fishery rationalized through a cooperative system may prove to be more difficult than entering into a fishery rationalized through a IFQ system. Entering a cooperative-based fishery may be more difficult because catch history in a cooperative system is not divisible, meaning the cost of entry is likely to be large. Since IFQ is finely divisible, one can buy a small amount of quota, representing a smaller outlay than buying a large quantity of catch history. In addition, one can increase shareholdings by purchasing small quantities of QS over time.

The cost of purchasing quota is largely determined by the revenue above cost that is attributed to harvesting. Based on the fleet consolidation and cost efficiency model, the amount of revenue generated above costs may average \$0.43 per pound for DTS species, and \$0.26 per pound for non-DTS species. These estimates reflect the cost of leasing QPs for a single year. Purchasing QS represents a longer-term investment, but the cost is a function of the annual lease price. The price of QS is theoretically equal to the discounted value of the annual lease price. While quota owners' discount rates in this case are not known, the per-pound value of QS can be calculated with an assumed discount rate. If we assume a 20 percent discount rate (which is a value that falls within the range suggested by available literature) and estimate the current value of a perpetual series, then the value of DTS QS on a per pound equivalent may be \$2.15, while the value of non DTS QS on a per pound equivalent may be \$1.30. Put in other terms, the cost of purchasing DTS QS that is equal to 100,000 lb may be \$215,000, while the cost of purchasing non DTS QS that is equal to 100,000 lb may be \$130,000. However, these values are sensitive to the personal discount rate exhibited by quota owners, which is not known (see Appendix E for additional discussion of personal discount rates and their effects on the distribution of QS). Whatever the discount rate may be, this information shows that entering into the fishery by purchasing QS may prove costly. If a loan is taken out to pay for purchased QS, then it will take several years to pay off that loan.

In addition to the description above regarding discount rates, published research has demonstrated that other factors influence the cost of acquiring QSs. Those entities who are initial recipients of QSs are in a position of bidding relatively high prices for those QSs or QPs because they have covered costs and generated revenue on their gifted QSs and can afford to make relatively small margins on additional purchases or leases (see Pinkerton and Edwards 2009). This tends to drive up the cost of QSs and QPs, making it difficult for a potential new entrant to buy into the fishery. This is because that new entrant

¹⁰¹ QS could be purchased, received as compensation for services or as a gift, or inheritance. For the purposes of the discussion here it is assumed the purchases will be the most likely way quota will be obtained.

would need to cover costs and generate revenue from those Qs and QPs that have been bid up to relatively high levels by the initial recipients of Qs who can afford to make small margins on those purchases. The AMP can alleviate the hurdle that new entrants must overcome to become owners of Qs. If adaptive management QPs are granted to new entrants for a sufficient period at a cost that is low, those new entrants can generate revenues off those AMP QPs and use those revenues to purchase Qs. In other words, the AMP QPs can be used to bridge the gap between those entities who are initial recipients of Qs, and those entities who are not initial recipients of Qs, but want to become holders of Qs.

4.7.2.4 Captain and Crew Safety

Captain and crew safety is likely to change because of rationalization. Captain and crew conditions are a function of vessel safety, as described in Section 4.6 above. As described in that section, rationalization is expected to improve vessel maintenance because of increased profitability. Such improvements in maintenance should be expected to improve conditions for captain and crew by reducing the probability of such things as equipment failure. In addition, implementing a rationalization program in the whiting fishery is expected to reduce the Olympic conditions in this fishery and should lead to less time spent fishing during hazardous weather conditions.

4.7.2.5 Effects on Captain and Crew by Alternative

The information presented in the above sections applies generally to describe the ways in which captain and crew will be impacted by rationalization of the west coast trawl fishery. However, some slight differences exist in the manner in which captain and crew are impacted depending on the alternative chosen. Some criteria used to estimate impacts do not appear to vary by alternative. These include the number of captain and crew jobs, changes in hours worked, changes in skill-set required, and changes in safety. This is because these criteria affect crew indirectly through direct impacts on trawl harvesters. Captain and crew jobs are tied to the number of vessels in the fishery, and, based on the analysis of trawl harvesters, each alternative should result in the same number of vessels. Changes in hours worked is an indirect effect resulting from the number of hours a trawl vessel spends fishing. This also does not appear to vary by alternative because there are no elements restricting catch or hours at sea. Likewise, changes in skill-set required and changes in safety do not appear to be impacted by alternative, as no element influences variations in these criteria. Those criteria that do appear to vary by alternative include the wages made by crewmembers (and the risk of crewmembers making expected wages) and the ability to become new owners of quota. These are outlined in the following subsections. The analysis above presents information documenting Alternative 1, so the effect of Alternative 1 is not repeated here.

4.7.2.5.1 Alternative 2a

Alternative 2a results in relatively high wages paid to crewmembers compared to the other action alternatives. This is an indirect result of higher prices paid to trawl harvesters under this alternative because of the amount of quota allocated to permit holders. Some of these relatively high wages are put at risk because of the species covered with IFQ in the program, also an indirect effect from risks imposed on harvesters. If a harvesting vessel incurs high costs or has to stop fishing, that would indirectly affect opportunities for captain and crew. Captain and crew face a relatively difficult time in becoming new owners of quota due to the lack of an AMP that could be used to allocate temporary QPs to captain and crew who want to become new owners of quota. Such a temporary allocation would enable captain and crew to make money from the AMP quota and save funds for purchasing Qs.

Purchasing those shares outright could prove quite difficult, as outlined in Pinkerton and Edwards, 2009.

4.7.2.5.2 Alternative 2b

Alternative 2b results in similar impacts as Alternative 2a. The place where Alternative 2b differs is in the presence of an adaptive management provision to help adversely impacted processors. If such a provision results in slightly lower ex-vessel prices paid to harvesters, then the wages captain and crewmembers receive from fishing will, in turn, be slightly lower compared to Alternative 2a.

4.7.2.5.3 Alternative 2c

Alternative 2c is similar to Alternatives 2a and 2b. However, because there is an initial allocation of Qs made to processors (25 percent for nonwhiting and 50 percent for shoreside and mothership whiting), the ex-vessel price paid to harvesters is likely to be smaller than under Alternatives 2a and 2b. This, in turn, should reduce captain and crew wages compared to Alternatives 2a and 2b.

4.7.2.5.4 Alternative 3

Alternative 3 results in lower wages to captain and crew in the nonwhiting fishery compared to other action alternatives due to lower ex-vessel prices paid to harvesters. In the shoreside and mothership whiting fishery, the outcome is not as clear due to difficulties in comparing the effect of a processor linkage with an initial allocation of IFQ to processors. The same risks to captain and crew that exist in Alternatives 2a, 2b, and 2c due to risks imposed on harvesters from rarely encountered species exist in Alternative 3 for captain and crew in the nonwhiting fishery. These risks do not exist in the shoreside and mothership portions of the whiting fishery because certain species are removed from the program. The presence of an ADP can help captain and crew in all sectors of the fishery become new entrants/second generation QS holders.

4.7.2.5.5 Alternative 4a

Alternative 4a results in relatively low wages for captain and crew in the shoreside whiting fishery due to low prices for shoreside whiting harvesters. This stems from the amount of Qs allocated to shoreside whiting processors under this alternative. Captain and crew in the nonwhiting portion of the fishery see relatively high wages in the fishery, as do captain and crew in the mothership sector. These wages are put at risk somewhat in the shoreside sectors because of the requirement that vessels be accountable for a large number of species, some of which are rarely encountered, yet may be costly to cover with quota and may result in some lost fishing opportunity. This risk does not exist to the same degree for captain and crew in the mothership sector.

4.7.2.5.6 Alternative 4b

Alternative 4b results in relatively high wages in the nonwhiting sector due to the relatively high ex-vessel prices expected for this alternative. Wages for shoreside whiting captain and crew are expected to be relatively moderate, with wages being higher than alternatives with a 25 percent or 50 percent allocation to processors, but with wages being lower than alternatives with no allocation to processors, or a 10 percent reserve for adaptive management for processors. Wages in the mothership sector are also somewhat moderate compared to the other alternatives as the declaration provision is likely to result in more favorable price negotiation conditions for harvesters than an alternative with a full processor linkage. The risk to those wages is lower in this alternative than in nearly all other

alternatives except for status quo, because several infrequently encountered species are removed from the program.

4.7.3 Cumulative Effects on Captain and Crew

Captain and crew are affected in several ways including fleet consolidation, vessel profits, and safety conditions on board vessels. These factors influence the number of captain and crew jobs, the wages made at those jobs, and the safety conditions associated with captain and crew employment. As such, the cumulative effect of rationalization on captain and crew includes the effects of rationalization itself, past and present trends, and RFFAs that influence fleet consolidation, vessel profits, and safety conditions. In addition to rationalization, the factors expected to influence these effects include the following:

- Increased demand for protein
- Change in production costs associated with trawl activities
- Ongoing harvest specifications
- Increasing public scrutiny of fishing, especially the bottom trawl gear type
- Climate change and variability
- Overfished species rebuilding
- Competing use of ocean areas

As described above, rationalization is expected to result in fleet consolidation in the nonwhiting, shoreside whiting, and mothership sectors of fishery. This, in turn, is expected to result in fewer jobs for captain and crew, but for those jobs that remain, wages are expected to be higher. Furthermore, as a result of increased revenues, safety on-board vessels is expected to improve because of greater funds available to perform onboard maintenance of vessels. Safety is also expected to be affected by rationalization because the incentive to race for fish is expected to be eliminated, reducing the frequency of vessels fishing in hazardous conditions.

Ongoing trends and future actions are also expected to influence revenues (and by extension, captain and crew wages) and vessel safety conditions. A relatively high demand for protein on a global basis should generally lead to higher prices for fish products and a higher ex-vessel price received at the dock. However, increasing demand for resources on a global scale in general is also likely to lead to a higher cost of inputs at the vessel level, thus increasing the cost of engaging in fishing activity and putting downward pressure on captain and crew wages. The net effect of increasing protein demand and prices for production inputs is not immediately clear. However, rationalization will have the effect of allowing fleet capital to respond to market conditions. Therefore, it is reasonable to expect that captain and crew wages will be no worse than under Alternative 1 conditions if the fishery is rationalized and will most likely be improve under rationalized conditions since the fleet will be able to consolidate to appropriate market conditions.

Harvest specifications for groundfish are set on a two-year cycle. At times, substantial revisions can be made to the OYs (ACLs) of groundfish species, requiring that management and fishing opportunities respond. Such changes can mean noticeable changes in the opportunities harvesters have in prosecuting fish resources, and captain and crew are affected by extension. While actual changes in the OYs (ACLs) of groundfish in the future cannot be clearly predicted, it is certain that OYs (ACLs) will be adjusted through time, requiring that management measures and fishing opportunities be adjusted. This will mean that wages earned by captain and crew will vary over time as OYs (ACLs) and associated management measures change.

Increased scrutiny of fishing activities, particularly bottom trawl fishing activities, may not lead to increased regulation or restriction of bottom trawling. It may, however, lead to differences in the marketability of trawl versus nontrawl caught groundfish. Nontrawl-caught groundfish may receive higher relative ex-vessel prices in the future compared to trawl-caught groundfish and this may induce increasing numbers of vessels to fish with fixed gear instead of trawl gear. The result may be a reduction in the tons harvested in the fishery since fixed gear is generally not as productive at catching many types of flatfish as trawl gear, but the price received for landed species may increase. It is not immediately clear what the net effect will be on vessel revenues (and by extension, captain and crew wages) but it will most certainly mean that increasing numbers of captain and crew members in the fishery will find it necessary to acquire new skills in order to prosecute fishing activities with fixed-gear as opposed to trawl gear.

Competing uses of ocean areas for such things as wave energy projects and offshore resource exploration and development will tend to place restrictions on locations where harvesters can prosecute fishing activities. Captain and crew may be affected by these restrictions. Harvesting operations may find it more difficult to prosecute fishing operations if productive fishing grounds are dedicated to other uses. If this occurs, captain and crew may see wages reduced as a result.

Overfished species rebuilding is expected to result in a positive influence on vessel profits in the long term as it is expected to result in an increased harvest. In the short term, the effect of overfished species rebuilding is not clear as it may result in increased harvests in some cases, decreased harvests in other cases, and no change from Alternative 1 (No Action) conditions in other cases. Captain and crew are affected, by extension, as harvesters are affected.

Finally, climate change and variability, as well as the possibility of a stock unexpectedly becoming overfished or rebuilt, may affect captain and crew. Climate change and variability may, for example, have an effect on species abundance and location. This can have an effect on the ability of harvesters to locate and prosecute fish resources successfully. Captain and crew wages are influenced (by extension) as the successful targeting of groundfish resources can directly influence vessel gross revenues and costs. It is not clear exactly how climate change and variability will influence groundfish stock abundance and location. Therefore, the effect of climate change and variability on captain and crew is not clear. The possibility of a stock unexpectedly becoming listed as overfished is likely to mean restrictions on the opportunities available to harvesters, which would impact captain and crew through a second order effect. Inversely, the possibility of a stock unexpectedly becoming listed as rebuilt is likely to mean a liberalization of fishing activity and a positive effect on captain and crew.

Table 4-51. Cumulative factors affecting captain and crew.

Factors Affecting Captain and Crew		Impact
Due to Rationalization	• Fleet consolidation	
	▪ Captain and crew wages	+
	▪ No. of captain and crew jobs	-
	▪ Safety conditions	+
Exogenous to Rationalization	• Increased demand for protein	+
	• Change in production costs associated with trawl activities	-
	• Ongoing harvest specifications	Unkn
	• Increasing public scrutiny of fishing, especially the bottom trawl gear type	Unkn
	• Competing use of ocean areas	-
	• Overfished species rebuilding	+
	• Climate change and variability	Unkn
	• Stock unexpectedly declared as overfished	-
	• Stock unexpectedly declared as rebuilt	+

4.7.4 Summary of the Effects on Captain and Crew by Alternative

The cumulative effects on captain and crew vary little by action alternative, except with respect to variations in wages, ability to become second-generation owners of quota, and risk to annual wages due to risks to harvesters. Alternatives allocating Qs to processors tend to result in lower wages to captain and crew than alternatives that do not allocate shares to processors. The effect of a processor linkage is difficult to compare to the effect of an initial allocation to processors; however, greater proportional linkages are likely to result in lower wages. A declaration procedure is likely to favor captain and crew wages more than a linkage.

Across all of the action alternatives, the number of captain and crew jobs is expected to decline from the no action alternative (Alternative 1). However, total wages paid to crew are expected to increase across the action alternatives compared to Alternative 1, because the amount of volume (and ex-vessel revenue) being handled by each vessel is expected to increase. Furthermore, because each vessel is expected to generate higher levels of revenue, maintenance is expected to improve, leading to safer conditions onboard vessels. Safety is also enhanced to the degree that race-for-fish conditions are eliminated. These conditions appear to go away for each of the alternatives, except for Alternatives 1 and 3, where whiting harvesters may race for fish via a race for bycatch.

Captain and crew wages are indirectly put at risk to the extent that harvester wages are put at risk. Each of the alternatives increases harvester risk due to the implementation of individual accountability for groundfish species. Each alternative imposes accountability for overfished species, creating risk since covering catch of these species with QPs could prove costly. However, Alternative 4b reduces this risk somewhat by removing some infrequently encountered species in the nonwhiting fishery from the program and removing other infrequently encountered species from the at-sea programs. This means that Alternative 4b increases risk relative to no action (Alternative 1), but less than the other alternatives.

Taken in the context of past, present, and future actions/conditions, captain and crew remaining in the fishery see their status improve and participate in a fishery that is more flexible and, thereby, more adaptable to changing conditions. Wages made by captain and crew are expected to be higher than current conditions and generally more stable, except in individual cases where a harvester inadvertently encounters some risk imposing species and fishing opportunities are ceased. Captain and crew would be indirectly impacted by such an event.

4.8 Nontrawl Commercial Harvesters

In this section we describe the effects of trawl rationalization on nontrawl commercial harvesters. This group comprises harvesters who target groundfish and nongroundfish species with nongroundfish trawl, or nontrawl gear. In one case, (the California halibut fishery) such harvesters may use gear that is described as groundfish trawl gear, but in other cases these harvesters do not use gear described as groundfish trawl gear. Examples include harvesters in the nearshore rockfish fixed-gear fishery, the Dungeness crab fishery, and the pink shrimp trawl fishery. In many cases, trawl harvesters also participate in these other fisheries, but the focus of this section is on the impacts to those harvesters who do not also participate in the LE trawl fishery.

We begin this section by briefly outlining the expected effects of rationalization on nontrawl harvesters. This initial section describes the potential effects of trawl rationalization on this group of harvesters and the reasons why those effects are expected to occur. We follow this initial section with a description of the broad level effects expected to occur on nontrawl harvesters similar to the equivalent discussion found in Sections 4.6 (harvesters), 4.9 (shore-based processors), and 4.10 (mothership processors).

4.8.1 Methods for Assessing Impacts

In this section, we describe the methodology for assessing the impacts of rationalization on nontrawl harvesters. This section summarizes the potential impacts, the reasons why those impacts occur (the mechanisms), and the way in which those impacts are analyzed and modeled (the metrics). Table 4-52 provides an overview of the approach used to estimate the impacts of the alternatives on nontrawl harvesters. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the potential impacts, 3) measurement criteria (indicators used in assessing each type of impact), and 4) models and data sets used in the analysis.

Nontrawl vessels, their owners, and crew are predominately indirectly affected by the rationalization of the trawl sector. Possible indirect effects may result from economic impacts of spillovers resulting from the rationalization of the trawl fishery. If the trawl fleet consolidates, vessels and crewmembers no longer employed in trawl fisheries will potentially be able to switch into nontrawl fisheries, increasing participation in those other fisheries and adversely impacting those nontrawl harvesters. In addition, the increased harvest timing flexibility afforded by rationalization may mean that trawl vessels participate in nontrawl fisheries to a greater degree than they do now. The increased effort in nontrawl fisheries would likely have a negative impact on the economic performance of the fishermen already engaged in those fisheries. Harvest for existing fishermen could decline due to crowding and intensified fishing pressure on stocks. Moreover, an increase in fishery participants would result in greater market competition. These changes in economic performance could, in turn, affect the participation levels and fishing patterns of nontrawl vessels. Finally, a type of spillover could occur that is based on changes in catch in the trawl fishery of nontarget species. If changes in the bycatch of Pacific halibut occur in the trawl fishery, this could increase or decrease the amount of directed Pacific halibut fishermen' fishing opportunity. Since Pacific halibut is managed to a fixed allowable catch level, an increase in trawl-induced mortality would decrease the amount available to other sectors.

Another potential indirect effect can occur if nontrawl harvesters rely on the presence of a trawl sector in particular communities. Trawl vessels are often the source of much economic activity as a result of the large volume of landings. Such activity tends to draw support businesses and processing activity to areas where trawl vessels are found. If trawlers leave a port (see the geographic comparative advantage analysis in Appendix C), their departure may mean the departure of support businesses and processing activity. Nontrawl harvesters reliant on the presence of these entities may suffer as a result.

Table 4-52. Overview of impacts, mechanisms, and metrics used to compare the effect of the Alternative 1 and the alternatives on nontrawl harvesters.

Potential Impacts	Reasons or Mechanisms for Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data, Models, and Methods used for Assessing Impacts
Changes in profits and participation of nontrawl commercial harvesters	Potential impacts on ex-vessel prices from increased fixed-gear catch as a result of gear switching	Price changes of select groundfish as a result of increased quantities of fixed-gear harvest	Available literature, together with expert opinion and other pertinent information
	Potential spillovers from trawl harvester participation in other fisheries, potential spillover from increased catch of nontarget species, and competition over grounds and fishery resources	Changes in trawl vessel effort and catch in nontrawl fisheries and impacts to opportunities for nontrawl harvesters	
	Access to processors and markets	Reliance of nontrawl harvesters on the presence and activity generated by trawl harvesters	

4.8.2 Direct and Indirect Effects of the Alternatives on Non-trawl Harvesters

The type and degree of indirect effects to nontrawl harvests may very well be fishery-specific, but to some extent, the factors driving these potential effects are the same. Potential impacts could result from potential spillover effects from a rationalized groundfish trawl fishery:

- Fleet consolidation
- Engagement in nontrawl sectors for a longer time than under Alternative 1 because of more flexibility
- Changes in trawl fishery bycatch that alters the available catch of certain species in nontrawl sectors
- Potential impacts to ex-vessel prices received for fixed-gear-caught groundfish if trawl vessels switch to fixed-gear to harvest IFQ fish.

Gear switching, which is part of the rationalization alternatives, is an additional mechanism that may cause a spillover effect. Gear switching could allow vessels that currently use trawl gear to access species occurring in rocky habitat that is inaccessible with trawl gear (unless footrope restrictions were relaxed). Depending on the allocation made to trawl and nontrawl sectors, this gear switching may allow trawl vessels to increase the take of species like nearshore rockfish. The likelihood of gear switching occurring will not be known until specific management measures and allocations are identified. However, state regulations minimize the capability of gear switching trawl vessels to

prosecute nearshore fishery opportunities. Vessels harvesting nearshore species off the states of Oregon and California are required to have a state-issued nearshore commercial fisheries permit. Washington prohibits commercial fishing in coastal state waters.

In addition to spillover effects, if nontrawl sectors rely on the presence of trawl harvesters to maintain the presence of processors and support businesses, the departure of trawl vessels from a port may have geographic consequences to nontrawl harvesters. Using the regional comparative advantage analysis as a guide, if nontrawl harvesters do indeed rely on the presence of a trawl sector to maintain support business and infrastructure, then nontrawl harvesters in the ports of Crescent City, Neah Bay, Fort Bragg, and Half Moon Bay may face difficulties accessing markets and finding necessary support businesses.

4.8.2.1 Spillover of Vessel Participation

Trawl vessels participate in several different fisheries under Alternative 1. The two most common fisheries, outside the trawl fishery, are the Dungeness crab fishery and the pink shrimp fishery. In a rationalized fishery, those holding Qs have more control over their future fishing opportunity than under Alternative 1 conditions. This relaxes the need for trawl harvesters to diversify into other fisheries (as they do under Alternative 1 conditions) because they have more certainty about the future of trawling. In addition, participation in multiple fisheries tends to make it harder to specialize, and the lack of specialization may create cost inefficiencies. This means that rationalization may actually result in fewer trawl harvesters participating in Dungeness crab and pink shrimp fisheries than under Alternative 1. However, fleet consolidation may tend to work in the opposite direction, because fleet consolidation will make additional, relatively large vessels available. Vessels that are removed from the trawl fishery may increase their participation in fisheries like Dungeness crab and pink shrimp. Although effort controls (LE and pot limits) are in place in these fisheries, there are many latent permits, making it possible for participation levels to increase over Alternative 1. Trawl vessels exiting the groundfish trawl fishery could replace vessels currently used in the Dungeness crab and pink shrimp fisheries. Replacement of existing vessels may change the harvesting power of some nontrawl harvesters.

4.8.2.2 Bycatch of Nontarget Species as a Form of Spillover

Bycatch of nontarget species in the trawl fishery affecting opportunities for other sectors that target those species is another type of spillover. Pacific halibut is one example of a species that is encountered, but not targeted, by trawlers. It is, however, targeted by commercial fixed-gear harvesters and by recreational harvesters. Pacific halibut bycatch in the trawl fishery may change as the fishery becomes rationalized. Some have hypothesized that Pacific halibut bycatch could increase as trawlers find more efficient ways to avoid overfished stocks and access more target species such as arrowtooth flounder and petrale sole. Both of these species have been shown to co-occur with Pacific halibut. Therefore, it is reasonable to expect that Pacific halibut bycatch may increase in concert. Others have countered that rationalization typically results in a wholesale reduction in bycatch because fishermen no longer feel the need to compete and can spend the time fishing more cleanly. This occurs because catching nontarget species and discarding them is time consuming and, therefore, costly. Under a rationalization program, harvesters have a greater ability to avoid such species in the first place because they are not racing and competing among one another for catch.

Since the nonwhiting trawl fishery does not currently operate as a derby with harvesters racing for catch, it may be likely that rationalization will significantly reduce nontarget bycatch not covered by IFQs. If nontarget species bycatch is covered with IFQ, there are reasons to expect bycatch of these

species to decline. The B.C. trawl fishery is one empirical example of Pacific halibut bycatch in a rationalized trawl fishery. At the outset of this trawl IFQ program, Pacific halibut was not managed at the individual vessel level, but was managed at a sector level. The result was that management targets set for Pacific halibut in the trawl fishery were not met. In an attempt to reach those goals, managers imposed individual vessel limits on Pacific halibut catch. Since that time, the trawl fishery has caught less than the management target for the trawl sector as a whole¹⁰². This implies that covering Pacific halibut with IFQs will tend to decrease bycatch from current levels. It is unclear whether not covering Pacific halibut with IFQs will change bycatch from existing levels without allocating less halibut to the trawl sector than is currently taken.

The Council's preferred alternatives for both Trawl Rationalization Alternative 4b and Intersector Allocation are expected to reduce the incidental catch of Pacific halibut in the trawl fishery. The Council's decision on Intersector Allocation consciously allocated less Pacific halibut to the trawl fishery than had been taken in the past. This regulated reduction in Pacific halibut bycatch should have a generally positive impact on nontrawl harvesters as greater amounts of Pacific halibut will be available to those sectors than would otherwise be the case.

4.8.2.3 Resource, Fishing Grounds, and Market Competition

Other nontrawl harvesters may see indirect effects because of resource and fishing grounds competition. Specifically, nontrawl groundfish harvesters may be affected because of the gear switching provisions in the rationalization alternatives and the fact that the utilization of nontrawl gear to catch groundfish creates different opportunities in terms of markets and areas. Trawl gear is subject to regulations that restrict the maximum size of the footrope. This footrope restriction limits the ability of trawl vessels to access areas of relatively high relief substrate where many types of rockfish are found. If trawl IFQ holders are able to use nontrawl gear, this may enable those harvesters to access species such as nearshore rockfish, black rockfish, and cabezon, potentially competing with harvesters of those species (though state regulations will minimize this effect on nearshore species to a great degree). However, the ability for trawl IFQ holders to engage in these activities depends on the management measures in place that allow or discourage the targeting of those species and the allocation made to the trawl sector. If allocations made to the trawl sector reflect Alternative 1 harvest amounts of these species, resource and grounds competition with harvesters targeting nearshore species (such as nearshore rockfish) are not likely to occur. If allocations to the trawl sector are increased over Alternative 1 amounts, and regulations allow targeting by trawl IFQ holders, competition over fishing grounds and resources may, in fact, occur.

Nontrawl harvesters who target species such as sablefish and thornyheads are more likely to see grounds competition than those nontrawl harvesters who target black rockfish and nearshore groundfish species. In addition, market competition is possible in cases where a change in the quantities of fish caught with fixed-gear and trawl gear can affect ex-vessel price. Sablefish is one species likely to motivate gear switching by IFQ holders. As illustrated previously, the price paid for fixed-gear-caught sablefish is noticeably higher than the price for trawl-caught sablefish. Because of this price differential, trawl vessels are likely to use nontrawl gear to some degree to harvest sablefish.

An increase in the amount of sablefish harvested with fixed-gear may drive prices down for fixed-gear-caught sablefish from their current levels, thus negatively affecting existing fixed-gear sablefish harvesters. Whether this is likely to be the case depends on several factors, including the amount of sablefish sold in the global market and whether sablefish caught on the west coast competes in the same, global market or is directed to a separate market. If the amount of sablefish caught on the west coast is

¹⁰² Mose, Brian. 2008. British Columbia Trawl Fisherman. Personal Communication.

small relative to the amount caught globally, and west coast sablefish competes in the same market as sablefish caught in Alaska and British Columbia, for example, then there is not likely to be a price effect due to gear switching.

To help determine whether a price effect is likely, we compare west coast sablefish landings with landings made in Alaska and British Columbia during 2006 (Table 4-53). In 2006, landings from the west coast made up 25 percent of landings from the three areas. The amount potentially subject to gear switching (the trawl allocation portion) represents 11 percent. It is unlikely that this entire amount would be caught with fixed-gear, simply because some must be held in order to serve as incidental catch while targeting other, associated target species like Dover sole.

Table 4-53. Alaska, British Columbia, and W-O-C sablefish landings.

	Alaska 2006 Landings	British Columbia 2006 Landings	W-O-C 2006 Landings	2006 West Coast Trawl Allocation (a portion of W-O-C)	Total 2006
Actual mt	15,199.5	4,535	6,472	2,971	26,206
Percent of total	58%	17%	25%	11%	100%

Source: NOAA Fisheries. 2008. Office of Science and Technology. Catch Statistics
 NOAA Fisheries, NWFSC. 2008. 2006 Groundfish Catch Estimates
 Canadian Department of Fisheries and Oceans. 2008. Pacific Region. Regional Data Services Unit. Summary Commercial Statistics

Unfortunately, data are not readily available to determine whether west coast sablefish is sold in a different market than sablefish caught in other regions. However, it is known that Japan is the largest consumer of U.S. exported sablefish. Japan purchased 90 percent of U.S. exported sablefish in 2002, and 73 percent of U.S. exported sablefish in 2005 (McDowell Group 2006). The Japanese market has been shown to be somewhat elastic, where changes in supply have noticeable changes in price. Huppert and Best (2004) show that the import price decreased as per capita imports of sablefish increased. Specifically, as per capita imports double, the import price in Japan declined by 30 to 40 percent.

Given the large amount of sablefish purchased by Japan, it appears unlikely that fixed-gear-caught sablefish on the west coast is sold in a different market altogether than fixed-gear-caught sablefish from other regions. Though there may be some local markets that purchase west coast sablefish specifically, it seems unlikely that all, or even most, west coast sablefish is purchased by these local markets. It may be reasonable to expect, however, that there are different markets for fixed-gear- and trawl-caught sablefish, simply because of the relative quality of fish caught by both methods. If that is, indeed, the case, and Japan is the buyer of most fixed-gear sablefish, the change in supply of fixed-gear-caught sablefish as a result of gear switching may have a slight effect on the import price paid in the Japan market. Such a change may, in turn, have a slight downward influence on the ex-vessel price received by harvesters. However, given the amount of sablefish potentially subject to gear switching, such a price effect is likely to be small. For example, using the information found in Huppert and Best (2004), if 10 to 20 percent of the trawl allocation is caught with fixed-gear, this will have less than a 1 percent downward price effect on the Japanese import price of sablefish.

Nontrawl harvesters who currently target sablefish may see grounds competition if trawl vessels switch to fixed-gear. For example, trawl vessels that switch to fixed-gear may join fixed-gear harvesters of sablefish in their same fishing grounds, thus leading to competition for space. In addition, as trawl harvesters switch to a new gear there may be a learning curve, which leads to more adverse interactions with other fixed-gear harvesters (because of the potential for tangled and poorly set gear) in the years immediately following rationalization. If gear switching leads to an increase in the amount of fixed-gear used, this may also increase conflicts with trawl vessels as trawl vessels search for grounds. Such

conflicts are likely to result in a loss of fixed-gear if trawlers inadvertently tow through sets of pot or longline gear.

Trawl and fixed-gear RCAs may interact with the gear switching provisions. If the seaward boundary of the RCA remains in deeper water for vessels harvesting trawl IFQ fish (either with fixed-gear or with trawl gear) this may reduce the impact on other nontrawl harvesters of sablefish since there would be less competition for those grounds shoreward of the trawl RCA seaward boundary. However, those trawl vessels using fixed-gear may conflict with those continuing to use trawl gear. Therefore, if differential RCAs remain gear-specific, trawl IFQ holders that use fixed-gear may avoid some interactions with trawl gear, but may interact with other fixed-gear harvesters.

4.8.2.4 Effects on Nontrawl Harvesters by Alternative

To a large degree, the effects on nontrawl harvesters do not vary much by action alternative. The criteria by which nontrawl harvesters can be impacted include, in short, market competition, grounds competition, spillover as a result of increased participation in nontrawl activities from trawl harvesters, and possible changes trawl harvesters may cause in the mortality of some species that are important species for nontrawl harvesters. Of these criteria, the only one that varies by alternative is the impact of bycatch in the trawl fishery. This varies depending on whether Pacific halibut is covered with IBQ in the trawl fishery. Alternatives 2a, 2b, 2c, and 4b include a halibut bycatch quota provision, while Alternatives 3 and 4a do not. Therefore, the analysis of alternatives addresses Alternatives 2a, 2b, 2c, and 4b simultaneously, and 3 and 4a simultaneously.

4.8.2.5 Alternatives 2a, 2b, 2c, and 4b

Alternatives 2a, 2b, 2c, and 4b include a provision for managing Pacific halibut bycatch in the trawl fishery. This provision caps the amount of bycatch that will occur in the trawl fishery and in this way protects the directed halibut fisheries. While bycatch has tended to decrease in other fisheries when they move toward a rationalization program, such declines have typically come from fisheries that have moved from a race for fish fishery to a rationalization fishery. Under existing conditions (Alternative 1, no action), the nonwhiting fishery (where most of the halibut bycatch occurs) is not described as a race for fish fishery. Therefore, harvesters in the nonwhiting fishery already have the opportunities to fish selectively should it be beneficial for them to do so. Under a rationalization program, it is expected that harvesters will have incentives to avoid overfished species, thereby increasing the catch of target species. Many target species, such as arrowtooth flounder and petrale sole, are correlated with Pacific halibut. Unless harvesters have an incentive also to avoid Pacific halibut, then the bycatch of Pacific halibut may actually increase in the Pacific groundfish program unless there are provisions limiting the catch of Pacific halibut in the trawl fishery. As Alternatives 2a, 2b, 2c, and 4b impose a limit on halibut bycatch, the directed halibut fishery should not be impacted by changes in the way the trawl fishery operates.

Other types of effects on nontrawl harvesters who are expected from these alternatives include spillover of vessel participation, grounds competition, and market competition. Some nontrawl harvesters may be impacted if substantial numbers of trawl vessels leave a port, and the infrastructure and support business that these nontrawl harvesters rely on follows. Vessel spillover is likely to occur in the pink shrimp trawl fishery and the Dungeness crab fishery under the action alternatives for a couple of different reasons. One reason is due to fleet consolidation and the fact that vessels leaving the trawl fishery may elect to participate in the pink shrimp and/or Dungeness crab fishery. Given the number of latent permits that appear to exist in these fisheries, the amount of spillover from this mechanism is not likely to be encumbered by the fact that these fisheries are LE. The other reason spillover is likely to occur is

simply due to opportunities over harvest timing. Trawl harvesters may elect to stay within the pink shrimp and Dungeness crab fishery for longer periods.

4.8.2.6 Alternatives 3 and 4a

For reasons outlined in the preceding paragraph, it may be reasonable to expect Pacific halibut bycatch to increase in the groundfish trawl fishery as that fishery moves to rationalized conditions unless there is an incentive for harvesters not to do so. Alternatives 3 and 4a do not appear to include such an incentive because there is no provision for a Pacific halibut bycatch quota. Therefore, the bycatch of halibut may actually increase under these alternatives, decreasing the amount of Pacific halibut left for the directed halibut fisheries and negatively affecting those nontrawl harvesters.

Other types of effects on nontrawl harvesters who are expected from these alternatives include spillover of vessel participation, grounds competition, and market competition. Some nontrawl harvesters may be impacted if substantial numbers of trawl vessels leave a port and the infrastructure and support business that these nontrawl harvesters rely on follows. Vessel spillover is likely to occur in the pink shrimp trawl fishery and the Dungeness crab fishery for a couple of different reasons. One reason is due to fleet consolidation and the fact that vessels leaving the trawl fishery may elect to participate in the pink shrimp and/or Dungeness crab fishery. Given the number of latent permits that appear to exist in these fisheries, the amount of spillover from this mechanism is not likely to be encumbered by the fact that these fisheries are LE. The other reason spillover is likely to occur is simply due to opportunities over harvest timing. Trawl harvesters may elect to stay within the pink shrimp and Dungeness crab fishery for longer periods.

4.8.3 Cumulative Effects on Nontrawl Harvesters

Nontrawl harvesters are affected by a variety of factors directly related to rationalization, including fleet consolidation; longer engagement of trawl vessels in nontrawl sectors; changes in trawl fishery bycatch that alter the available catch of certain species in nontrawl sectors, potential impacts to ex-vessel prices received for fixed-gear-caught groundfish if trawl vessels switch to fixed-gear to harvest IFQ fish, and competition over markets for species such as pink shrimp. Other factors affecting nontrawl harvesters (that are exogenous to the effect of rationalization) include the following:

- Amendment 21 (intersector allocations)
- Ongoing harvest specifications process (including nongroundfish species)
- Competing use of ocean areas (wave energy, MPAs, offshore resource development)
- Increasing consumer awareness of the fishing industry
- Relatively high demand for protein
- Relatively high production costs
- Overfished species rebuilding
- RCA and EFH area restrictions
- MSC sustainability certification in the pink shrimp and Dungeness crab fisheries

The effect of intersector allocations on nontrawl participants will depend on the amount of fish allocated to each sector. Opportunities in the nontrawl sablefish fishery are not expected to be affected to any appreciable degree by the intersector allocation process because the Council is not considering an adjustment to the sablefish allocation. Intersector allocations on other stocks may have an effect on nontrawl harvesters. If the allocation made to nontrawl sectors results in more catch available to those sectors, then the impact may be positive. The inverse is true if the intersector allocation process results in lower catch available to each sector.

At times, substantial revisions can be made to the allowable catch of fish species, including nongroundfish, requiring that management and fishing opportunities respond. Such changes can mean noticeable changes in the opportunities harvesters have in prosecuting fish resources, and this will influence the opportunities available to nontrawl harvesters. While actual changes in the available catch of various species in the future cannot be clearly predicted, it is certain that allowable catch levels will be adjusted through time, requiring that management measures and fishing opportunities be adjusted. This will mean that wages earned by captain and crew will vary over time as OYs (ACLs) and associated management measures change.

Projects such as wave energy development, MPAs, and offshore resource exploration and development have the effect of restricting areas available to harvesters. Wave energy projects may impact areas closer to shore and, therefore, affect nearshore harvesters and Dungeness crab harvesters, while offshore resource exploration may occur further out along the continental shelf, slope, and beyond, possibly affecting harvesters working in those areas. In other words, competing ocean uses may exist for all nontrawl harvesters, leading to restrictions on access to fishing grounds in those areas. Such restrictions may increase the cost of fishing or reduce the success harvesters have in prosecuting fishing activity. In either case, the effect of competing uses is likely to be adverse on nontrawl harvesters.

Increasing consumer awareness of the fishing industry (particularly of the bottom trawl gear type) may have mixed effects on nontrawl harvesters who could ultimately depend on the gear type used. The certification of fisheries as sustainable by the MSC is likely to lead to positive effects on fisheries attaining that certification, and harvesters in those fisheries may see higher ex-vessel prices as a result. Other factors may play a role including the increasing public scrutiny of bottom trawling. Such scrutiny may result in a wider price differential between fixed-gear-caught groundfish and trawl-caught groundfish regardless of any official certification. In this case, those nontrawl harvesters who possibly stand to see higher prices may end up better off, while those harvesters who use bottom trawl gear (such as California halibut and sea cucumber trawlers) may be worse off.

On a worldwide basis, the price of commodities has been high relative to recent years. This has the potential effect of increasing the value of harvested fish species, but it also results in higher production costs (fuel). Therefore, increased prices for such products simultaneously put upward and downward pressure on profits generated by nontrawl harvesters.

Over the long run, rebuilding is expected to result in positive effects on nontrawl harvesters by providing for additional opportunities on those rebuilt stocks, as well as alleviating the constraint that depleted stocks may place on other species. Over the shorter term, rebuilding may result in mixed effects. The rebuilding paradox may mean that rebuilding—at times—results in adverse effects on nontrawl harvesters in the shorter term. In other cases, rebuilding may result in positive effects on nontrawl harvesters.

RCA and EFH restrictions are expected to act similarly to other uses that restrict access to fishing grounds. In general, restrictions that limit access to fishing grounds should be expected to increase the cost of harvesting a given unit of fish. This should have the effect of reducing revenues to nontrawl harvesters if additional area management restrictions are put in place.

Table 4-54. Cumulative factors affecting nontrawl harvesters.

Factors Affecting Nontrawl Harvesters		Impact
Due to Rationalization	• Trawl fleet consolidation	– or no effect
	• Trawl fleet harvest timing flexibility (effort spillover)	–
	• Trawl fishery bycatch (catch spillover)	Conditional
	• Trawl sector gear switching	–
Exogenous to Rationalization	• Amendment 21	Conditional
	• Ongoing harvest specifications process (including nongroundfish species)	Unknown
	• Competing use of ocean areas (wave energy, MPAs, offshore resource development)	–
	• Increasing consumer awareness of the fishing industry	Conditional
	• Relatively high demand for protein	+
	• Relatively high production costs	–
	• Overfished species rebuilding	+ (long term)
• RCA and EFH area restrictions	–	

4.8.3.1 Summary of the Effects on Nontrawl Harvesters by Alternative

The effects of trawl rationalization on nontrawl harvesters all have similar impacts. The place where impacts differ on nontrawl harvesters is in bycatch as a form of spillover. Bycatch of Pacific halibut in the trawl fishery is expected to be higher in alternatives 1, 3 and 4a, than the other alternatives, reducing the amount of halibut available to the directed halibut fishery. Other effects are common across the action alternatives. Fleet consolidation in the trawl fishery under the action alternatives is expected to result in a spillover into nontrawl fisheries such as Dungeness crab and pink shrimp, compared to the no action alternative (Alternative 1). Furthermore, enhanced harvester flexibility in the trawl sector under the action alternatives is expected to provide opportunities for trawl harvesters engaged in multiple fisheries to increase participation in nontrawl fisheries, causing another form of spillover, compared to the no action alternative (Alternative 1). In addition, gear switching in the trawl rationalization alternatives is expected to result in grounds competition with nontrawl groundfish harvesters compared to the no action alternative (Alternative 1).

When combined with past, present, and future actions/conditions, nontrawl harvesters are expected to face increasingly stringent competition over space due to such issues as wave energy development. Combined with spillover and competition over grounds with trawl harvesters electing to engage in gear switching, nontrawl harvesters should be adversely impacted compared to the no action alternative. In addition, pink shrimp harvesters are expected to be adversely impacted by increased participation of trawl harvesters in the pink shrimp fishery. Since the pink shrimp fishery is not managed with a TAC, increased participation in the shrimp fishery should increase catch, reducing the price received for shrimp, and decreasing the revenues generated by shrimp harvesters. This trend may reverse the price increases in pink shrimp recently seen because of MSC certification. Dungeness crab harvesters may not see the same change in price because of increased participation. Markets for Dungeness crab have recently absorbed historically high harvest volumes, speaking to the ability of the market to absorb increases in catch that may occur because of increased participation in the Dungeness crab fishery.

4.9 Shoreside Processors of Trawl Groundfish

Trawl rationalization may result in a wide range of impacts to processors, varying in extent and degree depending upon alternative. As a result of rationalization, it is likely that impacts to processing businesses will be distributed according to the geographic shift of fishing effort and subsequent consolidation of fishing and processing enterprises. Impacts may also occur based on the extent to which processing companies gain and control QS. The types of impacts to processors resulting from the trawl rationalization program, and associated mechanisms, are outlined in more detail below.

In this section, we describe the impacts of rationalization on shoreside or land-based processors of trawl-caught groundfish. This group is composed of businesses that receive whiting and nonwhiting groundfish directly from harvesters and conduct processing activities on the fish to make product forms that are usable at the wholesale and/or retail market level. In several cases, entities holding LE trawl permits may be processors of LE trawl-caught groundfish. Impacts on these entities are also considered in this section.

Section 4.9.1 below describes methods used to assess effects on processors and the metrics used to illustrate those effects. The variables and metrics used, some of which are also used in earlier sections, can be compared and contrasted among the alternatives. Section 4.9.2 describes the broad-level effects of rationalization on groundfish processors and contains a discussion of important general issues associated with rationalizing the fishery.

Following the description of broad-level effects, we assess the impacts on processors of the alternatives. This section begins by identifying the impacts that are expected to occur from each of the elements of the alternatives independently. We then provide an assessment of the impact of each alternative on groundfish processors. This assessment is programmatic and examines the ways in which processors of trawl-caught groundfish are affected by the combined suite of options within each alternative. At the end of this section, we provide a side-by-side comparison of the effects of each alternative on groundfish trawl processors.

Finally, we assess cumulative effects of rationalization on processors. This cumulative effects section briefly summarizes the past and present actions with ongoing effects on shoreside processors of trawl-caught groundfish, and the RFFAs that are anticipated to have effects. The combined effect of these past, present, and RFFAs are merged with the effect of the alternatives to arrive at the cumulative effect.

4.9.1 *Methods for Assessing Impacts*

This section contains a brief overview of the methodology we used for assessing the impact of rationalization on processors, including the ways in which each of the expected impacts is measured and assessed. A summary is included of the potential impacts described above, the reasons why those impacts occur (the mechanisms), and the way in which those impacts are measured (the metrics). Table 4-55 provides an overview of the approach used to estimate the impacts of the alternatives on processors of trawl groundfish, in a format similar to previous analytical categories: 1) potential impacts, 2) mechanisms that relate the proposed action to the potential impacts, 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis. The potential impacts to processors are changes in economic performance, or profitability, of individual processors, and changes in economic efficiency of the processing sector as a whole. Changes are initiated by at least 11 identifiable mechanisms; these are described in some detail in Appendix C, along with the methods used for examining the impacts.

Table 4-55. Overview of impacts, mechanisms, and metrics used to compare the effect of the no action alternative and the alternatives on processors of trawl-caught groundfish.

Potential Impacts	Mechanisms Driving Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data and Models used for Assessing Impacts
Changes in processor net revenue	Changes in the bargaining power between harvesters and processors	Ex-vessel and wholesale prices	Qualitative economic assessment of negotiation outcomes
	Regional shifts in landings patterns	Location and quantity of landings	Regional comparative advantage model
	Initial distribution of IQs	<ul style="list-style-type: none"> • Processor ownership of harvest privileges • Location of harvest privileges 	The effect of initial distribution of IQs
	Changes in the quantity and mix of landings	Quantity and type of groundfish landings	Change in bycatch, landings and revenue
	Changes in the timing of harvests	Seasonality of groundfish landings	<ul style="list-style-type: none"> • Seasonality of harvest information from CP sector • Geographic shifts in fishing patterns
	Barriers to entry into the processing sector	New entrants to processing sector	Qualitative assessment based on expertise of analysts
	Market restructuring	Number of processing companies and the amount of vertical and horizontal integration	Qualitative assessment based on literature review and expertise of analysts
	Change in the quality of landings	Quality of trawl groundfish landings	Qualitative assessment based on expertise of analysts
	Change in processor costs	Changes in the cost of labor and other costs	Qualitative assessment based on expertise of analysts
	Product recovery and yield	Product recovery	Literature review on product yields and changes that occur as a result of rationalization
	Long term business planning	Ownership of QS	Qualitative assessment based on whether processors own QS
Product output mix	Seafood products produced by trawl groundfish	Qualitative assessment based on expertise of analysts	
Change in value of capital assets	Value and quantity of quota distributed to processors	Receipt of transferable quota	Initial allocation data and qualitative assessment
	Change in the value of processing capital	Processor consolidation and the potential for stranded capital	Estimates of processor consolidation and qualitative assessment

The mechanisms that are driving changes in processor net revenue include changes in relative bargaining power between processors and harvesters over ex-vessel prices; regional shifts in landing patterns; initial allocation of QS; changes in the quantity, quality, and timing of harvests; barriers to entry into processing and sector restructuring; and changes in processor costs, product yield, and output mix. Each of these mechanisms, which are drivers for the potential impacts, is measured by the criteria listed in the third column. The metrics are estimated using the methods described in the final column. The model-based methods are described in Appendix C and earlier sections of Chapter 4.

4.9.1.1 Potential Impacts, Mechanisms, and Metrics

Bargaining Power: There is a negotiating relationship between processors and harvesters with respect to ex-vessel prices. The alternatives would result in, at one extreme, 100 percent of shares going to permit owners. In this alternative, processors believe they will be at a relative disadvantage in setting ex-vessel prices, and that the capacity of the processing sector may no longer match the rationalized fishery, in which seasons may be elongated. At the other extreme, issuing the maximum amount of fishing QSs prescribed in the alternatives to processors would, it is argued, guarantee that certain processors would have access to product, beyond the QSs they may also receive as permit owners. This increased access to product could reduce a processor's need to compete in the marketplace for an independent harvester's fish. It is argued that these alternatives (Alternatives 2c and 4a) may lower the ex-vessel price received by harvesters.

The relative shift in bargaining power for processors is assessed qualitatively. A review of the game theory and negotiation literature is made with particular emphasis on applications to fisheries or similar common property situations. The experience of other fisheries is also examined for any conditions that may be applicable to this action.

Regional Shifts in Landings: Trawl rationalization is anticipated to result in geographic changes in harvest patterns in the nonwhiting trawl fishery, and consequently, increases or decreases in the number of landings at west coast ports. These changes are likely to impact processor operations. To examine this impact, the geographic shift and regional comparative advantage analysis are used to show regions likely to experience change. The output of this analysis was applied to a representation of the web of physical processing plants, ownership, and their regional buying stations.

Initial Distribution of IQ: The manner in which QS is initially distributed will have a profound effect on the processing sector, especially if processors receive designated QSs. The analysis of the initial distribution originates from two models: 1) a quantitative analysis of initial shares based on historic landings, and 2) a delineation of processor ownership combined with historic purchases of landed trawl-caught groundfish. Using the distribution rules for each of the alternatives, the two models' output can reveal the patterns of initial IQ distribution.

Changes in Quantity and Mix of Catch: Trawl rationalization will not only change the regional distribution of catch, but also the quantity and species mix of the catch. It is expected that the elimination of derby-style race for whiting, along with a net increase in nonwhiting harvests, will allow vessel operators to have a greater ability to respond to market forces in terms of targeting species. Furthermore, harvest operations managed with individual accountability are expected to avoid bycatch to a greater extent, leveraging more underutilized target species. These changes in quantity and mix of catch will have a direct effect on processor operations and profitability. Greater quantities of harvested species are expected to provide opportunities for processors to generate higher amounts of revenue. It is also argued that, particularly if processors own QSs, processors may play a greater role in arranging harvester contracts for targeting species.

The bycatch model (page 237), illustrating the potential to reduce the catch rate of overfished species, was used to predict changes in quantity of target species harvest. The model outputs allow for a forecast of the aggregate changes in deliveries made to processors.

Harvest Timing: The rationalization program will tend to slow the pace of derby style fisheries in both the shore-based and mothership sectors of the whiting fishery. It is expected that these sectors will lengthen because fishery participants no longer feel the need to compete. However, certain factors, in particular the timing of the Bering Sea pollock fishery and the availability of whiting to shore-based

harvesters, may limit lengthening seasons. Harvest timing will affect processors by changing or lengthening harvest and processing periods, changing the need and demand for labor, and changing the need and demand for processing capital. A longer season will tend to reduce peak harvest volume, thereby potentially lessening the demand for processing capital. A reduction in peak-period harvest volume may also reduce the need for overtime labor during peak periods, potentially altering the cost of labor.

Market Restructuring: The processing sector is organized with a few very large operations and their subsidiaries, along with a number of small and mid-sized firms. In a rationalized trawl fishery, some changes in the industrial organization of processors are anticipated, based on experiences found in other rationalized fisheries, including possible consolidation, joint ventures, and other arrangements among processors (vertical integration) and between processors and harvesters (horizontal integration). In addition, there can be influences leading to changes in diversification, expansion in the use of custom harvesting and processing, and related market restructuring.

Quality of Landings: In addition to changes in harvest timing and elimination of the derby-style fishery is an improvement in the quality of landed fish. Harvesters can be more selective in harvests, and to manage the harvested fish once on board, in such a way as to improve quality. The quality could also be affected if the volume of individual landings is reduced. This could lead to generally higher prices received by harvesters, and the effect on processors could be positive or negative, depending upon processors' ability to influence wholesale or retail prices due to the higher quality fish. Processors could also be positively affected if the better quality fish leads to new market opportunities. The analysis addressed these concepts qualitatively.

Processor Costs: In a rationalized fishery, the cost of processing could be affected in a variety of ways. Labor costs per unit of processed fish could be reduced if there is more uniform operation during the season or year, with fewer hires and layoffs and less overtime required. There may be an ability to better utilize capital resources and capacity to avoid idle periods, offset by times of overuse. Other costs could be affected depending on the ability to open new markets or change operations. Additionally, processors may bear the costs of shoreside catch monitors that will observe offloadings, depending on negotiations with vessels about the distribution of compliance costs. These effects are discussed qualitatively.

Product Recovery Yield: The positive effect on product recovery yields is related to harvest timing and quality of landings. Reducing the derby-style fishery can lead to more careful management of the fish that are harvested and less waste. The experiences from other rationalized fisheries are explored and discussed qualitatively.

Product Output Mix: A rationalized fishery will reduce the need for shortened seasonal harvests and allow harvesters (and processors who contract with them) to better respond to market conditions, tastes and preferences, and changing demands by consumers. In particular, the effect of rationalization may lead to new and additional products in the market, and allow specialized niche markets to develop, with associated increases in the ability to compete and profitability. The effects are evaluated qualitatively with reference to experiences in other fisheries and the existing market structure of the west coast fishery.

4.9.2 *Broad-Level Effects of Rationalization on Shoreside Processors*

Broad level effects to processors from rationalization could include changes in bargaining power over ex-vessel prices, the quantity and quality of fish to be handled, the location of landed catch, and the

timing of deliveries, among other things. The structure of the west coast groundfish processing sector differs from that seen in other fisheries, such as the pollock fishery in the Bering Sea or the North Pacific halibut fishery, and as a result, the effects on processors from trawl rationalization may be different than that seen elsewhere after rationalization goes into effect.

4.9.2.1 Ex-vessel Price Negotiation

Available information suggests that the processing sector, as buyers of raw fish, consists of few “large” firms, a few “moderate” sized firms, and a considerable number of small firms. In the nonwhiting sector, three firms have processed nearly 80 percent of landings in recent years. The shoreside whiting sector involves fewer firms in total, but the three largest have processed over 85 percent of recent landings.¹⁰³ Economic literature suggests that an industry with this type of structure may operate in a manner where the largest firms appear to behave competitively, and the smaller firms respond to the ex-vessel prices set by the larger ones. However, in the west coast seafood industry the final processed products enter markets where they compete with similar products originating elsewhere in the U.S. and other countries and are, therefore, more competitive in the final processed product market. In other words, market structure suggests that west coast processors are generally unable to influence market prices for final products.

Harvesters and processors are in a dependent relationship, each specializing in certain elements in the supply chain that brings fish to the ultimate consumer. For this reason, rationalization is likely to affect processors directly by altering this relationship. Rationalization will also have second-order effects on processors because of direct impacts to harvesters and the response of harvesters to such effects. The distribution of Qs will have a direct effect on processors by potentially altering the bargaining power between processors and harvesters over ex-vessel prices. Currently, the market structure indicates that nonwhiting processors may have more influence over harvesting operations than the permit owners. Pacific whiting processors appear to have less influence over harvesting operations.

Assignment of Qs to harvesters may alter existing relationships. Under status quo, harvest opportunity is ephemeral. It is either lost to other harvesters if all harvesters are fishing against a single quota (the situation in the whiting sector) or the opportunity must be exercised within a given two-month cumulative landing limit period (the situation in the nonwhiting sector). IFQs and cooperatives each institute a quasi-permanent harvest privilege assigned to the individual (or cooperating group). Even though the harvest opportunity (QPs) must be exercised within the year, the underlying Qs renew the specified opportunity in the next year. Qs holders even have the ability to sell their QPs and realize some gain from the harvest opportunity they do not exercise. This gives harvesters much greater latitude to hold out for better prices, because they have a guaranteed harvest opportunity over a longer time. Qs ownership by processors would tend to offset the gains for harvesters. For example, a processor could use Qs to induce a harvester that is short of QPs for a particular species to make deliveries under specified conditions and prices. At this time, it is unclear what balance of processor/harvester quota ownership would achieve status quo conditions.

Harvester Qs are likely to have a second order effect on processors in several ways. Fleet consolidation would reduce the number of harvesters, thus lessening the processors’ market influence by more closely aligning the number of harvesters with the number of processors. Assignment of Qs to processors would have a countervailing effect because, as suggested above, processors could use the Qs they control as leverage in forging agreements with harvesters.

¹⁰³ The “recent landings” period as used in this section is 2004 through 2006 for both whiting and nonwhiting.

Ex-vessel prices directly influence profitability. Asset values are one factor that could potentially change under a rationalized fishery because of changes in ex-vessel prices. This can occur because the value of an asset is a function of the profits associated with that asset. If ex-vessel prices change in a fishery in favor of harvesters or in favor of processors, the value of assets associated with harvesting or with processing should be expected to change in concert. Therefore, while considering the effect on ex-vessel prices, it is important to consider the implications that a change in ex-vessel prices may have on profitability and the value of current assets in the fishery.

A number of second order effects on processors result from changes in the groundfish trawl sector that would occur no matter how a trawl rationalization program is structured as part of the proposed action. These include changes in the distribution of landings across west coast ports and over the year, the quantity and mix of catch delivered to processors, and the quality of landed catch. These broad-level effects are discussed in Section 4.6.2 (page 289) from the harvester perspective; from the processors' perspective, some effects may be beneficial and others adverse.

4.9.2.2 Regional Shifts in Landings

As discussed in Section 4.14.5, the distribution of landings across west coast ports may change as a result of fleet consolidation, industry agglomeration, and the comparative advantage of ports (a function of bycatch rates in the waters constituting the operational area for the port, differences in infrastructure, and other factors). Processors have invested in physical plants (processing facilities and related infrastructure) based on the historical distribution of landings. To the degree that harvesters wish to change their port of landing, and depending on the relative bargaining power discussed above, there could be a mismatch between the distribution of existing physical plants and the volume of catch landed in different ports. If processors retain a relatively large degree of bargaining power (by holding Qs), they could influence the location of landings by enticing or directing harvests to existing plants even if the harvesters prefer to fish in other areas. Otherwise, processors may have to enlarge operations at facilities experiencing an increase in landings and reduce operations, or shut down plants in ports where landings permanently decline. Alternatively, they could truck fish from the port of landing to their facilities. In either case, a shift in the location of landings may mean a shift in the location of where those landings are processed. We use the term "at risk" to describe processing volumes that may move to another location under a rationalized fishery. For example, landings of nonwhiting trawl groundfish that historically came into Neah Bay have often been processed in Astoria, Oregon. According to the regional comparative advantage analysis, those landings historically made at Neah Bay are at a disadvantage for a variety of reasons, and it may be reasonable to assume that catch would be landed elsewhere. The quantity of product processed in Astoria that originated in Neah Bay may be put at risk as catch historically delivered to Neah Bay is delivered elsewhere. These landings may continue to be processed in Astoria, but not necessarily; therefore, that relationship is at risk.

The implication of this network information can be combined with the geographic comparative advantage analysis described in Appendix C. This comparative advantage analysis indicates several potential shifts in regional distribution of landings:

- Neah Bay appears to be at a clear relative disadvantage, suggesting landings may shift toward another location.
- The ports with the greatest advantage appear to be in the north, suggesting a shift in effort and catch at a much broader, aggregate level from central California, toward northern California and Oregon.

This geographic shift information implies that processors associated with disadvantaged communities may see trawl groundfish volume decline. Those processors receiving landings from central California may see a reduction in trawl-caught groundfish if the market is able to redirect activity toward more efficient and advantaged ports. However, gear switching may work at retaining landings in those ports because of different relative rates of bycatch, less infrastructure necessary to support (presumably smaller) fixed-gear vessels, and proximity to markets that appear more favorable to nontrawl caught-fish species.

At a smaller, less regional scale, individual ports may see a reduction or increase in landings. Very few processors rely on a single port, so processors may be able to make up a reduction in landings made at one port with an increase in landings made at another. However, landings directed to a processor because of a relationship between a disadvantaged port and a processor may be considered to be at risk because it is not clear where landings will redirect. For example, under a purely market driven outcome it may be expected that landings into Neah Bay would decline or move to another port altogether, meaning that for those processing centers historically receiving their fish from Neah Bay, those landings would be placed at risk. As indicated in the above information, these at-risk landings have historically been processed in Astoria. However, this does not necessarily mean that Astoria will see a subsequent reduction in volume. It could very well be that landings historically made into Neah Bay are redirected to Astoria or Westport (which are then processed in Astoria). However, those landings may also be redirected to Bellingham. Because it is not known where those landings will be redirected, the relationship and associated volume that flows between Neah Bay and Astoria is termed at risk.

The fact that more ports in the north appear to be at a relative advantage than those in the south (particularly those south of Fort Bragg) means that a gradual shift of trawl activity may occur toward the north, potentially putting at risk those landings and relationships in the San Francisco area and areas further south. Factors that may influence this potential shift include making an initial allocation to processors and implementing an area management provision. In addition, allowing trawlers to use fixed-gear may influence this geographic shift. Harvesters in central California, for example, may shift to fixed-gear and continue harvesting sablefish and thornyheads while trawlers to the north increase their take of flatfish by harvesting the flatfish catch foregone by vessels that have engaged in gear switching. Making an initial allocation to processors could allow processing facilities to direct landings associated with their quota to areas that are beneficial to them. An area management provision would also influence this geographic shift by retaining a given proportion of quota in the south, restricting the ability of trawl activity to migrate north.

Because of shifts in the geographic distribution of landing activity, some processing facilities may no longer be necessary, while others may have to expand. The cost to processors who may be adversely affected by these shifts depends on a number of factors. Processors may be able to relocate equipment, but that would have to be balanced against the cost of purchasing new equipment. The tradability of immovable assets (buildings, wharves, etc., and the land upon which they reside) depends on the economic climate in the port region and whether the processor owns or leases these assets. If facilities can be easily put to other uses, and there is sufficient demand, they could be sold; leased facilities could be turned back at relatively little cost. However, there may be human capital assets in a port, such as specialized labor and longstanding relationships with local suppliers that could be lost in the event of relocation. Finally, the actual depreciated value of the facilities would be a factor. A business would face the replacement cost of a fully depreciated asset anyway, so the cost of buying new assets because of relocation may not represent an added cost.¹⁰⁴

¹⁰⁴ This assumes that businesses' accounting of depreciation accords with the actual, physical depreciation of the asset. For example, a business could assume a period for depreciation but continue to use the asset after the end date because the asset is still usable. Purchase of new assets would then represent a cost the business

4.9.2.3 Changes in the Quantity and Mix of Landings

As discussed under the section describing impacts to LE trawl harvesters, the quantity of harvested species in the nonwhiting sector is expected to increase because of rationalization. This is because of the individual accountability harvesters will face under rationalized fishery conditions and the perceived reward—in the form of increased harvests of currently underutilized species—that will come about as a result of successful bycatch avoidance. The implications of higher harvest volumes could be positive for processors of nonwhiting groundfish if higher harvest volumes decrease the cost of production.

To address the production cost issue, we examine available information from a variety of sources, including the 2001 groundfish harvest specifications EA, reports prepared for the West Coast Seafood Processors Association and presented via public testimony at various Council meetings, and discussions with stakeholders in the shoreside processing industry. Information from the 2001 Groundfish Harvest Specifications EA (PFMC 2000) provides a clear indication of cost per unit of production and available capacity. While this information is not recent, making it likely that costs have changed and industry consolidation may have reduced capacity, it is the best available information. Obtaining operational data from private firms can be difficult because they are often unwilling to divulge information that has business value. In spite of these caveats, this information is still useful for illustrating patterns. In this EA, costs per pound of processing are indicated for 1997 and 2000 (Table 4-56). In addition, the total number of filleting stations is indicated for 1997 and 2000.

Table 4-56. Landings, processing capacity, and costs in 1997 and 2000 (Source: PFMC 2000).

Year	Landings	Utilized Processing Capacity	Processing Cost per Pound
1997	56,209	83%	\$1.55
2000	37,557	51%	\$1.89

Table 4-56 provides evidence of the effect on processors during a time before recent restrictions on groundfish harvesting and during the start of the period of recent groundfish harvest restrictions. Since harvest volumes are expected to increase in the nonwhiting sector as a result of rationalization, the comparison of processing costs and capacity between 1997 and 2000 is relevant for inferring changes that may occur between status quo conditions and a rationalized fishery. From this information, several patterns become apparent:

- The cost per pound of finished groundfish product increased by 22 percent from 1997 to 2000.
- Eighty-three percent of processing capacity was utilized in 1997, while 51 percent of processing capacity was utilized in 2000.
- Information from PacFIN indicates the landings of nonwhiting groundfish declined from 56,209 to 37,557 mt from 1997 to 2000 (2000 landings were 67 percent of 1997 landings).

From this information, it is clear that excess capacity existed in the shoreside processing industry in both 1997 and 2000, but with substantially greater excess capacity in 2000. It is also clear that the cost per unit of processed product increased substantially in 2000. These changes appear to have occurred because of a decrease in landed volume of nonwhiting groundfish. Several changes have occurred in the industry since 2000, including consolidation in the processing sector. This means that the amount of excess capacity in the industry in 2000 may have diminished, and that, because of this consolidation, the cost per pound of processed product may be now what otherwise would have been the case without the

otherwise would not have had to bear.

recent consolidation. Nevertheless, it is generally accepted that there is excess capacity in the shoreside processing industry.

Analysis of potential increases in harvest volume suggests that landings in the trawl fishery may nearly double (depending on one's level of optimism regarding bycatch reduction). Depending on the degree of increase in landings, existing yet idle capital may simply be reactivated, or new capital may be constructed. In any event, available information indicates that the cost per pound of finished product should decline in the shoreside nonwhiting processing industry because of higher landings.

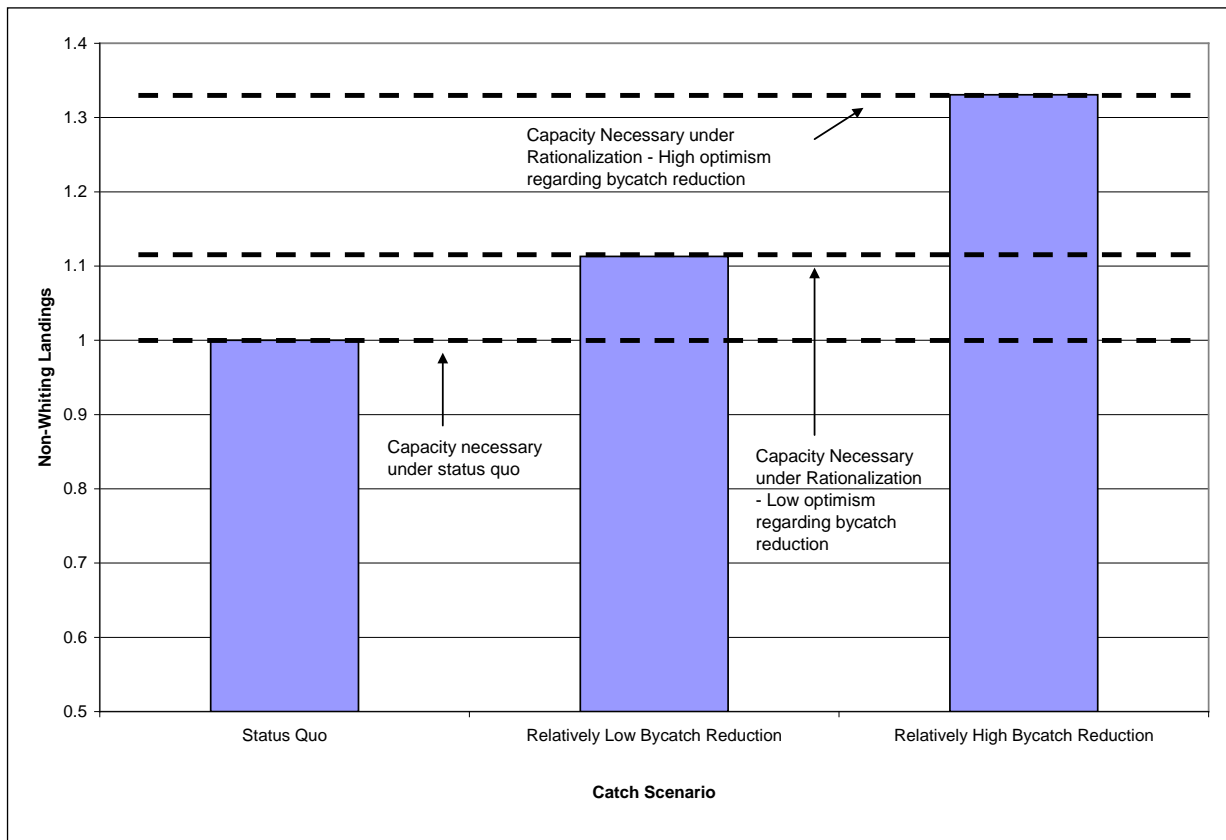


Figure 4-43. Estimated volume of landed catch of nonwhiting trawl-caught species (status quo = 1).

The degree to which shoreside processors could market this additional volume is uncertain. Since whitefish is a global commodity, processors of west coast groundfish compete in a global market with many substitute products. This is likely to mean increased efforts at marketing and selling the additional catch and these increased efforts may mean that the benefit to shoreside processors from increased harvest volumes may be realized over a longer time horizon as marketing efforts and new markets are developed.

In addition to overall volume, the mix in the type of species landed is expected to change. Many species are currently discarded for regulatory reasons and this need for regulatory discard is expected to be substantially reduced under rationalized fishery conditions. Many of the species currently discarded are rockfish, which are relatively valuable. Increases in the amount of these species landed at shoreside processing facilities are likely to be a source of benefit as processors are able to generate revenue on these higher valued species.

Stranded Capital Potential in the Nonwhiting Processing Industry

The possibility of higher harvest volumes speaks directly to the concept commonly referred to as “stranded capital.” While it is difficult to identify a consistent and agreed-upon definition of the term “stranded capital,” we assume it refers to the potential for capital to become worth substantially less than what may have been the case before rationalization because that capital has little or no other use, and rationalization may have eliminated the need for some, or all, of that capital. In fisheries that have transitioned from a derby style system to a rationalization system, the need to handle peak harvest volumes is reduced or eliminated and as a result, less capital is needed for both the harvesting and processing aspects of the fishery. If this capital is relatively specialized, that capital that is consolidated out of the fishery may be considered “stranded.” The fact that harvest volumes in the nonwhiting fishery are expected to increase, and because peak harvest volumes generally do not exist in the nonwhiting trawl fishery, stranding of capital in the processing aspect of the nonwhiting trawl fishery is not expected to occur as a result of rationalization.

4.9.2.4 Changes in the Timing of Landings

An important effect of rationalization on the harvester side is to eliminate Olympic- or derby-style fisheries. This is because harvesters have control over an allocation of fish that is defensible from the actions of others. In the groundfish trawl fishery, the current two-month cumulative landing limits have largely eliminated this form of Olympic-style competition in the nonwhiting sector. The whiting sector remains a single, common quota-based fishery. With exception of the catcher-processor sector, which operates as a cooperative, the whiting fishery can be described as a derby with respect to both target species (the traditional race-for-fish concept), and important bycatch species (often termed “race-for-bycatch”).

Rationalization assigns catch privileges to individual harvesters or cooperatives that coordinate their behavior, eliminating the need to compete. This traditionally has led to an increase in the length of the season and a reduction in the volume being harvested during peak time periods. In the whiting fishery, complete flexibility in the timing of landings is mitigated by regulatory measures to limit the bycatch of salmon and vessels’ participation in other fisheries, such as the Alaska pollock fishery, or other west coast fisheries. Chinook salmon bycatch is controlled to a large degree by the June 15 start date in the shoreside sector; participation in the Alaska pollock fishery will likely induce at least some participants to leave the west coast during the summer months. However, a reduction in peak harvest volumes could lead to a decrease in the amount of capital necessary to process whiting. Such a decrease in necessary capital should be expected to lead to consolidation of processing activity, and this may translate to the downsizing or closure of some existing whiting processing facilities. Although difficult to estimate, the degree to which necessary processing capital may be reduced can be informed by ability for the whiting season to lengthen.

In recent years, the shoreside whiting fishery end dates have varied between early and mid-August with a start date for the primary season of June 15. Though the period depends on several factors, including the specified Pacific whiting OY and the number of vessels engaged in whiting activity, this information means that the season has lasted 1.5 to 2 months in recent years. Anecdotal information and empirical evidence from the 2007 whiting fishery suggests that whiting become increasingly difficult to prosecute in a shoreside fishery around October 1. This October date of availability can essentially serve as a sideboard on the degree to which the season can lengthen. Using this October date as the possible extent of the primary whiting season means that the season could lengthen by an additional 1 to 1.5 months, or by 33 to 50 percent if peak volumes decline and are used to extend the season. This effectively serves as an upper bound estimate on the degree to which the need for shoreside whiting processing capital could decline. It is likely that the demand for shoreside whiting capital will not

decline this far because many harvesters in the shoreside whiting fishery still participate in other sectors (the mothership sector) and other fisheries (the Bering Sea pollock fishery), which are time constrained. This means that many harvesters may still have to prosecute their fishing activity during the same time as status quo. Therefore, the season is likely to be characterized by a period of peak production that is the same as the existing period of peak production. However, the magnitude of that peak may decline somewhat, and the season may extend into the early fall. The decline in peak production is likely to be less than 33 to 50 percent due to the time constraints described above.

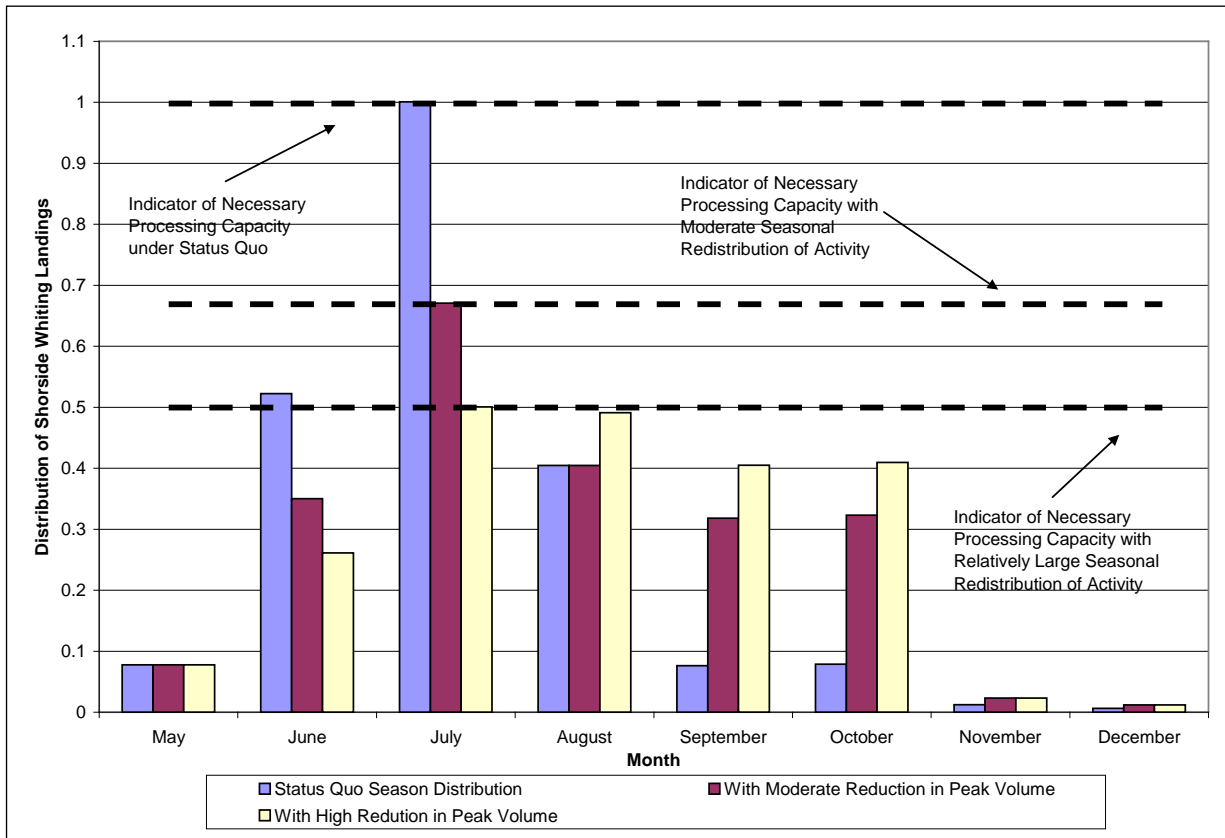


Figure 4-44. Estimated seasonality of shoreside whiting landings.

In the nonwhiting sector it is generally accepted that Olympic fishery conditions do not exist. Nevertheless, an IFQ system could have some benefit in terms of greater control over the timing of landings in comparison to the current cumulative limit system. From the processors’ perspective, these changes in harvest timing are likely to be beneficial. Again, depending on relative bargaining power, they would be able to optimize plant operations by better matching deliveries to the plants’ characteristics (for example, how much fish can be processed in a given time period and the use of labor) and match product flow with market conditions.

Stranded Capital Potential in the Shoreside Whiting Processing Industry

The timing of landings in the shoreside whiting fishery speak to the potential of stranded capital in the shoreside portion of the Pacific whiting fishery. While harvest volumes may not necessarily change substantially, the seasonal redistribution of that harvest will tend to reduce the need to accommodate peak processing demand and therefore reduce the need for processing capital. If this capital is relatively specialized, that capital may become stranded as it may have little to no other alternative use.

4.9.2.5 Market Restructuring of the Processing Sector

Rationalization could change the overall makeup of the processing sector through restructuring and making it more difficult for new firms to enter the sector. Currently, the west coast processing sector is organized around a large operator and its subsidiaries, several mid-sized firms, and a larger number of smaller firms. If the trawl fishery is rationalized, new opportunities may present themselves, leading to restructuring of the processing sector. From the experience of other rationalized fisheries, there has been a move towards further consolidation of processing firms to counter the increased bargaining power of harvesters. Either through consolidation by direct purchase or joint ventures, integration could increase. This includes both horizontal integration—business arrangements among processors—and vertical integration—arrangements between processors and harvesters. An initial allocation of Qs to processors could stimulate horizontal and/or vertical integration. First, Qs are likely to encourage consolidation as more efficient firms are willing to buy up Qs owned by less efficient firms. This could occur among processing firms or processing firms could buy up harvesters' Qs (and their physical assets, such as vessels), increasing vertical integration. Depending on the availability of capital the converse could occur; more efficient harvesters could buy up processors' Qs (and/or their physical assets) to vertically integrate. In general, such consolidation or integration would be encouraged by any resulting returns to scale: increased size and integration across a range of operations would serve to reduce overall costs. Joint ventures serve much the same purpose while retaining existing ownership arrangements.

4.9.2.6 Product Recovery

Regular supply is likely to increase “product recovery yield,” or the ratio of the final weight of processed fish to the weight delivered to the plant.¹⁰⁵ Better use of plant equipment, fine-tuning, and modification of equipment, as well as better use of labor would lead to an increase in product recovery. Laborers working under more paced conditions would have the opportunity to cut fish more carefully; likewise, equipment could be more easily adjusted to maximize yield. As previously discussed, this is likely to be a bigger factor in the whiting fishery if its derby characteristics are eliminated. Since this is a high-volume fishery with a generally highly processed end product, small changes in product recovery yield can lead to a substantial increase in profits. Initial allocation of Qs to processors, functioning as a means of guaranteeing supply, could provide an incentive to make necessary capital investments to increase product recovery yield.

In the nonwhiting fishery, some factors may lead to an increase in product recovery, while others may lead to a decrease. Since IFQs tend to increase certainty about the future and enhance business planning, new investments may be made in processing equipment, which would lead to greater product recovery. However, less desirable fish may be landed in the nonwhiting fishery as market discards and high grading are decreased. Since a discarded fish represents a cost to harvesters in a rationalized fishery (discards serves as foregone revenue because any such amounts must be covered by QPs), there may be reasons for harvesters to land smaller and less desirable fish under a rationalized fishery than under status quo, where small and unmarketable fish are more likely to be discarded. In general, smaller fish result in lower yields because a larger proportion of the fish comprises unmarketable parts (e.g., head and guts).

¹⁰⁵ This is also discussed with respect to effects on harvesters, in Section 4.6.2.2.

4.9.2.7 Changes in the Value of Capital Assets Held by Shoreside Processors

The value of capital assets held by shoreside processors may be affected by rationalization similar to the ways in which trawl harvesters are affected. While shoreside processors may not hold permits (though some processors do own LE trawl permits), shoreside processors have the potential to be affected by consolidation in the processing portion of the fishery. Consolidation in the processing aspect of the fishery can occur for several reasons, the most common of which is a redistribution of harvest timing in a fishery moving from a derby fishery to a rationalized fishery. This redistribution of harvest timing reduces the need for peak processing volumes and subsequently reduces the amount of capital required to process the same amount of harvest. Through market mechanisms, the amount of capital that exists in a fishery that experiences a reduction in peak harvest volumes should consolidate. Though the form of that consolidation may not be entirely known, a decrease in the amount of processing capital necessary to process a given amount of catch will almost certainly reduce the value of capital, especially if that capital is relatively specialized and cannot be easily used toward another purpose.

The initial allocation of Qs can offset the change in asset value that may be driven by a switch in a fishery that moves from a derby fishery with peak harvest volumes, toward a rationalized fishery that is more paced and with harvest volumes that are relatively spread out. Those alternatives that allocate Qs to processors will undoubtedly grant processors a capital asset. Those alternatives that allocate relatively greater amounts of Qs to processors will grant those processors a relatively greater amount of capital assets, while those that allocated little or no shares to processors will allocate little or no capital assets to processors.

4.9.2.8 Other Broad-Level Effects on Shoreside Processors

The overall mix of landed species could change, both because of an increase in the quantity of target species and added flexibility to employ different harvest strategies. As already discussed, harvesters will have more control over the timing of their catch and it is expected that landings will be more evenly distributed throughout the year. These changes could benefit processors in at least two ways. First, harvesters should be able to increase the quality of landed fish, because a more measured pace of fishing will allow more attention to factors affecting quality (such as the amount of fish caught in a given haul and the storage of fish onboard the vessel). This may be more of a factor in the whiting sector because, as discussed above, currently it is more of a derby-style fishery. If harvesters are able to better control the quantity and mix of species in their landings, this could benefit processors by assuring a more stable supply, which would make it easier to maintain existing markets and develop new ones. With more stability in catches, harvesters and processors may be able to coordinate to develop new products and markets. Changes in harvest strategies, assuming they translate into reliable supply, could allow processors to more effectively market new product forms. Higher quality landings could benefit processors because they can deliver a higher quality—and perhaps higher priced—product to markets. Any premium realized again depends on relative bargaining power; however, if harvesters have relatively more bargaining power then they may be able to command a price premium for higher quality landings, reducing processors' profits from higher retail prices.

Several factors, while related to the changes in the harvesting sector that would induce a more regular supply of fish to processors, bear more directly on the operational characteristics of processors. These include operating costs, product recovery yield, ability to respond to market demand, and the ability to realize higher final product prices. As previously mentioned, these effects are more likely to be felt in the whiting fishery, because currently it is subject to greater variability in the timing of landings in comparison to the nonwhiting sector managed under cumulative landing limits. However, a more modest effect could be felt in the nonwhiting sector because harvesters would be released from what are essentially two-month individual vessel quotas.

In a rationalized fishery, the cost of processing could be affected in a variety of ways. Labor costs per unit of processed fish could be reduced if, as discussed above, deliveries are steadier or made on a predictable basis. This would reduce the need to lay off workers when deliveries dip and pay overtime when delivery volume exceeds normal plant operating capacity. Similarly, the physical plant could be more efficiently used if inputs are supplied more regularly. For example, variable inputs like power and water might be obtained at lower cost if demand is more even. While operating costs could be lowered, changes in the relationship between harvesters and processors affecting bargaining power could change raw fish (input) costs. If harvesters are in a better position to negotiate prices then the overall cost to processors could increase. Relations with harvesters will also affect the distribution of some of the compliance costs, such as payment for a catch monitor to observe the offloadings. While regulations may require that the processor pay these costs directly to an observer contractor, depending on relative bargaining power, the processor may pass the expenses through to the vessel or bear the cost itself.

To the degree that IFQs or cooperatives allow harvesters to time landings and coordinate with processors, rationalization could allow processors to better respond to changing market conditions along with the ability to develop new markets. Market conditions are subject to the changing tastes and preferences of consumers. A guaranteed supply of fish, and thus more steady supply to retailers, would allow processors to gauge these consumer preferences and develop products to meet them. Processors could also bring a greater variety of products to market, including new ones. This could include development of specialized products for niche markets, based on the ability to reliably supply certain species or product forms.

Markets respond favorably to uniformity and predictability, and stronger guarantees of steady product deliveries could increase market penetration and the building of stronger relationships with retailers. West coast fish providers (harvesters and processors) could in turn increase their share of the international whitefish market, for example by providing higher quality fillets to niche markets. Again, increasing the ability to guarantee supply to retailers and meet consumer demand for specialized products should increase profits for processors and potentially for harvesters, depending on their relationship with processors.

4.9.3 Direct and Indirect Effects of the Alternatives on Shoreside Processors

This section provides an analysis of the direct and indirect effects of the alternatives on shoreside processors. It begins with an overview description of the manner in which each of the key elements of the alternatives is expected to impact processors. The details of the alternatives are evaluated in the remaining subsections, with a comparison to status quo and other alternatives, as appropriate.

4.9.3.1 Expected Effects of Elements of the Alternatives on Shoreside Processors

A summary comparison of the key elements of the alternatives is provided below. Each of the alternatives will impact groundfish processors in different ways. Before considering the impact of the alternatives, we first examine how the elements of the alternatives are expected to impact processors in a general sense. Following this discussion, we examine the impact of each alternative on groundfish processors.

How does the implementation of an IFQ / co-op system impact processors relative to status quo?

IFQs and co-ops have a direct effect on the harvesting associated with a fishery. Processors may be affected indirectly from changes in harvesting activities. If processors are allocated Qs, however, they

may have a direct influence over harvesting activity. Issuing catch privileges that are defensible and in a manner that makes harvesting entities individually accountable will lead to changes in the timing of harvesting operations, in the flexibility of harvesting operations, in the volume and mix of landed species, and potentially in the location of delivery and processing activity. Many of these effects were described previously. Changes in timing and harvest volume associated with the fishery may have some positive impacts to some processors and potentially adverse impacts to other processors. Those processors who are the recipients of additional volumes of nonwhiting groundfish may be positively impacted because of additional throughput (which creates potential for revenue) and lower per unit costs of processing. In addition, if the whiting fishery season length increases, production costs in the whiting fishery may decline, because of less necessary capital to process the same amount of volume. Those firms able to capitalize on those lower costs may benefit. Furthermore, an increase in the season length of the Pacific whiting fishery and a subsequent reduction in peak harvest volumes allow for fine-tuning of production, which tends to increase yield and product quality. However, because of a reduction in peak harvest volume, fewer processing companies and/or facilities may be necessary to handle harvest volumes of Pacific whiting, meaning some companies may find themselves without enough product to continue justifying processing operations of Pacific whiting. This could also occur in the nonwhiting fishery because of regional shifts in fishing patterns where those processors in areas seeing a reduction in nonwhiting activity may find themselves without enough volume to justify operations, while those seeing an increase may benefit.

The decision to implement IFQs or cooperatives may have different effects on processors. Much of the effect of IFQs or cooperatives on processors depends on whether processors are allocated quota (in an IFQ program) or whether they are tied to catch history (in a cooperative program). If processors are not allocated quota in an IFQ program, or are not tied to a permit in a cooperative program, then the effect on processors may be the same. The effect of allocating processors QSs or establishing processor ties is described in a later sub-section.

IFQs and co-ops have the potential to increase certainty about future opportunities. With greater certainty to harvesters and, potentially, processors, better planning and efficient utilization of processing facilities can be achieved. Certainty about future opportunities can be achieved if processors hold QSs, or if they have established relationships with harvesters who hold QSs.

How does initial allocation of QS to harvesters make things different for processors?

The initial allocation of QSs will have a secondary effect on processors, as described above, with parts of the coast seeing a decline in processing activities and others an increase. Allocating QSs to harvesters will also have an effect on ex-vessel prices paid to harvesters for fish. This is because harvesters with QSs may be able to leverage higher ex-vessel prices from processors if the entire allocation is made to harvesters.

How do processor initial allocations or ties affect processors?

If processors receive initial allocation of QSs, then processors' bargaining power over ex-vessel prices will increase compared to a case where they do not receive QSs. Processors with initial allocation can vertically integrate and also engage in fish harvesting opportunities to some degree independent of other harvesters. This increases the ability of processors to hold out against harvesters while negotiating over ex-vessel prices.

Processors with QSs will gain increased flexibility for matching catch periods to market demand, and elongating the season for optimal processing efficiency. This creates opportunities for lower per unit

costs; in combination with expanded market opportunities, this could lead to an increased ability to compete with groundfish providers in the global market.

The regional distribution of fishing activity, a result of harvester shares, may also be influenced by processors that receive initial allocation. Since processors have fixed and generally immobile processing plants, they may use their Qs to contract for harvesters' nearest existing facilities and maintain harvest volume in their facilities.

If processors are tied to harvesters in a cooperative system, the net effect on ex-vessel prices is unclear. Prices paid in this case may depend on personal relationships between the processing entity and the harvesting entity. Some Bering Sea cooperatives appear to have developed profit-sharing arrangements between harvesters and processors. A cooperative with processor linkages tends to create a structure where harvesters take into account the needs of processors and vice versa. This relationship begins to look like a vertically integrated firm, and profit sharing between harvesters and processors may become more likely. However, this may only occur if both the harvester and processor are able and willing to coordinate activities with one another.

Finally, a processor linkage provision in a cooperative system does not decrease the quota available to individual harvesters. Therefore, establishing linkages in a cooperative system does not give processors direct control over any harvesting activity.

How will accumulation limits affect processors?

Accumulation limits restrict the amount of quota any single entity may hold (the control limit) and the amount of quota that can be placed on a vessel (the vessel limit). A per-vessel limit will limit fleet consolidation, which tends to restrict the economic performance of harvesters. However, this tends to spread out the amount of harvesting activity across a wider number of locations. If this results in a more widespread geographic distribution of vessels then this would tend to reduce the likelihood for closure of geographically disadvantaged processing facilities.

Control limits affect the ability of the processing sector as a whole to increase the amount of Qs held by the processing sector. High control limits will tend to allow the processing sector to acquire more Qs over time, while small control limits tend to favor harvesters and restrict the amount of quota the processing sector can acquire over time. This is due to the concept of scale economies. In general, the structure of harvesting and processing will lead to more harvesters than processors participating in a fishery. Accumulation limits, therefore, tend to leave Qs in the harvesting sector more than in the processing sector simply because there may not be enough individual processing entities to acquire all the quota if accumulation limits exist, though this will depend on the size of the accumulation limit and the number of processing entities. This will have a long-term effect on ex-vessel prices.

A restriction on control will tend to limit the degree of influence that the largest processors will have on the program, and, therefore, affect the distribution of economic performance. Large processors potentially affected by a control limit may have their participation in the fishery restricted by that limit, thus causing redistribution in their control over delivery and, therefore, processing activity.

How will a grandfather clause affect processors?

A grandfather clause tends to have a distributional effect on processors if processors stand to receive an initial allocation of Qs. Those processors that have historically been large producers would gain Qs in excess of the accumulation limits if a grandfather clause is adopted.

If large processing entities receive QSs in excess of the accumulation limits, this may affect ex-vessel prices, because it creates the potential for a few dominant companies to hold large amounts of QS. In contrast, if there is no grandfather clause, those same large processing entities with excess QSs may be allowed to divest QSs that are over the limit by a specified date. When that divestiture must take place—whether immediately after IFQ implementation, or after a specified waiting period—will likely affect the value received by processors for the excess QS asset. A delayed divestiture period will provide those processors with time and opportunity to transfer that quota in a manner that benefits them, and this may come in the form of relatively high sale price for excess QSs, or transfer to an operator that tends to deliver harvested species to their processing operation.

How does the number and type of species covered affect processors?

The number of species covered will affect harvesters directly, and processors indirectly. As the number of species covered in the program increases, harvester flexibility—at some level—begins to decrease, and this may have an effect on the outcome of the program. Species with low OY levels may impose risk to harvesters because of uncertainty about what a vessel will catch while fishing and the cost of going into deficit (Section 4.6.2.4). If some of the species covered generate a high level of risk to harvesting operations, harvesters may avoid targeting those species associated with high-risk species. This would decrease the amount of some species available to processors. This may be true for shelf flatfish species that include English sole, petrale sole during summer months, and sanddabs, among other species.

How do the number of trawl sectors influence processors?

The number of trawl sectors primarily influences the ability of the shoreside sectors to trade quota among one another. Establishing four trawl sectors may, at times, make it difficult for either one of the sectors to operate, if a target species in one sector becomes a constraining species in another. As described in Section 4.6, describing impacts to harvesters (page 284), establishing a four-sector split on sablefish, for example, may constrain the shoreside whiting sector during years when sablefish bycatch is higher than expected. This could occur because shoreside whiting harvesters may not have a mechanism for acquiring additional sablefish quota to cover unexpectedly high bycatch. In the extreme case, this constraint may lead to premature closure of the fishery and foregoing harvest of whiting. This would have an adverse impact on shoreside processors, because less whiting would be delivered than otherwise would be the case. In a three-sector alternative, both shoreside sectors can trade quota among each other as necessary, thus providing a mechanism for covering unexpectedly large catches of nontarget species in one sector with QS held by the other. This would tend to increase the likelihood that shoreside processors would receive the expected amount of harvest volume.

How will an adaptive management provision affect processors?

If processors do not get an initial allocation of QS, the adaptive management provision provides a mechanism to mitigate harm to adversely impacted processors. This may mean that some processors receive greater landings of groundfish than would otherwise be the case.

If processors are awarded an initial allocation (and therefore cannot be direct recipients of adaptive management quota, which is one option considered by the Council), adaptive management will have a distributional effect on processors. Some processors may gain while others lose because of the distribution of adaptive management quota to harvesters who deliver to certain processors.

Adaptive management could also provide a vehicle for entry of new processors, enable development of specialty processing opportunities addressing niche markets, or create goal-oriented processor-harvester arrangements.

How will area management affect processors?

For processors who operate both in the north and the south, establishing an area management provision (dividing QS at 40° 10' N. latitude) will tend to decrease efficiency and processor flexibility, because large processors would have less ability to optimize the location of their processing and buying activity. Instead, they may need to retain a larger presence in both areas than would otherwise be the case. However, area management could increase the certainty that catch will continue to be delivered in each area, benefiting those locations that might otherwise stand to lose deliveries. Smaller processors that are located in only one of the management areas may be more likely to continue receiving landings in their region.

Area management, combined with gear switching provisions for harvesters, may have an indirect effect on processors. If large-scale gear switching occurs off certain areas of the coast, the harvest of many flatfish species may be foregone since nontrawl gear is less effective at catching many types of flatfish. In such an event, the inability to move flatfish quota to another area of the coast, where trawl vessels may be located, may result in lost or decreased potential for flatfish catch. This will decrease the quantity of flatfish available to processors in areas where large-scale gear switching occurs.

How will a carry-over affect processors?

A carry-over provision lowers the cost to harvesters of going into deficit, and, therefore, decreases the risk associated with harvesting activity. Such a change in risk may mean that harvesters are willing to prosecute target species that are associated with high-risk species. This will have a secondary effect on processors, because it may mean that processors are the recipients of shelf flatfish catch.

How will tracking and monitoring affect processors?

At-sea monitoring primarily affects the cost of fishing. It will have only limited effect on processors, except to the extent that harvesters can bid prices received higher to cover added costs. High monitoring costs may also lead to higher levels of fleet consolidation and this may influence processors because of the presence of fewer harvesters from whom to purchase fish. Implementation of shoreside tracking and monitoring, including the use of shoreside compliance monitors, will likely add to processor operating costs. Under the program, processors are obligated to bear the direct costs of providing shorebased compliance monitors at the time of landing. Sharing of monitoring costs with harvesters could be subject to negotiation, depending on the relative bargaining power of the parties. If harvesters are in a relatively stronger position they could demand that a processor pay part of the cost of at-sea monitoring as an incentive to make deliveries, for example. In contrast, if processors have relatively more bargaining power, they could demand that harvesters pay part of the cost of shoreside compliance monitors. Processors would also bear some indirect costs for shoreside compliance monitors. For example, they would have to provide a workspace for the monitors, possibly modify production processes to accommodate monitoring, and incur other costs related to coordinating shoreside monitor activities with landings.

4.9.3.2 Alternative 1 (No Action)

The No Action alternative is largely expected to result in a continuation of existing conditions in the processing portion of the fishery. Harvest volumes in the nonwhiting and whiting portion of the trawl

fisheries are not expected to change dramatically from current conditions and. Therefore, processors are not expected to receive harvest volumes that are much different from status quo. The existing state of processor capital consolidation is not expected to change substantially, though it may continue to become more heavily concentrated into fewer companies. The revenue that processors generate under status quo conditions is not readily known and therefore the amount of revenue generated by processors under the No Action alternative are not readily known.

4.9.3.3 Alternative 2a

The net effect of Alternative 2a on processor net revenues compared to status quo is unclear. However, it is likely that processors will be the least well off under this alternative when compared to the other non status quo alternatives.

Under this alternative, QSs are given to permits based on catch history. As noted above, this will lead to consolidation among the harvester fleet, and harvesters remaining in the fishery will have a stronger position from which to negotiate (and if necessary, hold out) for ex-vessel prices without fear of losing harvest opportunities to others. In addition, the fact that the harvesting sector has control over the QSs means that the fishery is likely to be prosecuted in a manner that benefits harvesters. As illustrated in Appendix C, this is likely to result in geographic effects with some ports standing to be at a disadvantage, and others at an advantage, because of rationalization. Those processors reliant on deliveries to disadvantaged ports stand to see delivery volumes potentially decrease.

Because they would not receive an initial allocation, processors would be worse off under Alternative 2a than Alternatives 3b, 4, 5, or 6. Processors overall would also tend to be worse off under Alternative 2a than under Alternative 2b, which has a provision for adaptive management that could be used for mitigating effects on certain processors. It is not clear whether processors would be better or worse off under Alternative 2a compared to status quo.

Nonwhiting processors

In general, it is expected that processors will pay a higher ex-vessel price under this alternative compared to status quo, principally because the majority of QS is distributed to harvesters. However, the cost of processing production (outside the cost of purchasing fish) may decrease under this alternative as volumes increase in the nonwhiting sector. Under perfectly competitive conditions, those holding the QSs may be expected to bid away all of the profits from others. However, current conditions suggest that existing nonwhiting processors may have some influence over harvesting activity in the nonwhiting sector because a relatively small number of firms process the majority of the harvest and because processors currently exert some influence over the timing of harvesting operations even though harvesters apparently wish to fish at other times. Because of this apparent influence, it is not clear that allocating QSs to harvesters will mean that harvesters can bid away all of the profits generated by processors, if any are actually realized. It is likely, however, that harvesters will increase their influence over ex-vessel prices, therefore increasing the cost processors incur from purchasing fish. On the other hand, the likely increase in harvest volume means that the cost of production may decline. The net effect on processors in this sector depends on the net effect of higher ex-vessel prices versus lower unit costs of production. If ex-vessel prices increase more than unit costs of production decrease, then processors may be worse off, but if unit costs of production decrease more than ex-vessel prices increase then processors may be better off compared to status quo.

The bargaining advantage that harvesters have over ex-vessel prices is likely to exist in the short term and possibly over the long term. While theory would suggest that quota could be purchased by processors over the long term (thus shifting some ex-vessel price negotiation advantage back to

processors), the accumulation limits in this alternative will temper the ability of processors to purchase substantial quantities of quota. Accumulation limits in this alternative would lead to a maximum of 3 percent being controlled by any single entity, which is substantially less than the amount of groundfish currently handled by several west coast processors of trawl groundfish.

Under this alternative, harvesters have greater influence over the geographic distribution of activity than the processing sector, because of their control of QS. This control will have a geographic effect on where landings take place, and this will have impacts to processors. Those processors who rely heavily on ports where landings may diminish may see less volume than under status quo, while processors who rely heavily on ports where landings increase would see more volume than under status quo. Based on the regional comparative advantage analysis, processors of nonwhiting trawl-caught groundfish who rely on landings from Neah Bay, Crescent City, Fort Bragg, Moss Landing, and Half Moon Bay may see landings volume decrease, while processors who rely on activity from other ports may see volume increase. Table 4-57 illustrates the expected geographic effect of landing activity and indicates how that influences processing entities. While specific business information is not provided, the table does indicate that many processing centers may have some of their sources of landings put at risk by geographic shifts in landing activity that could occur under Alternative 2a. However, many of those same centers may stand to gain product because of geographic shifts at the same time (e.g., Astoria). This information is based on the geographic comparative advantage analysis contained in Appendix C, and the information collected on where processing plants are located and the ports from which those plants receive their fish.

Table 4-57. Processing centers with some landings at risk due to regional shifts in fishing and delivery activity.

Astoria	San Francisco
Bodega Bay	San Jose
Eureka	Sand City
Fort Bragg	Santa Rosa
Half Moon Bay	Scotts Valley
Hawaiian Gardens	Watsonville
Morro Bay	

Under Alternative 2a, several processing companies stand to gain QSs. Although quota is not explicitly allocated to processors under this alternative, the fact that several processing companies own trawl permits means that some QSs will be held by processors. Figure 4-45 illustrates the QSs received by processing entities under this alternative.

Under both Alternatives 2 and 6, nonwhiting processors will not receive an initial allocation of QSs, but processors have the opportunity to participate in an adaptive management provision available specifically to nonwhiting (but not whiting sector) processors under Alternative 4b. No such provision exists under Alternative 2a.

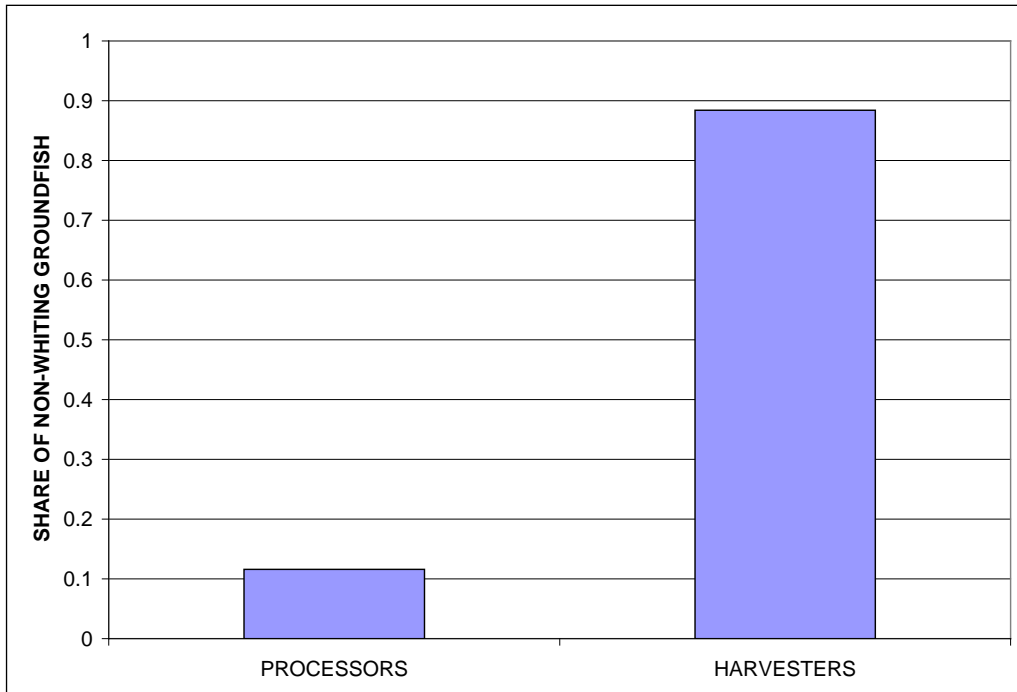


Figure 4-45. Share of nonwhiting groundfish allocated to harvesters and processors in Alternative 2a.

Shoreside Pacific whiting processors

As noted in the harvester section (4.6.2.2), fleet consolidation will take place among shoreside whiting vessels, but not to the extent of the nonwhiting portion of the fishery. Harvest activities are bounded by resource accessibility and seasonality of other fisheries, particularly Alaska pollock in the North Pacific. Geographic migration of the stock to the north imposes a resource access issue because shoreside whiting processors are limited to areas that range from northern California to southern Washington, and the depth-based migration of the stock poses an access issue because harvesters in the shoreside fishery have difficulty fishing at depths where whiting are found later in the year.

Season length in the shore-based harvesting sector is expected to lengthen to some degree under a rationalized fishery. This change in the pace of harvesting will tend to increase product quality and therefore increase the value of Pacific whiting harvests. However, since the holders of Qs are able to bid away profits from others, it is likely that harvesters will bid up higher ex-vessel prices, thus increasing the costs processors must bear for acquiring fish. The elongated season is also likely to result in less processing capital being necessary to handle harvest volumes. If the length of the season increases by 33 to 50 percent, the amount of processing capital needed to handle the same volume may decrease in a similar fashion, because there is less volume at any given time. Such a decrease in processing capital is likely to decrease the cost associated with processing outside the cost of acquiring fish from harvesters. However, this decrease in the need for processing capital will also decrease the asset value of processing equipment that is no longer necessary. Owners of that equipment would tend to be adversely impacted if the equipment cannot be sold or put to another use.

The net effect of this alternative on shoreside whiting processor profits is not clear; however, harvesters may have more leverage over ex-vessel prices in the whiting fishery than in the nonwhiting fishery. Available information indicates that new entry into the whiting processing sector has occurred in recent years, which is a form of competition among processors. This competition means that individual

processing entities may not exert as much influence over harvest operations and prices as in the nonwhiting sector. In addition, the rationalization of the fishery and resulting end of race-for-fish conditions means that harvesters in the whiting fishery can hold out against processors without losing available harvest, increasing their negotiation stance over processors. Such new entry seems not to have occurred in the nonwhiting processing sector, nor has the race for fish occurred in the nonwhiting fishery, meaning that harvesters in that sector currently have the ability to hold out to some degree without losing available harvest volume—at least within the two-month cumulative trip limit period. Therefore, ex-vessel prices paid by processors for shoreside whiting are likely to increase more than in the nonwhiting sector. However, since the cost of processing is likely to decline because of lower peak harvest volumes, the net effect on the shoreside processing industry in the aggregate is not clear. It is possible, however, that certain processors could be adversely impacted if their assets lose value, while other processors could be positively impacted if their production volume increases.

The negotiation power over ex-vessel prices will shift from processors to harvesters, at least in the short run, in Alternative 2a relative to status quo. Over the long term, however, processors may be able to acquire enough Pacific whiting quota to influence ex-vessel prices. The control limits specified in this alternative could allow four business entities to control the harvest of shoreside whiting. Since there are currently more than four shoreside processing entities, this alternative could conceivably allow processors to control all of the whiting Qs over the long term. In addition, under the initial allocation provision, some processing entities will receive an initial allocation of quota, because they own LE trawl permits.

Geographic shifts in the delivery of shoreside Pacific whiting are not expected to occur. Since shoreside whiting processing facilities are geographically constrained to an area that ranges from central Washington to northern California, there is limited opportunity for additional processors of whiting to become established elsewhere, and therefore there is limited opportunity for harvesters to deliver to other locations. Furthermore, the fact that the processing of shoreside whiting relies on a large investment in relatively specialized capital means that it should be relatively difficult for new companies to enter into the processing of shoreside whiting. Therefore, it is reasonable to expect that the delivery location of shoreside whiting under a rationalized fishery should remain the same or similar to the existing delivery locations. One factor that may influence these patterns, however, is if a large processor of shoreside whiting closes operations because of consolidation in the shoreside whiting processing industry.

Processors of shoreside whiting are expected to receive some Qs even though no explicit allocation is made to processors, because of trawl permits that are held by shoreside processors. Because both the estimated QS processor allocation and the number of processing companies receiving Qs are small, the actual data are not presented. However, processors receive less than 5 percent of shoreside whiting quota under this alternative.

4.9.3.4 Alternative 2b and 2c

Many of the provisions under Alternatives 2b and 2c are similar to those of Alternative 2a, but Alternatives 2b and 2c are designed to compare two methods for addressing processor concerns. One method (Alternative 2b) uses an adaptive management provision to mitigate against adverse impacts to processors.¹⁰⁶ Processors that receive this quota (and the communities in which they reside) will likely

¹⁰⁶ To be clear, the suite of alternatives allows the adaptive management provision to be used for things other than addressing processor concerns, such as mitigating against the effects to adversely impacted communities, and to provide incentives to use habitat- and bycatch-friendly gear.

benefit, although it may not yield the most efficient outcome in terms of national economic development gains expected from rationalization.

The second method (Alternative 2c) initially distributes Qs to processors, including 25 percent of groundfish Qs and 50 percent of whiting Qs. This alternative will have a distinctly positive effect on processors relative to Alternative 2a in terms of their bargaining power over ex-vessel prices. Harvesters with Qs will gain bargaining power because of their holdings of Qs, but also through fleet consolidation. Such fleet consolidation limits the number of vessels that processors can negotiate with, and therefore limits the ability of processors to shop around for harvesters willing to fish at lower ex-vessel prices. The fact that processors begin with some initial allocation means that they can vertically integrate and engage in fish harvesting opportunities to some degree independent of other harvesters. This increases the ability of processors to hold out against harvesters while negotiating over ex-vessel prices. It is almost certain that the ability for processors to negotiate lower prices increases as their ownership of quota increases; however, it is not certain whether the initial allocation options that grant quota to processors will increase or decrease their negotiation stance relative to status quo.

In general, those holding Qs experience more certainty about the future than those entities that do not. This increased certainty provides for better business planning in the long term. This greater degree of certainty can be expected to lead to greater degrees of reinvestment into fishing and/or processing-related capital equipment and technology (Anferova et al, 2005). This is because greater certainty makes profit expectations—and the ability to pay back loans taken for investments—more certain. Over time, the reinvestment of financial capital back into fishery related industries may very well improve the overall economic status of fishing-related industries, since such reinvestment will be driven by the expectation of profits associated with that reinvestment. Those entities that do not hold Qs are less likely to reinvest in fishery-related activities, and the result may be deterioration in the status of equipment used by those entities. Such an outcome was observed in the Russian Far East where Qs were auctioned off. The result was a serious deterioration in the economic situation of fishing enterprises (Anferova, *et al.* 2005). Although auctions work differently than Qs that are initially allocated over the long term (and, therefore, the outcomes may be quite different), the perspective of an entity engaged in purchasing quota through an auction is inherently shorter term than an entity that owns Qs. In a program where Qs are intended to be long term, those entities that do not hold Qs are likely to be more uncertain about the future than those entities that do hold Qs. Therefore, if processing companies do not hold Qs, the level of reinvestment is likely to be smaller than if they do hold Qs. Furthermore, the level of reinvestment made by each entity is likely to be correlated with the level of Qs held by each entity.

Also related to the above discussion is the fact that Alternative 2c effectively grants processors a type of asset, while Alternative 2b does not. With an initial allocation of Qs in Alternative 2c, processors can entice harvesters to deliver to their plants, but, in the event they do not, and that processor cannot continue to justify participation in the fishery, that processor can receive some compensation by selling the Qs received through initial allocation, or by leasing it to an operator. Alternative 2b does not have this capital asset effect.

A distribution of Qs to processors, as in Alternative 2c, will tend to have a geographic effect as those processors direct landings associated with their Qs to particular ports where their plants are located. In contrast, an adaptive management provision (Alternative 2b) will tend to have different geographic consequences as well, if adversely impacted processors are located in areas to which adaptive management shares are directed. Figure 4-46 illustrates the geographic implications of 1) allocating nonwhiting quota to permits entirely, 2) allocating 75 percent of the nonwhiting quota to permits and 25 percent to processors, and 3) allocating 100 percent of nonwhiting quota to permits, but reapportioning 10 percent of that quota through an adaptive management provision to adversely

impacted processors. For analysis, we assume that adversely impacted processors are in Moss Landing and Half Moon Bay.

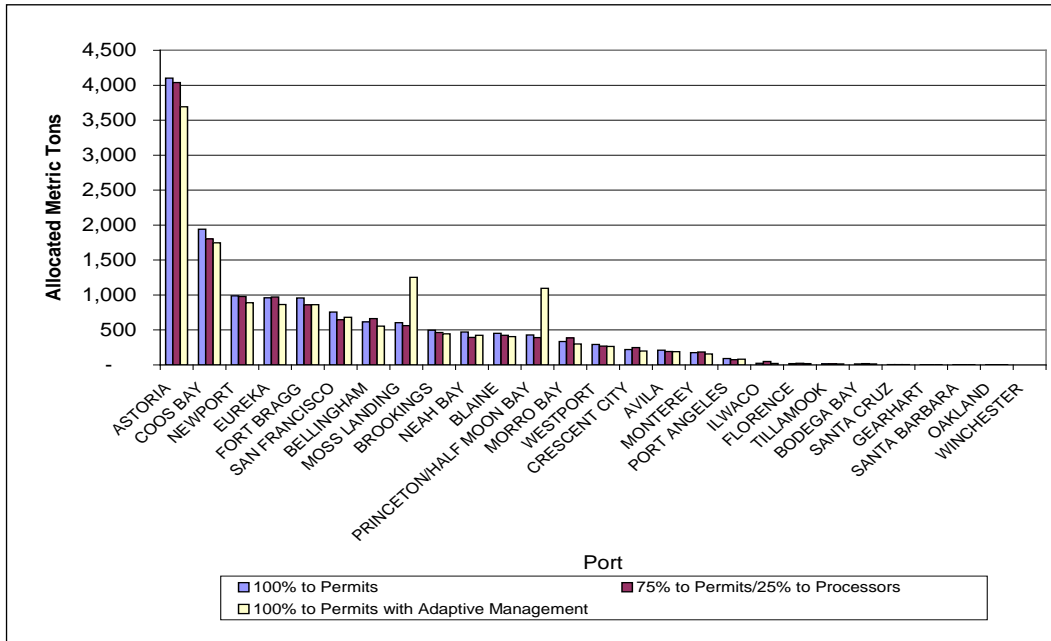


Figure 4-46. Geographic distribution of nonwhiting QS.

In the whiting fishery, the geographic effect is somewhat different than in the nonwhiting fishery. For the at-sea portion of the whiting fishery, allocating to permits or to processors is not expected to change the fact that at-sea activity is primarily tied to the Puget Sound region. For the shoreside whiting fishery, geographic differences exist. In particular, Coos Bay is affected substantially by the choice of whether to allocate in part to processors or not. An adaptive management provision used in the shoreside whiting fishery to mitigate against adverse impacts to processors would presumably alter the geographic distribution of shoreside whiting landings.

The distribution of whiting QSs under Alternative 2b is difficult to predict, because the only port that is engaged in the whiting fishery and labeled as potentially disadvantaged is Crescent City. While it may be possible that all of the adaptive management whiting quota is directed to Crescent City, such a distribution is unlikely since it would represent a higher delivery of Pacific whiting to the port than under status quo conditions. Furthermore, devoting such an amount to Crescent City would exceed the current 5 percent of Pacific whiting devoted to California fisheries prior to the June 15 primary shoreside season start date. Since no change is contemplated in this allocation, devoting such a large share (10 percent) to Crescent City seems unlikely. Therefore, the processors that are possible recipients of shoreside whiting adaptive management quota are largely unknown.

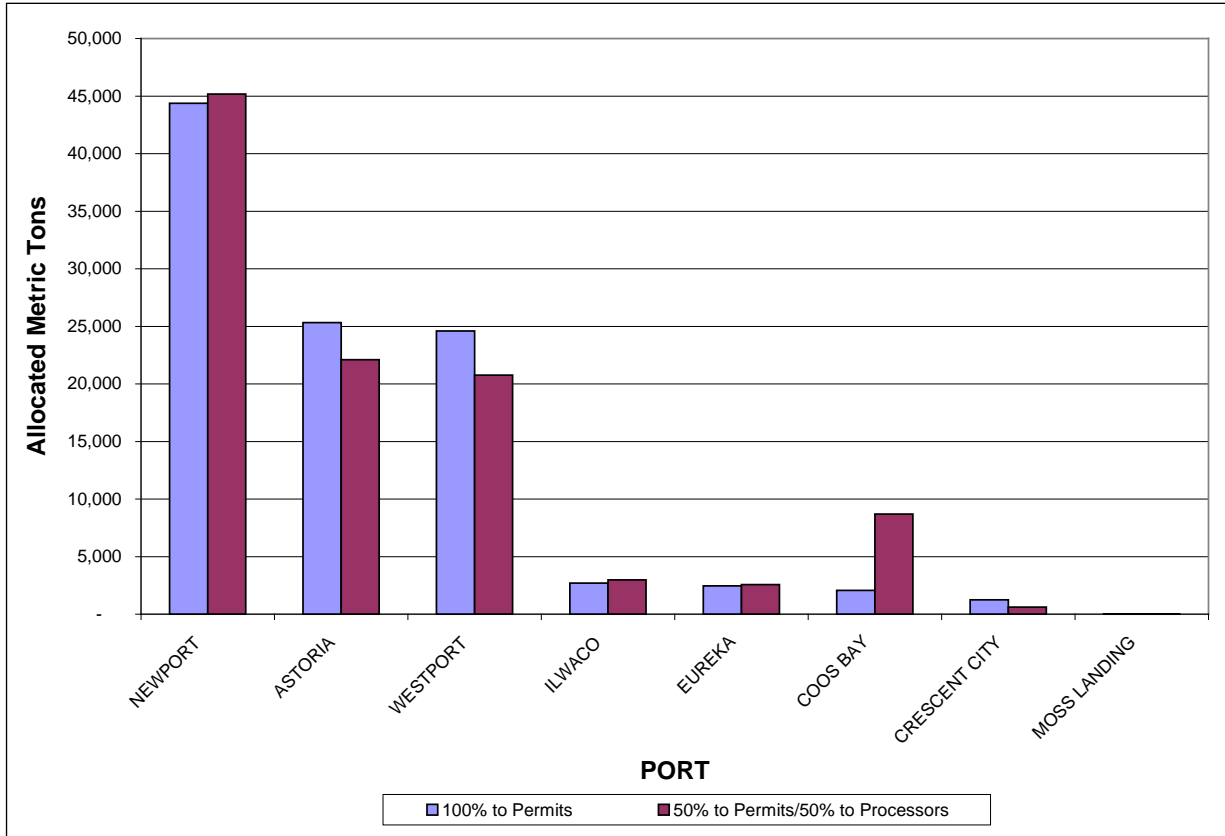


Figure 4-47. Geographic distribution of shoreside whiting quota.

An adaptive management provision may place downward pressure on ex-vessel prices, while possibly benefiting certain processors or communities with processing facilities. However, this is true only if harvesters are prosecuting groundfish subject to adaptive management, which comprises 10 percent of the Qs. A limit on the number of potential buyers may have a downward effect on prices paid for the adaptive management fish. However, the adaptive management provision is not likely to impact ex-vessel prices to the same degree as initial QS allocation to processors, simply by virtue of the difference in volume attributed to processors. In Alternative 2c, the amount of initial allocation to processors is approximately 33 percent for nonwhiting groundfish and approximately 58 percent for whiting.¹⁰⁷ A 10 percent adaptive management provision intended for use by adversely impacted processors is small in comparison.

Over the long run, processors may continue purchasing Qs in the whiting sectors because of the relatively large size of the control limit. The 25 percent control limit specified for the shoreside and mothership whiting sectors means that four entities could, theoretically, control the harvest of whiting in both sectors. It is unlikely that processors will acquire much additional quota in the nonwhiting sector because of the control limits. The 3 percent control limits specified for the nonwhiting sector makes it difficult for the processing sector as a whole to acquire additional quota, unless, over time, the composition of that sector shifts to many small producers. This means that over time, ex-vessel prices in the shoreside whiting sector may fall to some degree since processors have the ability to acquire additional quota, but it is not likely that ex-vessel prices will fall over time in the nonwhiting sector because processors have limited ability to purchase additional quota.

¹⁰⁷ These numbers exceed 25 percent and 50 percent respectively because some processors own trawl permits.

If processors are allocated initial QSs (Alternative 2c), they may play a greater role in directing the location of harvests, since they could enter into harvest contracts that include delivery points. This could help at least partially to offset any negative effects on processors from broader level regional shifts in landings that may occur if harvesters control quota. Vessels in ports where processors are located may have access to more quota than if an initial allocation was made to permits. In addition, initial allocation of QSs to processors could increase their ability to create joint ventures or other arrangements among processors (horizontal integration) and between processors and harvesters (vertical integration).

The distribution of QSs across entities under Alternative 2c is different than under Alternative 2a because of the allocation to processors. One hundred twenty-one entities are expected to receive QSs of nonwhiting groundfish under Alternative 2c, and three of these entities exceed the control limit (but are grandfathered). Under this alternative, the majority of receiving entities receive less than 1 percent of the nonwhiting allocation of groundfish, while a handful of entities receive more than 2 percent. The figures illustrating this concept can be found under the corresponding section on harvesters.

In the whiting sector, there is also a different distributional effect. Interestingly, by including shoreside processors in the initial allocation, the distribution of shoreside whiting becomes relatively more uniform than in Alternative 2a. The largest recipient of shoreside whiting QSs receives less than 10 percent of the shoreside whiting quota, while under Alternative 2a the largest recipient receives almost 12 percent. Sixty-seven entities are estimated to receive shoreside whiting QSs under this alternative. The figures illustrating this concept can be found under the corresponding section on harvesters.

4.9.3.5 Alternative 3

The elements of Alternative 2b and 2c for the nonwhiting fishery differ somewhat from alternative 3. However, there is a considerable difference in the whiting fishery under Alternative 3 in that harvest cooperatives are established for each of the three whiting sectors. This has an effect on processors, primarily in terms of the negotiating relationship over ex-vessel prices and/or profit-sharing arrangements that may develop. With a harvester cooperative, the effect on bargaining position and the change in ex-vessel prices cannot be predicted, because it largely rests upon personal relationships and the bargaining skill of the negotiators. However, if the mothership sector is an indicator, cooperatives may lead to profit-sharing arrangements among processors and harvesters.

A feature unique to Alternative 3 is that there would be four trawl sectors, rather than three for the other alternatives. As indicated above, establishing a four-trawl sector split may inadvertently constrain one or both of the shoreside sectors in certain years if bycatch of a nontarget species is higher than expected. This could occur if Pacific whiting bycatch is higher in the nonwhiting sector than expected and harvesters in that sector have no means of acquiring quota to cover that bycatch. In the worst-case alternative, harvesters in this sector may have their harvest opportunities truncated by the bycatch of Pacific whiting and this may lead to adverse impacts on shoreside processors because of a lack of delivered volume.

The vessel limit for the shoreside groundfish sector is 3 percent under Alternative 3, and lower (more restrictive) than Alternatives 2a, 2b, 2c, 4a, and 4b. The vessel limit generally restricts fleet consolidation. The control limit restricts control, and this may come in the form of vertical integration where processors purchase, or somehow merge operations, with harvesting entities with QSs. The control limit in this alternative is the lowest of all alternatives, meaning it will restrict the ability for entities to acquire QSs and this will restrict the ability for processors to vertically integrate. There is

also no grandfather clause under Alternative 3. This means that relatively large producers who may stand to receive Qs in excess of the control limit would only receive Qs up to the control limit. Some of these entities are processors. If processing entities are potentially restricted by the control limit, and they know that in advance, they may sell some of their LE trawl permits prior to the start of the program so that they are under the control limit and capture the rent associated with the quota that will eventually be associated with that permit. Alternative 4b is similar to Alternative 3 in that it does not have a grandfather clause. Under Alternative 4b, however, the divestiture period takes place four years into the program, allowing entities the ability to fish the overage quota for several years and then divest of that quota under conditions where the value of that quota is likely to be better known.

Nonwhiting processors

As is the case with Alternative 2c above, Alternative 3 provides for an initial distribution to processors of 25 percent of groundfish Qs. This alternative will have a distinctly positive effect on processors in terms of their bargaining power (relative to Alternatives 2a and 4b) with respect to ex-vessel prices and will tend to offset the gains in bargaining power by harvesters. The long run effect on ex-vessel prices is expected to remain relatively unchanged from the period following implementation. This is because the accumulation limits specified under this alternative are relatively small, and will act as a de facto limit to the amount of quota that processors are able to acquire. The 1.5 percent control limit over all nonwhiting groundfish without a grandfather clause provision means that the amount of quota allocated to processors will have to be divided among at least 17 processing companies. Several processors who qualify for an initial allocation will have their initial allocations truncated by the lack of a grandfather clause. That some historically large producers will have their initial allocation truncated means that ex-vessel prices could be higher than they would be under Alternative 2c, where some large producers receive relatively large amounts of quota. Having some entities with relatively large amounts of quota may make those entities more dominant in the negotiation, potentially influencing ex-vessel prices in the aggregate, while not having entities with such large amounts of quota would tend to erode that dominant position.

A distribution of Qs to processors will tend to have a geographic effect as those processors direct landings associated with their Qs to particular ports where their plants are located. An adaptive management provision will tend to have different geographic consequences, if adversely impacted processors are located in particular areas to which adaptive management shares are directed. Figure 4-45 above illustrates a hypothetical geographic distribution of quota under 25 percent to processor allocation rule (Alternative 3).

Compared to Alternative 2c, the area management provision in Alternative 3 (which divides species north and south of 40° 10' N. latitude) could be beneficial for some processors while adversely affecting others. Area management effectively ensures that markets are retained in each area, and harvest quota will be allocated accordingly. The regional opportunities are enhanced by processor Qs, where they can entice harvesters to contract and deliver to their plants. Processors with plants in both north and south areas could be negatively affected by area management if it causes inefficiencies within the firm's allocation of capital resources. For example, a processing company may find it most cost effective to close existing plants and concentrate landings in one area of the coast. Area management restricts the ability of processing companies in such a position to reorganize that way, thus restricting potential profits. In addition, area management combined with large-scale gear switching may mean that the harvests of some types of shelf flatfish are foregone, as discussed previously. This would tend to reduce aggregate volume to processors from what would otherwise occur.

Pacific Whiting Processors

The relationship between Pacific whiting harvesters and processors that is formed through co-ops for harvesters in this alternative is different from the relationship established by issuing both sectors Qs. The ex-vessel prices that result through a harvester-processor affiliation (linkage) could very well be different from the negotiated ex-vessel prices when both harvesters and processors receive Qs. While both harvesters and processors can buy and sell Qs and associated fish freely, harvesters and processors in a cooperative with a linkage requirement are contractually bound to limit such exchanges to co-op members (though the linkage can be broken with some effort). This linkage means that negotiation and relationships between the harvester and processor are likely to have a large influence over ex-vessel prices in the short term, as opposed to a market-driven outcome. Over the long term, harvesters and processors can break that arrangement if harvesters fish in the noncooperative portion of the fishery, though this fishery is a competitive, derby-style fishery, which makes it unattractive and arguably less profitable. Though there may, at times, be an incentive to break the linkage and seek higher prices elsewhere, doing so may come at a cost.

The distribution of harvest opportunities under a cooperative structure with harvester-processor linkages is in many respects more similar to Alternative 2a, with 100 percent of the initial allocation going to permits, than for Alternatives 3b and 6, where an initial allocation is made to both harvesters and processors. This is because under a cooperative system with processor linkages, the harvester still controls the opportunity to harvest the available quantity. That quantity is not made available to processors, as would be the case if QS was allocated to processors.

4.9.3.6 Alternative 4a

The elements in Alternative 4a reflect some features of each of the previous alternatives. Alternative 4a differs primarily in the results of the initial allocation formula, the presence of a grandfather clause, the lack of an initial allocation to processors for groundfish but a 50 percent allocation of whiting, the merging of both shoreside sectors into one, area management, and the presence of an adaptive management provision. Other elements of this alternative differ from the other alternatives, but do not appear to have a noticeable effect on the outcome.

A distribution of Qs to whiting processors will tend to influence or direct landings to particular ports where their plants are located; an adaptive management provision will also have geographic consequences. The adaptive management provision could be used to mitigate adverse impacts on communities, particularly ports with nonwhiting processors. It could also be used to encourage gear switching or the development of gear with lower bycatch. Depending on the objective, the distribution of these effects is likely to be different.

An adaptive management provision may place downward pressure on ex-vessel prices. However, this may only be true if harvesters are prosecuting groundfish subject to adaptive management, which comprises 10 percent of the Qs. The fact that the adaptive management provision comprises 10 percent means that the price effect is likely to be relatively small.

An area management provision in Alternative 4a, as in Alternative 3, divides species north and south of 40° 10' N. latitude. This could be beneficial for certain processors in both areas by effectively ensuring that markets are retained in each area, and harvest quota will be allocated accordingly. The regional opportunities are enhanced by processor Qs, where they can entice harvesters to contract and deliver to their plants. Processors with plants in both north and south areas could be negatively affected by area management if it causes inefficiencies within the firm's allocation of capital resources. Area management restricts the ability of processing companies to reorganize, thus restricting potential profits.

In addition, area management combined with large-scale gear switching may mean that the harvests of some types of shelf flatfish are foregone, as discussed previously. This would tend to reduce aggregate volume to processors from what would otherwise occur.

Nonwhiting processors

Nonwhiting processors are expected to see lower profits under this alternative compared to some other alternatives. As in Alternative 2a, ex-vessel prices paid to nonwhiting trawl harvesters will tend to be relatively higher because QS is initially allocated only to permits, which enhances harvesters' negotiation power. This bargaining advantage away from processors is likely in the short term and possibly over the long term. Quota could be purchased by processors over time (thus shifting some advantage back to processors); however, the accumulation limits will temper the ability of the larger processors to purchase substantial quantities of quota. Accumulation limits in this alternative would lead to a maximum of 2.2 percent being controlled by any single processor, which is considerably less than the amount of groundfish currently handled by several west coast processors of trawl groundfish.

Pacific whiting processors

Alternative 4a will have a positive effect on whiting processors in terms of their bargaining power with respect to ex-vessel prices because they are allocated 50 percent of initial QSs. Processors can vertically integrate and engage in fish harvesting opportunities independent of other harvesters. The ability of processors to negotiate lower prices increases as their ownership of quota increases, and this alternative results in a large portion of the QSs being allocated to processors.

4.9.3.7 Alternative 4b (Preferred Alternative)

Alternative 4b is the Council's preferred alternative for rationalization of the LE trawl fishery. The Council's preferred alternative includes several components similar to those encompassed within Alternatives 2a through 4a, but includes additional measures that are not. Of significance in Alternative 4a is that shoreside processors in the whiting sector would receive 20 percent of the QS initial allocation; these are somewhat smaller proportions for processors than provided under some of the other alternatives. Under Alternative 4b, nonwhiting processors would not receive an initial allocation, which is also the case in Alternatives 2a, 2b, and 4a.

Many aspects of Alternative 4b are similar to Alternatives 3 and 4a, in particular. For nonwhiting processors, the negotiated ex-vessel price would be comparable to that under Alternatives 2a and 4a, where prices paid to nonwhiting trawl harvesters will tend to be relatively higher because QS is initially allocated only to permits, which enhances harvesters' negotiation power. Among whiting processors, initial allocation of QSs is 20 percent under Alternative 4b, which is much smaller than the 50 percent allocation under Alternatives 2c and 4a. As noted above, distribution of QSs to processors will tend to influence or direct landings to particular ports where their plants are located while also improving their negotiation power over ex-vessel prices.

There is no grandfather clause in Alternative 4b, which is also the case in Alternative 3. However, Alternative 4b differs from Alternative 3 in that there is a divestiture provision allowing those with quota in excess of the limits the opportunity to sell that quota within a specified period. Without a divestiture provision, entities would not receive an initial allocation of QSs above the accumulation limits. Instead, that overage quota would be automatically redistributed among other QS holders. Alternative 4b includes a two-year moratorium on QS sales, followed by a two-year period over which the excess QSs can and must be divested. This waiting period benefits those processors with excess shares, since it eliminates the possibility of an immediate fire sale of quota that must be divested and

allows a longer period for orderly and strategic sale of their QS assets, allowing them to capture the rent associated with that quota and assume the monetary value of that asset.

Both shoreside sectors are combined into a single sector under this alternative. This alleviates the potential that a species may become unexpectedly constraining to one of the shoreside sectors. If one shoreside sector encounters unexpectedly high amounts of a certain species, that sector can compensate by purchasing QPs of that species from the other shoreside sector. The lack of hard allocations across sectors provides flexibility that can reduce the risk of premature closure of a particular fishery, and the accompanying effect on processors.

An adaptive management provision is a feature in Alternative 4b, as it is in Alternatives 2b, 3, and 4a; however, the provision applies only to nonwhiting species, and is not available for whiting. The provision is likely to have geographic consequences and may place downward pressure on ex-vessel prices, which may tend to benefit processors. However, this will happen only if harvesters are prosecuting nonwhiting groundfish subject to adaptive management, which comprises 10 percent of the QSs.

An area management provision is not present in Alternative 4b, as it is in Alternatives 3 and 4a. This can be beneficial relative to Alternatives 3 and 4a for larger processors who own facilities both north and south of 40° 10' N. latitude, because it allows them an efficient allocation of firm resources to where they are needed without having to consider species management limits in each location. It may not be beneficial to smaller processors who are located in a single port if fishing activity tends to migrate to a different area.

Nonwhiting processors

For nonwhiting processors, this alternative has similarities to Alternative 2b, which has no initial allocation of QSs to processors, but an adaptive management provision to mitigate adverse effects. In terms of ex-vessel prices paid to harvesters, the gains in bargaining power accruing to harvesters will tend to push prices higher in their favor relative to other alternatives. As in the other alternatives, the amount of overall catch in the fishery is expected to increase because of a reduction in the bycatch rate of overfished species that, in turn, allows vessels to leverage higher catch amounts of underutilized target species. This increased catch should lead to greater ex-vessel revenues in total relative to status quo and provides opportunities for processors to generate more revenues from that additional fish. The long run effect on ex-vessel prices may remain relatively unchanged from the period following implementation, based on the accumulation limits. These limits will act as a de facto limit to the amount of QSs that processors are able to acquire, limiting processors to an amount of QSs that may allow for one or two full time nonwhiting trawl vessels. As noted above, some entities with relatively large amounts of quota tend to be more dominant in negotiation, potentially influencing ex-vessel prices in the aggregate, while not having entities with such large amounts of quota would tend to erode that dominant position.

An adaptive management provision for nonwhiting species will tend to have different geographic consequences if it is used to help adversely impacted processors, and those processors are located in particular areas to which adaptive management shares are directed. However, there is a two-year waiting period before the adaptive management provision will take effect; as a result, it is possible that some nonwhiting processors who endure adverse effects may close before the adaptive management opportunity becomes available.

Pacific whiting processors

Alternative 4b will have a positive effect on whiting processors in terms of their bargaining power with respect to ex-vessel prices (relative to a case where no initial allocation is made to processors) because they are allocated 20 percent of initial QSs. The effect would be lower than for Alternatives 2c and 4a, which allocates 50 percent of initial whiting QSs to processors. Processors can vertically integrate and engage in fish harvesting opportunities independent of other harvesters.¹⁰⁸ The ability of processors to negotiate lower prices increases as their ownership of quota increases; however, it is not certain at what level an initial allocation to processors offsets the effect of allocating QSs to harvesters. Therefore, while this alternative provides greater leverage to processors when negotiating over prices compared to Alternatives 2a and 2b, for example, it is not clear whether processors will have greater negotiating power than under status quo.

The initial allocation of whiting to shoreside processors also acts as a capital asset. Since consolidation is expected in the processing portion of the whiting fishery, the value of processing capital may decline. In addition, processors who are consolidated out of the fishery are likely to experience a loss of revenue that they realize under status quo conditions. The initial allocation of QSs to processors can offset some of the losses that may be attributed to a decline in asset value and a loss of revenues. Processors who are consolidated out of the fishery may elect to sell that quota or lease it to another operator, and in this way replace the revenue or capital value that was affected by rationalization.

Although whiting processors are provided with an initial allocation of QS, under Alternative 4b they will not become eligible for adaptive management should they become subject to adverse effects of rationalization. The provision is afforded only to nonwhiting species, and therefore is likely to impact only nonwhiting processors.

The species covered in this alternative alleviates some of the risk present in the other alternatives. Some of the risk present in the other alternatives exists because of the coverage of low OY species and species caught irregularly. Not requiring that harvesters cover the catch of these species with quota means that there is more flexibility in prosecuting fishing activity and less risk that an unexpected catch event could shut down fishing opportunity. Processors are impacted indirectly. Since the risk of premature closure of a fishery is reduced, processors have relatively greater expectations regarding catch volumes during the year.

4.9.3.8 Comparative Summary of the Effects of the Alternatives

Alternative 1	<ul style="list-style-type: none"> • Continued overcapitalization and relatively low processed volume among nonwhiting processors. • Continued overcapitalization as a result of derby conditions in shoreside whiting industry.
Alternative 2a	<ul style="list-style-type: none"> • Higher cost of purchasing fish from harvesters in nonwhiting and whiting sectors compared to status quo. • Lower cost of production in nonwhiting due to increased harvest volume. Lower cost of production in whiting because of increased season length and processor consolidation. • Geographic shift in processing activity occurring on a localized scale and a wide-scale perspective as a result of shift in landings.

¹⁰⁸ However, the Council recently enacted some limits on quota share ownership, restricting the ability to vertically integrate.

Alternative 2b	<ul style="list-style-type: none"> • Lower cost of production in nonwhiting sector due to increased harvest; lower cost of production in whiting sector because of increased season length and processor consolidation. • Select, adversely impacted processors receive quota through adaptive management, minimizing disruption of activity. • Processors who are not recipients of adaptive management may be affected similarly to Alternative 2a. • Potentially less geographic shift as a result of adaptive management.
Alternative 2c	<ul style="list-style-type: none"> • Lower cost of production in nonwhiting sector due to increased harvest; lower cost of production in whiting sector because of increased season length and processor consolidation. • Processors pay lower prices for fish from harvesters than in Alternative 2a. • Differential geographic shift than in Alternatives 2a and 3a—movement of activity toward processors with QS.
Alternative 3	<ul style="list-style-type: none"> • Lower cost of production in nonwhiting sector due to increased harvest; lower cost of production in whiting sector because of increased season length and processor consolidation. • Nonwhiting processors pay lower prices for fish than in Alternative 2a. • Whiting processors may pay lower prices for fish than in Alternative 2a, or may enter into profit-sharing arrangements with harvesters. • Minimal wide-scale geographic shifts, but some localized shifts affecting localized processors.
Alternative 4a	<ul style="list-style-type: none"> • Lower cost of production in nonwhiting sector due to increased harvest; lower cost of production in whiting sector because of increased season length and processor consolidation. • Nonwhiting processors may pay relatively high prices for nonwhiting groundfish. • Shoreside whiting processors may pay lower prices for whiting than Alternatives 2 and 3a. Unclear how this compares to Alternative 3. • Minimal wide-scale geographic shifts, but some localized shifts affecting localized processors.
Alternative 4b	<ul style="list-style-type: none"> • Lower cost of production in nonwhiting sector due to increased harvest; lower cost of production in whiting sector because of increased season length and processor consolidation. • Nonwhiting processors pay comparable prices for fish as in Alternative 2a, but are eligible for adaptive management shares after the first two years. • Whiting processors may pay lower prices for fish than in Alternative 2a, or may enter into profit-sharing arrangements with harvesters. • Minimal wide-scale geographic shifts, but some localized shifts affecting localized processors. • Potential reduction in loss of processing opportunity due to a lower risk of premature whiting fishery closure, as a result of only select species covered by IFQs.

4.9.4 Cumulative Effects on Shoreside Processors

The effect of the alternatives on shoreside processors is combined with past actions, current and future trends, and RFFAs to derive the cumulative effect. Each of these effects is measured using the potential impacts identified in Table 4-55, which include the (cumulative) effect on the net revenues for processors of trawl-caught groundfish. This cumulative effects analysis uses the analysis contained in

the section describing broad level effects of rationalization as well as the effects described in the analysis of alternatives.

In some respects, the effect of rationalization on processors can be viewed as a replacement to present conditions rather than an action that is additive to present conditions. Rationalization is intended to change the system in which the trawl fishery operates, including that of processors.

4.9.4.1 Overview of Past Actions and Trends Affecting Processors

A variety of past fishery management measures and other exogenous trends have affected shoreside processors, and been instrumental in shaping the present structure of the industry. Many of these measures and trends were discussed above in Chapter 3, and in the section on cumulative effects on trawl harvesters, and the details can be found there. Some of the significant ones affecting processors in particular are summarized identified here.

Harvest restrictions started to become prominent during the 1980s due to concern about depressed stocks. MPAs were implemented during the last decade, which closed off wide areas to trawl harvesters. Harvest levels and revenues for nonwhiting harvesters declined, the industry found itself over-capitalized, and many were unable to cover fixed costs of vessel ownership. Reduced harvests carried over to shoreside processors, who also found themselves overcapitalized; a number of facilities closed and companies consolidated or were purchased by larger entities. A 2003 trawl vessel buyback program had the effect of reducing harvest participants and improved the viability of remaining harvesters. The closure rate of shoreside facilities has also slowed; however, revenues and volumes in recent years have not recovered to levels experienced in the 1990s.

A different picture has emerged within the Pacific whiting industry. Processor innovations helped to develop surimi from Pacific whiting, largely for export to the Far East, and the domestic industry began to take hold in the 1980s and 1990s. A setback in the early 2000s was the result of an overfished declaration and concern over Mad Cow disease (Pacific whiting surimi producers used beef plasma in the production of surimi), which reduced the demand and price for whiting surimi. Recent changes in processing methods and products have led to resurgence in the industry, considerably higher prices, and new entrants among processors. There has also been greater Council involvement in harvest restrictions, including Amendment 15, which limited access to specific harvesting sectors of the whiting fishery.

4.9.4.2 Trends and Actions Influencing Shoreside Processors

A number of exogenous trends are influencing the operating environment for shoreside processors. The combined effect of these trends and actions become the cumulative effect of rationalization on shoreside processors. They are discussed in this section and include the following:

- Changes in use of ocean areas
- Changes in use of coastal land areas
- Increased protein demand and production costs
- Increased consideration of demand for ecosystem-wide fishery management approaches
- Increased public awareness and scrutiny of the fishing industry
- Climate change
- Short-term versus long-term trends
- The development and implementation of CFAs

Ocean areas around the world are under increased pressure and scrutiny. Population growth, combined with increased global concern for environmental protection, is leading efforts to ensure fish populations are harvested responsibly without depleting the fishery for future generations and that uses methods that will not cause environmental harm. Other uses for oceans, such as transportation, energy production, environmental recovery, and waste assimilation, can and will continue to lead to conflicts with traditional fishery practices. This trend will continue in the future. For the west coast fishery, conflicts may increase in the future, and these could affect the supply of fish for processors to utilize and send to market.

Conflicts may increase on coastal land areas. Population increases in most areas of the coast can lead to increased conflicts among incompatible land uses. Existing processors can face pressures within communities that are changing emphases to tourism, residential housing, or other land uses that may be considered incompatible with fish processing. Processing companies that wish to establish processing facilities are likely to face greater difficulty in locating suitable sites, particularly in fast growing or changing communities. This trend is likely to continue in the future. In addition to community land use changes, a greater environmental awareness and emphasis on protection of sensitive coastal areas may further restrict the availability of processing sites.

As the world's population increases, there will continue to be a greater demand for protein sources. Fishery resources are generally considered an increasingly important source for meeting the growing world demand. This large-scale trend applies regionally as well: population growth rates in the western United States, particularly near coastal metropolitan areas, are expected to be among the highest in the nation. Demand for fish will increase accordingly; if the trend continues towards higher per capita consumption of fish, demand will increase even more. The demand for wild-caught fish could be met, at least in part, by increases in aquaculture production, however. The degree to which aquacultured fish will meet demand will depend on the substitutability of this product form for wild-caught fish and relative prices, which is a function of supply and production costs. If aquacultured fish are perfectly substitutable for wild-caught fish and supplied at a lower price this would reduce demand for wild-caught fish.

Trends expected to affect the cost of processing in the future include the expectation that resource inputs will remain high relative to prices seen in the past few decades. These include the expectation that steel, fuel, and many other inputs necessary to operate and maintain a processing facility will remain high in the future because of increased global demand for such inputs. Rationalization has the effect of mitigating some of the expected increases in cost that may be exogenous factors as well as factors that are part of Council actions. Since rationalization allows vessels to time deliveries and fishing activity in order to take advantage of market conditions, rationalization has the effect of mitigating some of the cost burden by allowing opportunities to optimize revenues for both harvesters and processors. While various input costs, such as energy, are generally expected to increase at rates higher than other costs, it is also expected that the value of fish products will escalate or remain relatively high on a global basis and the supply of whitefish from sources such as the North Atlantic remain depressed. This increased demand is expected to result in higher prices for raw fish products and this should offset the cost associated with relatively high fuel prices. However, the ability for processors to benefit from this expected increase is tied to harvester/processor negotiation power. This concept is closely related to the decision over the amount of QS that should be allocated to harvesters versus the amount of QS allocated to processors. Those alternatives that allocate relatively more to permits will tend to allow harvesters to benefit from this demand compared to those alternatives where processors are allocated relatively more.

Increased scrutiny of the fishing industry by the public is expected to continue, particularly scrutiny of bottom trawl gears. Such increased scrutiny may not necessarily lead to formal regulation changes, but it may affect the marketability of processed fish from trawl-caught groundfish and groundfish caught

with nontrawl gear. One possible outcome of increased scrutiny is a relatively higher price for nontrawl-caught groundfish. The net effect on processors is not clear, but this trend could affect the source of fish for processors in the future.

Several additional factors that are largely exogenous to the effect of rationalization, but that may influence processor profitability, include the possibility of a stock becoming declared as overfished, the unexpected removal of a stock from overfished status, and the effect of climate change and variability on species abundance and location. While these factors are largely unpredictable, they are best considered within the cumulative effects section because they are not directly related to rationalization. If a stock becomes overfished and a lower OY is implemented, harvesters are likely to see lower revenues due to a loss in harvest of that species, or because that species constrains access to other stocks, or both. The inverse is true if a stock is taken off the overfished list. The effect of climate change and variability on fish abundance and location also influences processor profits. If conditions are such that groundfish migratory patterns differ substantially from one year to the next, the fixed nature of shoreside processor facilities will become compromised.

The final factor considered here which is expected to affect revenues and (potentially) asset values is the development and implementation of CFAs. While it is difficult to predict the effect CFAs will have since they have not yet been formally defined, some assumptions can be made regarding what they will be allowed to do and how they may operate. The first assumption is that a CFA will be allowed to hold quota in excess of accumulation limits. It is also assumed that the goals and objectives of the CFA will take into account the needs of the community, and these goals and objectives may be somewhat different from the goals and objectives of a QS holder or harvester. Since processing facilities are often seen as an important piece of a fishing community, it is not unreasonable to expect that a CFA may be take on actions that assist local processors in some fashion, as long as doing so benefits the local community. This may have some mixed effects across processing companies. Those processing companies that operate in several locations may have to maintain operations in some ports that may not be optimal to the bottom line. For those processors that only have a single location, however, the development of a CFA may be beneficial to that processor as the CFA operates as an entity helping to ensure that fish continue to be landed in that port. However, the possibility of the CFA operating in a manner that helps a local processor is conditioned on the way in which CFAs organize and the way in which the Council outlines the manner in which CFAs can form.

Table 4-58. Trends and factors affecting processor profitability and asset values.

Trends and Factors Affecting Processor Profitability and Asset Value		Score
Due to Rationalization	<ul style="list-style-type: none"> • SS whiting processor consolidation 	
	<ul style="list-style-type: none"> • Value of capital assets 	–
	<ul style="list-style-type: none"> • Processing cost efficiency 	+
	<ul style="list-style-type: none"> • Increased harvest of under-utilized target species 	+
	<ul style="list-style-type: none"> • Intersector allocations of groundfish 	Conditional
	<ul style="list-style-type: none"> • Changes in the negotiation power of harvesters and processors 	Conditional
Exogenous to Rationalization	<ul style="list-style-type: none"> • Changes in use of ocean areas 	–
	<ul style="list-style-type: none"> • Changes in use of coastal land areas 	–
	<ul style="list-style-type: none"> • Increased global demand for protein 	+
	<ul style="list-style-type: none"> • Rebuilding of depleted groundfish species 	+
	<ul style="list-style-type: none"> • Increasing cost of inputs, including energy 	–
	<ul style="list-style-type: none"> • Possibility that a stock unexpectedly becomes overfished 	–
	<ul style="list-style-type: none"> • Climate change 	Unknown
	<ul style="list-style-type: none"> • Increased public scrutiny of fishing industry 	Conditional
	<ul style="list-style-type: none"> • Community Fishing Associations 	Conditional

4.9.5 Summary of the Effects on Shoreside Processors by Alternative

Each of the action alternatives replaces the existing management structure responsible for the past and present condition of the fishery. Processors focusing on nonwhiting species have experienced consolidation over the past several years in response to a decline in harvests of nonwhiting species. Each of the action alternatives is expected to result in an increase in harvests of nonwhiting species, potentially increasing the need for processing activity and capital. In the whiting fishery, each of the action alternatives (except for alternative 3) is expected to result in an elimination of the competitive, race for fish conditions that exist in the current fishery. Alternative 3 is an exception due to the common fishery-wide bycatch limit that exists in that alternative, providing incentives to race for fish via bycatch. The elimination of the competitive conditions that exist in the whiting fishery can be expected to slow down the fishery, reducing peak harvest volumes and the corresponding need for processing capital. This reduction in need for capital in the whiting fishery can be expected to reduce the value of capital.

An initial allocation of Qs to shoreside whiting processors is expected to replace to the lost capital value potentially occurring among whiting processors due a decline in the demand for that capital. Furthermore, an initial allocation to whiting processors will tend to enhance their negotiation power with harvesters over prices. Since nonwhiting processors are not expected to see a reduction in the demand for capital, any initial allocation to processors is likely to impact ex-vessel price negotiations and result in a net increase in capital value.

4.9.5.1 Alternative 1 (No Action)

The current status of shoreside processors would be expected to only change as a result of exogenous factors under Alternative 1. Nonwhiting processors are expected to continue to consolidate, while whiting processors may see some continued increase in processor participation.

4.9.5.2 Alternative 2a

The effect of Alternative 2a is expected to mean a replacement of the current management system responsible for much of the past and current status of shoreside processors. These changes are expected to result in an increase in utilization of processing capacity for nonwhiting species and a reduction in capacity demand for shoreside whiting. In addition, this alternative is expected to place much of the ex-vessel price negotiation power in the hands of shoreside harvesters, which may be a change from status quo. Changes in ex-vessel price negotiations among nonwhiting harvesters and processors are less clear.

When combined with past, present, and future conditions/actions, this alternative is expected to result in impacts on nonwhiting processors that replace some of the harvest volume in the nonwhiting fishery lost during fishery restrictions that started in the 1990s. Such increases in harvest volumes in this fishery provide opportunities for the processing sector to reduce average costs and capitalize on revenue that may be generated from that increase in product volume. Some of this may offset the losses in salmon opportunities that have occurred since the 1980s, losses in groundfish opportunities since the 1990s, and future variations in the catch of other important species such as Dungeness crab.

In terms of shoreside whiting processors, this alternative may allow the processing sector to become more cost-efficient by reducing capital necessary in the fishery. However, this may not mean that processors will benefit from rationalization as whiting processors may stand to lose negotiation power with harvesters and those processors who are consolidated out of the fishery may need to close down their operations while seeing a subsequent decline in the value of their capital assets. When combined with past, present, and future actions/conditions, this alternative can be expected to add to the conditions that have adversely impacted processors in the past (such as groundfish restrictions and salmon restrictions). For those processors who may have capitalized on the recent expansion of the whiting fishery, this alternative may erode some (or all) of the recent gains on which those processors may have been able to capitalize.

4.9.5.3 Alternative 2b and 2c

Similar to the other action alternatives, Alternatives 2b and 2c replace much of the existing management structure responsible for the past and present status of shoreside processors. Alternatives 2b and 2c differ in their approach to specifically dealing with processors. Alternative 2b uses an adaptive management provision for protecting adversely impacted processors while Alternative 2c makes an initial allocation to processors. Each of these measures has a different effect on processors due to the tool used to address processor concerns, the magnitude of the set aside versus the initial allocation, and which processors stand to receive the adaptive management set aside versus the initial allocation of Qs. For reasons described previously, Alternative 2c appears to benefit the processing sector as a whole more than Alternative 2b, but Alternative 2b may benefit specific processors more than Alternative 2c.

When combined with past, present, and future conditions/actions, Alternatives 2b and 2c have differing effects. Alternative 2b would allocate adaptive management quota to processors adversely impacted by rationalization. Assuming it is possible to differentiate between processors impacted by some other measure from those impacted by rationalization, then Alternative 2b will be equivalent to Alternative 2a for many processors—specifically those not receiving adaptive management quota. For those processors that are recipients of adaptive management quota, the effect of Alternative 2b could prove to be quite different than Alternative 2a. The receipt of adaptive management quota could allow adversely impacted processors more say in business planning and execution, potentially giving those processors the tools necessary to respond to adverse impacts as a result of rationalization. This has the added benefit of granting those processors tools that would tend to help make those processors adaptable to

changing future conditions. This is because those processors holding adaptive management quota have control over the way in which that quota is prosecuted, and this can be used to tailor harvest strategies in a way that matches up with their processing needs. While processors may receive this quota to address adverse impacts of rationalization, it has the potential benefit of allowing them to respond to other potentially adverse effects as well.

Alternative 2c is different than alternative 2b in that the processing sector as a whole has more say over the ways in which harvesting activities are prosecuted and can use this to their advantage. Specific processors may not see this alternative as advantageous as 2b if such an initial allocation results in less quota being allocated than could occur with adaptive management. However, unlike adaptive management, an initial allocation of QS acts as a capital asset which can offset changes in capital asset values that may occur through rationalization. When combined with past, present, and future conditions/action, this alternative tends to place the processing sector as a whole in a better position than other alternatives. The value of quota as a capital asset may offset changes in asset values from rationalization, but also due to changes in the decline of the nonwhiting fishery since the 1990s. The initial allocation of quota also allows processors to have more say over the ways in which the fishery is prosecuted, thus granting processors tools which they can use to help respond to changing future conditions such as changes in OYs (ACLs), changes in markets, and changes in the opportunities presented by nongroundfish fisheries.

4.9.5.4 Alternative 3

The effects of Alternative 3 are similar to Alternative 2c for nonwhiting processors. Shoreside whiting processors are impacted differently through the implementation of a cooperative program with a processor linkage. This linkage provision has some similar characteristics to a processor initial allocation in that a processor LE permit with a long-term linkage has the potential to act as a capital asset if that permit is transferable. The linkage provision also provides processors with more influence over the manner in which harvest activities are prosecuted and gives processors leverage in negotiations over prices with harvesters. Alternative 3 results in an outcome on shoreside whiting processors that is similar in some respects to status quo. This is because of the three-sector whiting bycatch limit and the fact that implementing such a limit would tend to create incentives necessary for a race for fish. This means the fishery may not slow down, processing volumes necessary to handle that peak would still be necessary, and, therefore, consolidation of processing capital—and corresponding changes in asset values—is not likely to occur.

When combined with past, present, and future actions/conditions, Alternative 3 tends to place the processing sector as a whole in a better position than many other alternatives. The value of nonwhiting quota as a capital asset is a beneficial outcome for processors. The increase in nonwhiting harvest expected from this alternative is also expected to offset some of the decline of the nonwhiting fishery that has occurred since the 1990s. The shoreside processor linkage can work similar to a capital asset. The initial allocation of quota and the linkage provision also allows processors to have more influence over the ways in which the fishery is prosecuted, thus granting processors tools which they can use to help respond to changing future conditions such as changes in OYs (ACLs), changes in markets, and changes in the opportunities presented by nongroundfish fisheries. However, this is minimized to some degree by the race for fish incentives created through the three-sector common bycatch limit.

4.9.5.5 Alternative 4a

The effect of Alternative 4a on shoreside processors depends on whether the processor is a nonwhiting processor or a shoreside whiting processor. Nonwhiting processors are affected similarly to

Alternative 2b because they receive no initial allocation, but stand to be assisted if adverse impacts occur through the adaptive management provision. The effect of Alternative 4a on shoreside processors is similar to Alternative 2c because shoreside whiting processors receive an initial allocation of quota equal to 50 percent of the shoreside whiting allocation.

When compared to past, present, and future actions/conditions, Alternative 4a creates a system that replaces the system responsible for much of the past and present condition of the fishery. This system allows the fishery to adapt to changing future conditions more readily; however, since nonwhiting processors do not have an initial allocation of quota (and are restricted from acquiring more quota by purchase due to the accumulation limits) nonwhiting processors may not be in a position to adjust harvesting strategies to meet optimal processing conditions. However, shoreside whiting processors are given a tool to help adjust harvesting practices in response to changing future conditions through the processor linkage.

4.9.5.6 Alternative 4b (Preferred Alternative)

The effect of Alternative 4b on shoreside processors depends on whether the processor is a nonwhiting processor or a shoreside whiting processor. Nonwhiting processors do not receive an initial allocation of Qs, but do stand to be assisted through an adaptive management provision if they are adversely affected by rationalization. This makes the effect of Alternative 4b on nonwhiting processors similar to Alternatives 4a and 2b. Shoreside whiting processors are granted an initial allocation of Qs, and this helps offset potential declines in asset values because of rationalization, as well as helping processors negotiate over ex-vessel processors with harvesters.

When combined with past, present, and future conditions/actions, Alternative 4b helps to replace some of the volume nonwhiting processors lost during the downturn of the nonwhiting trawl fishery beginning in the 1990s. This is expected to help nonwhiting processors decrease average costs and to provide opportunities for generating higher gross revenues through the added volume of groundfish species being landed. Shoreside whiting processors are impacted differently. Alternative 4b is expected to result in a decline in processing demand, thus reducing the value of processing capital and potentially leading to a contraction in the number of processing companies processing shoreside whiting. However, this effect is offset by the initial allocation of quota granted to shoreside whiting harvesters. This initial allocation acts as a capital asset, but also places processors in a position of influencing the manner in which harvest activities take place. This means that processors can use their quota to help influence the fishery in a way that allows them to more effectively respond to conditions that may change in the future, such as increases or decreases in opportunities in other fisheries and changing market conditions.

4.10 Mothership Processors of Trawl Groundfish

In this section, we describe the impacts of the alternatives on mothership processors of trawl-caught groundfish. This group is composed of offshore businesses that receive whiting directly from harvesters, and process the fish to make product forms that are usable at the wholesale and/or retail market level. In several cases, entities holding LE trawl permits may also operate motherships. Such entities are included among those examined in this section.

Trawl rationalization may result in a range of impacts to motherships, varying in extent and degree depending upon alternative. As a result of rationalization, it is likely that impacts to motherships will be distributed according to whether harvesters are issued Qs or form cooperatives, and the extent of subsequent consolidation of fishing and processing enterprises. Impacts may also occur based on the extent to which mothership companies gain and control Qs, or catch history, and/or whether linkages

are established between catcher vessels and motherships. The types of impacts to motherships and associated mechanisms relating to the trawl rationalization program are outlined in more detail below.

The section begins with a description of the metrics used to illustrate the effects on motherships. The variables and metrics used, some of which are also used in earlier sections, can be compared and contrasted among the alternatives. The broad-level effects of rationalization on motherships are presented next (page 451), which includes a discussion of important general issues associated with rationalizing the fishery.

Following the description of broad-level effects, we assess the impacts on motherships of the alternatives (page 455). This section begins by identifying the impacts that are expected to occur from each of the elements of the alternatives independently. We then provide an assessment of each alternative on motherships. Finally, we assess cumulative effects of rationalization on motherships. The combined effect of these past, present, and RFFAs are merged with the effect of the alternatives to arrive at the cumulative effect.

4.10.1 Methods for Assessing Impacts

The section describes the methodology we used for assessing the impact of rationalization on motherships, including the ways in which each of the expected impacts is measured and assessed. The potential impacts to motherships are measured as changes in economic performance, or profitability, of individual businesses, and changes in economic efficiency of the processing sector as a whole. Changes are initiated by at least 11 identifiable mechanisms, described in some detail in Appendix C, along with the methods anticipated for examining the impacts.

4.10.1.1 Potential Impacts, Mechanisms, and Metrics

Bargaining Power: The negotiating relationship between motherships and harvesters with respect to ex-vessel prices is a reflection of relative bargaining power. The alternatives would result, at one extreme, in 100 percent of Qs allocated to permits; in this case, mothership operations believe they will be at a relative disadvantage in setting ex-vessel prices. At the other extreme, issuing fishing Qs to motherships would, it is argued, guarantee that certain motherships would have access to product, above and beyond the Qs they may also receive as permit owners. This increased access to product could reduce a mothership company's need to compete in the marketplace for an independent harvester's fish. The establishment of a long-term linkage to mothership processors provides an additional dimension to bargaining power where there is a near balance between the buyer (mothership) and seller (harvester). A short-term, annual declaration provision establishes yet another potential outcome in the negotiations over prices. The effect of this declaration provision on price negotiations may be more akin to a situation where no allocation to motherships is made or where no long-term linkage provision is established.

The relative shift in bargaining power for motherships is assessed qualitatively. A review of the economic literature was presented above with particular emphasis on applications to fisheries or similar common property situations. The experience of other fisheries is also examined for any conditions that may be applicable.

Initial Distribution of IQ, Long Term Linkages, and Annual Declaration: The manner in which QS is initially distributed will have an effect on the mothership sector, especially if motherships receive Qs. The analysis of the initial distribution originates from two models: 1) a quantitative analysis of initial shares based on historic landings and 2) a delineation of processor ownership combined with

historic purchases of landed trawl-caught groundfish. Applying the distribution rules in each of the alternatives to the two models yields output that can demonstrate the patterns of initial QS holdings.

Long-term linkages will affect the bargaining relationship, as noted above, but could also affect how motherships respond to market conditions and how their operations encourage or influence harvester activities. A declaration process will operate differently than a linkage in terms of bargaining power, but will operate similarly to linkages when considering the ability for motherships to engage in short-term business planning.

Harvest Timing: The rationalization program will tend to slow the pace of derby-style fisheries in both the shore-based and mothership sectors of the whiting fishery. Currently, the timing and length of the whiting season is highly influenced by salmon bycatch regulations, timing of the Alaska pollock season in the North Pacific, in which both whiting harvesters and whiting motherships participate, and timing of other whiting sectors or other west coast fisheries. Harvest timing could affect motherships by lengthening the period of harvest somewhat and influencing the hiring and use of processor labor.

Barriers to Entry: At present, the mothership sector is fairly stable in size, because new entrants must overcome significant capital requirements, market structure, and established marketing relationships. In a rationalized trawl fishery, barriers to entry may be altered depending on whether the potential entrant has buying history or acquires QSs through gifting or purchase. Barriers to entry for motherships are assessed qualitatively.

Market Restructuring: The mothership sector is organized around fewer than 10 large or moderate-sized entities and their subsidiaries, and a smaller number operating in any one year. In a rationalized trawl fishery, some changes in the industrial organization of processing companies are anticipated, based on experiences found in other rationalized fisheries, including possible consolidation, joint ventures, other arrangements among motherships (horizontal integration), and arrangements between motherships and harvesters (vertical integration).

The qualitative analysis in this section began with a summary of the market structure developed as a part of Section 3.5. Changes in the market structure in other fisheries that have been rationalized were reviewed as part of that section. Finally, a discussion is included of the anticipated changes that may occur in the groundfish processing sector.

Quality of Landings: In addition to, and influenced by, harvest timing and elimination of the derby-style fishery is an improvement in the quality of landed fish. Harvesters have better opportunity to be more selective in harvests and to manage the harvested fish once on board in such a way as to retain higher quality. The quality could also be affected if the volume of individual landings is reduced. This could lead to generally higher prices received by harvesters, and the effect on motherships could be positive or negative, depending upon the motherships' ability to influence wholesale or retail prices with the higher quality fish. Motherships could also be positively affected if the better quality fish leads to new market opportunities. The analysis addresses these concepts qualitatively.

Processing Costs: In a rationalized fishery, the cost of processing could be affected in a variety of ways. Labor costs per unit of processed fish could be reduced if there is more uniform operation during the season or year, with fewer hires and layoffs and less overtime required. Other costs could be affected depending upon ability to open new markets or change operations. However, harvest timing and associated hires and layoffs are not likely to change as much within the mothership sector as it would among shoreside processors. These issues are discussed qualitatively.

Product Recovery Yield: The effect of harvest timing and quality of landings could positively affect product recovery yields. Reducing the derby-style fishery can lead to more careful management of the fish that are harvested and less waste. However, the motherships in the Bering Sea pollock fishery also participate in the Pacific whiting fishery. This same capital was streamlined and made more efficient as a result of the American Fisheries Act; therefore, further efficiency gains are unlikely, other than minor improvement in product recovery.

4.10.2 Broad-level Effects of Rationalization on Mothership Processors

Broad level effects to motherships from rationalization could include changes in bargaining power over ex-vessel prices, the quality of fish, timing of deliveries, and consolidation among motherships. There were generally three or four motherships active in the whiting fishery each year from 1998 through 2005, with a new entrant in 2006 that did not participate in 2007 or 2008. This means that a relatively small number of companies process whiting on motherships. However, the final processed products from the motherships enter markets where they compete with similar fish products originating elsewhere in the United States and other countries, and, therefore, have more competition in the final processed product market. In other words, mothership processors are generally unable to control market prices for final products.

Harvesters (catcher vessels) and mothership processors are in a dependent relationship, each specializing in certain elements in the supply chain that brings fish to the ultimate consumer. Rationalization will have direct and indirect effects on motherships, and the distribution of Qs (or catch history as is the case with a harvest cooperative structure) will have a direct effect on motherships by potentially altering the bargaining power between processors and harvesters over ex-vessel prices. Assignment of Qs to harvesters directly increases their bargaining power with processors if there is no assignment or linkage to a processor. The type of IFQs and cooperatives being considered here each institute a quasi-permanent harvest privilege assigned to the individual (or cooperative). Even though the harvest opportunity (QPs) must be exercised within the year, the underlying Qs renew the specified opportunity in the next year. IFQ holders even have the ability to sell their QPs and realize some gain from the harvest opportunity they do not exercise. This gives harvesters much greater latitude to hold out for better prices because they have a guaranteed harvest opportunity over a longer period.

QS ownership by motherships would tend to offset the gains for harvesters who may arise through allocation of Qs to harvesters, and bring the relationship closer toward status quo. For example, a processor could use Qs to induce a harvester that is short of QPs for a particular species to make deliveries under specified conditions and prices. At this time, it is unclear what balance of processor/harvester quota ownership would achieve status quo conditions.

Alternatives 3 and 4a implement harvester co-ops with linkages instead of IFQs; long-term processor linkages would have a direct effect on motherships in terms of bargaining power. A long-term linkage provision means that harvesting entities will negotiate with motherships in a sort of bilateral monopoly, essentially as two strong but countervailing powers. In some respects, the resulting negotiated price outcome is not predictable, because it depends upon the relative skill of the negotiators. However, there is some indication that the motherships and linked harvesters may establish profit-sharing arrangements. In that sense, the harvester-processor relationship can operate almost like a vertically integrated firm.

Alternative 4b (reflecting the Council's final preferred alternative) establishes a mothership declaration procedure that obligates deliveries from a catcher vessel to a mothership within a given year. This declaration procedure is short term (only lasts for one season) and can be changed by the catcher vessel

without penalty in the next year. This procedure establishes some business planning certainty to the mothership for the upcoming season, but provides little negotiation power over ex-vessel prices for the mothership compared to a case where no allocation of Qs is made to motherships or no long-term processor linkage exists. The difference in the price negotiation process is merely timing. Whereas price negotiations may be somewhat ongoing throughout a season in a fishery without linkages and without an initial allocation of Qs to motherships, price negotiations in a declaration process are likely to play out prior to the declaration being made. This negotiation is likely to be a relatively competitive process, similar to a case where no long-term linkages exist, and where no Qs are held by motherships. However, the fact that these negotiations may play out several months prior to the start of the season means that the type of outcome may be different than the outcome that would occur if those negotiations were occurring immediately prior to the start of the season, or during the season. Several months prior to the season, there is substantial uncertainty about what the markets will be and, therefore, what an appropriate ex-vessel price may be. Rather than negotiating over a particular price, the negotiations may be over how to share the profits associated with harvesting and processing. The outcome is likely to be one that favors the harvester, but there will be some certainty over the margins each entity can expect from engaging in mothership processing operations and catcher vessel activity.

Rationalization is likely to have some indirect effects on motherships through several fronts. Fleet consolidation would reduce the number of harvesters, thus lessening the motherships' influence over ex-vessel price negotiations by more closely aligning the number of harvesters with the number of motherships. Assignment of up to 50 percent of QS to mothership processors is a feature of Alternative 2c. This would have a countervailing effect because, as suggested above, motherships could use the Qs they control as leverage in forging agreements with harvesters. After trawl rationalization, entry of new motherships could be more difficult. First, they would have to establish business relationships with harvesters who—other things being equal—may be more inclined to deal with motherships with whom they have an existing relationship (but this disadvantage pertains under status quo). They could face a second hurdle if Qs are initially allocated to motherships or long term linkages are established; to be equally competitive they would need to purchase Qs, a cost existing motherships would avoid by any initial distribution, or they may have to entice catcher vessels away from their linked motherships, which can be difficult. A third hurdle exists in the form of the mothership licensing provision, which is another cost to entering the fishery that does not exist under current conditions.

An important effect of rationalization on the harvester side is to eliminate Olympic- or derby-style fisheries, because harvesters control an allocation that they may deploy at will. The mothership whiting sector remains a single, common quota-based fishery. With exception of the catcher-processor sector, which operates as a voluntary cooperative, the whiting fishery can be described as derby-style. To the degree that rationalization allows catch privileges to be assigned to individual harvesters or cooperatives that coordinate their behavior, landings could be more evenly distributed throughout the season. As a result, both the shore-based and mothership sectors should be expected to engage in operations over a longer period. Complete flexibility in the timing of landings is mitigated by regulatory measures to limit the bycatch of salmon and vessels' participation in the Alaska pollock fishery. Chinook salmon bycatch is controlled to a large degree by the May 1 start date; participation in the Alaska pollock fishery will likely induce at least some participants to leave the fishery before the whiting are no longer available to the fishery in late fall or winter.

Currently, the mothership season starts in May and typically lasts about a month, when the motherships depart to participate in the Alaska pollock B season beginning June 10. It is not unreasonable to assume that under rationalization, the MS whiting fishery would turn into two ad hoc seasons with some effort occurring in May and a second effort occurring in September or October, after the pollock B season and/or shoreside whiting season. This may occur because salmon bycatch increases late in the

pollock B season. In addition, literature has shown that the value of whiting increases later in the year. More certainty about autumn fishing opportunities under a rationalized fishery should provide opportunities to capitalize on this value, which should influence the timing of the mothership sector. Figure 4-48 demonstrates one possible seasonal distribution of mothership activity in a rationalized fishery. This is based on the same current seasonal distribution as in the catcher-processor sector, except that it is assumed the mothership participants move to shoreside whiting or Bering Sea pollock in July and August, but return in September.

One important consideration in the figure below is the reduction in peak harvest volume under rationalized conditions. Under status quo conditions, over 50 percent of the sector allocation is caught during the month of May. Sufficient capital must be present in the fishery to process that volume. Under rationalized conditions, that peak harvest period may be reduced and more catch may come in at other times of the year. This reduces the overall need for processing capital in the fishery and is one source for possible mothership sector consolidation. If the information shown in the figure is consistent with eventual harvest timing, then the amount of capital necessary in the fishery could be reduced by almost one half. This will tend to have an effect on the value of mothership capital currently present in the fishery as surplus capital will exist after rationalization. Other things being equal, this surplus availability will tend to reduce the value of mothership assets in the fishery.

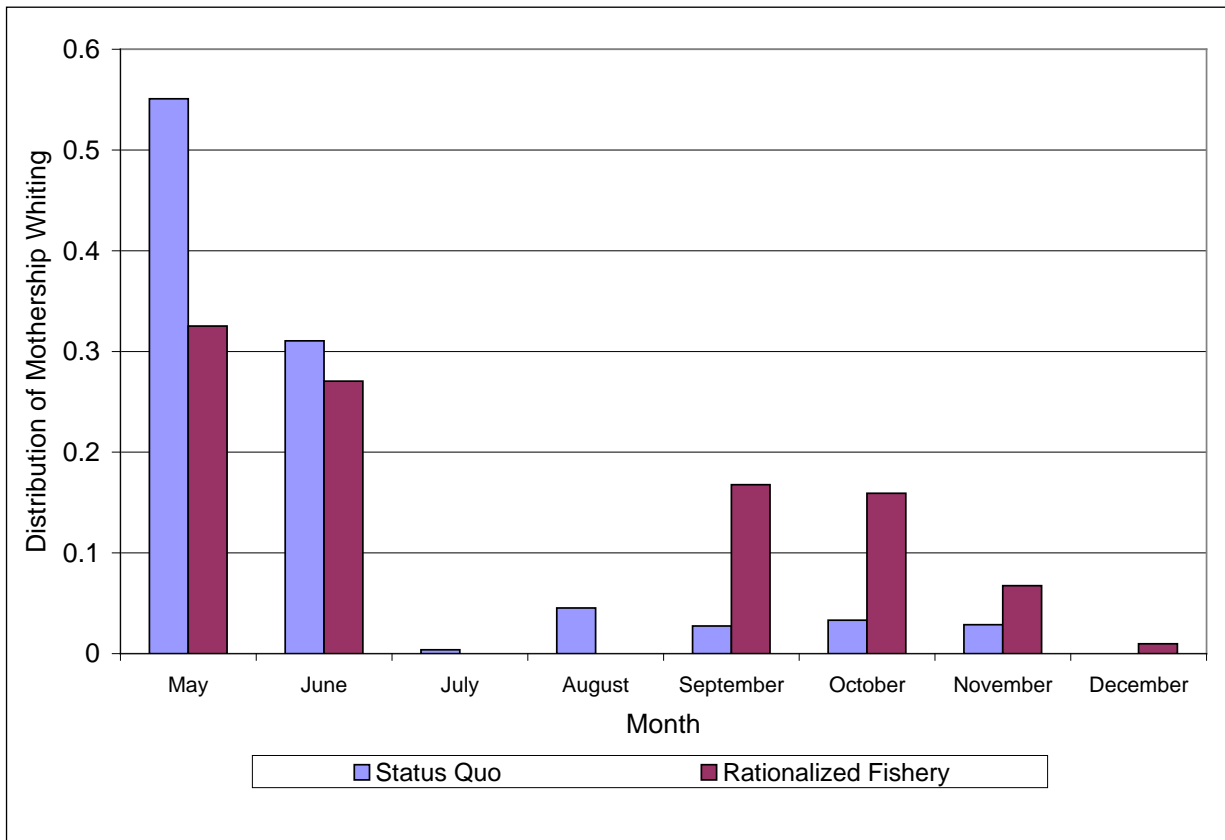


Figure 4-48. Estimated seasonality of mothership whiting harvests.

Rationalization should allow harvesters the opportunity to increase the quality of landed fish, because a more measured pace of fishing will allow more attention to factors affecting quality. This could benefit motherships by assuring a stable, high quality supply, which would make it easier to maintain existing

markets and develop new ones. With more stability in catches, harvesters and motherships may be able to coordinate to develop new products and markets.

In a rationalized fishery, the cost of processing on motherships could be affected in a variety of ways. Labor costs per unit of processed fish could be reduced if the season elongates and fewer motherships may be needed to handle the harvested volume. It is likely that the season will still be compressed to some degree because of constraints within the pollock fishery, the shoreside whiting fishery, and the availability of whiting. Therefore, any mothership engaged in processing operations is likely to be fully engaged, though fewer motherships may be necessary if the season is extended.

Regular supply could also increase product recovery. Although equipment in the mothership sector has been modified by the implementation of the American Fisheries Act in the Bering Sea, rationalization could result in better use of existing capital equipment and labor. Workers could have the opportunity to cut fish more carefully; likewise, equipment could be more easily adjusted to maximize yield. Since whiting is a high volume fishery with a generally highly processed end product, small changes in product recovery yield can lead to a substantial increase in profits. Initial allocation of QSs to motherships, functioning as a means of guaranteeing supply, could provide an incentive to make further adjustments to increase product recovery.

To the degree that IFQs or cooperatives allow harvesters to time landings and coordinate with motherships, rationalization could allow motherships to better respond to changing market conditions along with the ability to develop new markets. Markets respond favorably to uniformity and predictability, and stronger guarantees of steady product deliveries could increase market penetration and the building of stronger relationships with retailers.

As noted above, a rationalized trawl fishery could create new opportunities leading to a restructuring of the overall processing sector, based on the experiences from other rationalized fisheries. Either through consolidation by direct purchase or joint ventures, integration could increase. This includes both horizontal integration—business arrangements among motherships—and vertical integration—arrangements between motherships and harvesters.

An initial allocation of QSs to motherships could also stimulate horizontal and/or vertical integration. First, QSs are likely to encourage consolidation, because firms that are more efficient are willing to buy up QSs owned by less efficient firms. This could occur among processing firms or processing firms could buy up harvesters' QSs (and their physical assets, such as vessels) increasing vertical integration. Depending on the availability of capital, the converse could occur; harvesters who are more efficient could buy up motherships' QSs (and/or their physical assets) to vertically integrate. In general, such consolidation or integration would be encouraged by any resulting returns to scale: increased size and integration across a range of operations would serve to reduce overall costs. Joint ventures serve much the same purpose while retaining existing ownership arrangements.

New motherships entering the whiting sector must overcome barriers to entry, such as meeting the considerable capital requirements required to constitute physical plant and cover operating costs (depending on initial cash flow) and competing with existing motherships to establish business relationships with harvesters, which could require paying higher ex-vessel prices in order to lure harvesters away from their current buyers.

4.10.3 Direct and Indirect Effects of the Alternatives on Motherships

This section analyzes the direct and indirect effects of the alternatives on mothership processors. It begins with an overview of how each of the key elements of the alternatives is expected to impact motherships. The alternatives are evaluated in the remaining subsections, with a comparison to status quo and other alternatives, as appropriate.

4.10.3.1 Expected Effects of Elements of the Alternatives on Mothership Processors

Each of the alternatives will impact motherships in each of the sectors in different ways. Before considering the impacts of the alternatives, we first examine how the elements within the alternatives are expected to impact motherships in a general sense. Following this discussion, we examine the impact of each alternative on motherships.

How do IFQs and co-ops change general operating conditions relative to status quo?

IFQs are likely to decrease the number of harvester vessels and as a result decrease the bargaining power for motherships relative to status quo. IFQs may increase operational flexibility for processors, including motherships, compared to status quo. With potentially greater certainty to harvesters and (in some cases) motherships afforded by Qs, motherships can better plan and more efficiently utilize their facilities. However, bargaining power for ex-vessel prices may shift toward harvesters. With long-term mothership linkages, the negotiation environment will change to one that may be akin to a bilateral monopoly, with essentially balanced power. The co-op also provides an opportunity for mothership owners to establish profit-sharing arrangements with the co-op(s) members, even operating in a vertically integrated partnership. A cooperative system with a mothership declaration process will establish some business planning certainty for motherships, but are likely to act similar to a case where no linkages exist, and/or no motherships hold Qs, when negotiating over ex-vessel prices.

Increased flexibility and certainty over fish for processing can lead to more uniform timing, better product quality, higher recovery yield, and possibly decreased operating costs. This is because whiting processing capital is structured to account for larger pulses of fish consistent with a seasonal race for fish; under a quota system, harvest timing is more controlled, and some capital (i.e., the number of motherships operating at any given time) may not be necessary. This provides opportunities for motherships to have lower per unit costs and, therefore, additional profit.

How does initial allocation of Qs to harvesters make things different for motherships?

Consolidation among harvesters will concentrate Qs, among fewer entities, and as a result decrease the bargaining power for motherships relative to status quo. This occurs because there are fewer harvesters to negotiate with, meaning the relative bargaining position of each harvester has improved, simply because he/she harvests a greater portion of the catch and influences a greater portion of the fishery.

Allocating the entire Qs, to harvesters may allow them to leverage higher prices from motherships. However, many of the relationships that exist between harvesters and processors in the mothership sector appear to be an extension of those in the BSAI pollock operations, meaning ex-vessel price negotiations may be a function of relations in the BSAI pollock fishery.

Initial allocation of Qs could affect some long-term harvester-processor relationships if the distribution of Qs results in smaller allocations to entities than what those entities harvest under status quo levels.

How do mothership initial allocations, long-term linkages, and annual declaration requirements affect motherships?

If motherships receive initial allocation of Qs, then motherships will regain at least some of the bargaining power over ex-vessel prices potentially lost to harvesters, relative to the case where no initial allocation is made to motherships. Motherships with an initial allocation can vertically integrate and engage in fish harvesting opportunities to some degree independent of other harvesters. This increases the ability of motherships to hold out against harvesters while negotiating over ex-vessel prices.

An initial allocation of Qs, or a long-term linkage to motherships, allows motherships to gain increased flexibility for matching catch periods to market demand, and elongating the season for optimal processing efficiency. The mothership sector may evolve into a two-period whiting season. This creates opportunities for lower per unit costs; in combination with expanded market opportunities, this may increase their ability to compete with groundfish providers in the global market.

If harvesters have long-term linkages with motherships, the net effect on ex-vessel prices is likely to be more beneficial to the mothership compared to a case where no linkage or no initial allocation of Qs is made to motherships. The outcome of prices in this case may depend heavily on personal relationships and negotiation skill. In addition, a processor linkage does not decrease the quota available to individual harvesters and, therefore, does not give motherships direct control over harvesting activity.

An annual declaration requirement provides motherships with some business planning certainty in the upcoming season. Motherships do not receive much negotiation power over ex-vessel prices in this alternative because those prices will merely be negotiated in a competitive process prior to the deadline for the declaration. However, negotiations take place in advance of the season, when future market conditions are not known by either buyers or sellers; this may lead to profit sharing arrangements—rather than negotiation over an absolute ex-vessel price—to account for unforeseen price swings in the final product market.

An initial allocation of Qs, or catch history, can act as an asset or a vehicle with which mothership entities can generate revenue. If consolidation occurs among motherships, the entities who own motherships that are consolidated out of the fishery can replace the revenues previously generated by mothership processing activity with the sale or lease of that IFQ.

How will accumulation limits affect motherships?

Accumulation limits generally restrict control and consolidation among motherships. A limit on fleet consolidation will tend to reduce economic performance of harvesters, but will also reduce the likelihood of vertical integration among mothership companies.

Control limits also affect the ability of the mothership sector as a whole to increase the amount of Qs held by motherships. This will have a long-term effect on ex-vessel prices because lower limits will mean fewer Qs held by motherships and, therefore, less leverage over price negotiation. A restriction on control will tend to limit the degree of influence that the largest motherships will have on the program and will, therefore, affect the distribution of economic performance.

A usage limit will restrict the amount of whiting that a single mothership can purchase in a year. This has the effect of ensuring a minimum number of motherships in a given year and restricting the degree of consolidation that could occur among motherships.

How will a grandfather clause affect motherships?

A grandfather clause tends to have a distributional effect on motherships if they stand to receive an initial allocation of QSSs. The current participants have historically been moderate to large producers, and some could stand to gain QSSs in excess of the accumulation limits if the accumulation limits are relatively small, a grandfather clause is adopted, and an initial allocation is made to motherships.

If large processing entities receive QSSs in excess of the accumulation limits, this may have an effect on ex-vessel prices. This is because it creates the potential to have few dominant companies that hold large amounts of QSSs.

How does the number of species covered affect motherships?

The number of species covered will affect harvesters directly, and motherships indirectly. As the number of species covered in the program increases, harvester flexibility decreases and this may have an effect on the outcome of the program. Species with low OYs (ACLs) may impose risk to harvesters because of the uncertainty associated with what a vessel will catch while fishing and the cost of going into deficit (Section 4.6.2.4). This risk may affect fishing behavior that can have a secondary effect on motherships if such behavioral changes influence harvest timing or harvest volume.

How does the number of trawl sectors influence motherships?

The number of trawl sectors (three or four) is not likely to affect mothership processors, as they would remain in their own sector under any alternative.

How will an adaptive management provision affect motherships?

The adaptive management provision provides a mechanism to mitigate harm to adversely impacted motherships or to achieve other objectives as may be specified by the Council, such as bycatch reduction or community protection. Awarding adaptive management quota to adversely impacted mothership companies is likely to have a distributional effect, with some motherships receiving that quota and being able to capitalize on the opportunities that holding that quota provides.

If motherships are awarded an initial allocation and therefore cannot be recipients of adaptive management quota (which is one option explored by the Council), adaptive management will provide a distributional effect. Much of this effect may be via a second-order effect through direct effects on harvesters. This is because most motherships potentially operating in the fishery under rationalization would, available data indicate, also receive quota. Therefore, if an initial allocation is made to motherships, adaptive management may be provided only to harvesters. Depending on which harvesters receive that adaptive management quota, the motherships that receive those deliveries could stand to gain indirectly.

Adaptive management could provide a vehicle for entry of new motherships, aid in development of specialty processing opportunities addressing niche markets, or create goal-oriented processor-harvester arrangements.

How will area management affect motherships?

Area management, as envisioned, is not expected to affect motherships because they are restricted to operating entirely in the northern area and the envisioned area management option would not split this area into smaller divisions.

How will a carry-over affect motherships?

A carry-over provision decreases the cost to harvesters of going into deficit, and, therefore, decreases the risk associated with harvesting activity. Such a change in risk may mean that harvesters are willing to prosecute fishing activity in a manner that is somewhat more risky. This will have a limited secondary effect on motherships.

How will tracking and monitoring affect motherships?

At-sea-monitoring primarily affects the cost of fishing. Since this cost is internalized within a mothership operation, it could have some effect on profitability.

4.10.3.2 Alternative 1 (No Action)

The No Action alternative is expected to result in a continuation of the present status of the mothership processing industry. Harvest timing is anticipated to be highly concentrated into the May and June period, with little harvest occurring after that time. While revenues generated by mothership harvesters are not readily known, it is generally believed that the amount of mothership processing capital in the fishery is more than what may be the case in a rationalized fishery, particularly if the season becomes elongated in a rationalized fishery.

4.10.3.3 Alternative 2a

The effect of Alternative 2a on mothership net revenues is unclear in absolute terms. In relative terms, Alternative 2a is less beneficial to motherships than many other alternatives. Ex-vessel prices paid to harvesters are generally expected to increase under this alternative compared to the status quo, primarily because most of the quota is distributed to harvesters, increasing costs for motherships via price negotiation and higher prices paid for whiting. Under a rationalized fishery, the holders of the Qs generally hold the value of the fishery because of their ability to bid away profits from others. However, ex-vessel price negotiations among motherships and harvesters may be driven by whiting allocations, but also relations in BSAI pollock fishery. On the other hand, it is likely that other factors will lead to increased gross revenues for the mothership sector as a whole. Since rationalization provides greater certainty, it is reasonable to expect that some mothership sector operations will occur during the fall months and literature has shown that whiting are more valuable later in the year (Larkin and Sylvia 1999). Therefore, while motherships may pay higher ex-vessel prices to harvesters for whiting, the revenue generated from Pacific whiting may increase if fishing activity occurs later in the year. Therefore, there is reason to believe that motherships will pay more for acquiring fish from harvesters, but they may also receive more for their finished product. This makes the overall effect on mothership net revenues unclear, but relatively worse off than other action alternatives.

Under this alternative, Qs is given to harvesters based on catch history. As noted above (Section 4.6.2.2, page 297), rationalization will lead to consolidation among the harvester fleet, and harvesters remaining in the fishery will have a stronger position from which to negotiate (and if necessary, hold out) for ex-vessel prices without fear of losing harvest opportunities to others. In addition, the fact that the harvesting sector has control over the Qs means that the fishery is more likely to be prosecuted in a manner that benefits harvesters. Harvest activities are bounded by resource accessibility and the seasonality of other fisheries, particularly Alaska pollock in the North Pacific, and shoreside whiting opportunities on the west coast.

The fishing season is expected to lengthen to some degree under a rationalized fishery. This change in the pace of harvesting will tend to increase product quality and therefore increase the value of Pacific whiting harvests. However, since the holders of Qs are able to bid away profits from others, it is likely that harvesters will bid up higher ex-vessel prices, thus eroding potential gains in profits to motherships that would otherwise occur because of changes in product quality. The longer season may also require less processing capital to handle harvest volumes. Such a decrease in processing capital is likely to decrease the per-unit cost associated with processing, thus generating higher profits. However, since harvesters control the majority of quota in this alternative, some or all of those profits are likely to be bid away from the mothership sector toward the harvesting sector in the short run.

Because they would not receive an initial allocation, mothership companies would be worse off under Alternative 2a than Alternatives 2c, 3, or 4a. Mothership processors would also be worse off under Alternative 2a than under Alternative 2b, which has a provision for adaptive management that could be used for mitigating effects. It is also expected that motherships could be made worse off under Alternative 2a than Alternative 4b. While the effect of price negotiations may be similar under both alternatives, Alternative 4b affords motherships the ability to plan more effectively for the upcoming season, and therefore to control costs to a greater degree.

The negotiation power over ex-vessel prices may shift from motherships to harvesters, at least in the short run, in Alternative 2a relative to status quo. Over the long term, however, motherships may be able to acquire enough Pacific whiting quota to influence ex-vessel prices. In addition, under the initial allocation provision, some processing entities will receive an initial allocation of quota because they own LE trawl permits. Compared to Alternative 4b, Alternative 2a also lacks an annual mothership declaration that is required of vessels under Alternative 4b, leaving them without the commitment certainty of harvest necessary for advance planning.

The distribution of rationalization's effect may be somewhat positive to some mothership owners and overall negative to others. If the season elongates and less mothership capital is necessary, then it is reasonable to expect some consolidation to occur among motherships. Those who stay in the fishery stand to see their total production increase as they handle more volume, and this tends to reduce average costs. Those motherships that are consolidated out of the fishery stand to lose a stream of revenue that they generate under status quo conditions and may also experience decline in the value of their assets.

4.10.3.4 Alternative 2b and 2c

Many of the provisions under Alternatives 2b and 2c are similar to those of Alternative 2a, but Alternatives 2b and 2c compare two methods for addressing processor concerns. Alternative 2b includes an adaptive management provision to mitigate against adverse impacts to mothership companies.¹⁰⁹ Such a program is likely to benefit those companies that are recipients of this quota, although it may not yield the most efficient outcome in terms of the national economic gains expected from rationalization.

Alternative 2c includes a second method: initial distribution of Qs to motherships in the form of 50 percent of whiting QS. This alternative will have a distinctly positive effect on motherships relative to Alternative 2a in terms of their bargaining power over ex-vessel prices. Without an allocation of quota to motherships, harvesters with Qs will gain bargaining power because of their holdings of Qs, but also through fleet consolidation. Such fleet consolidation limits the number of vessels that can

¹⁰⁹ As noted in a previous section, the suite of alternatives allows the adaptive management provision to be used for things other than for processor concerns, such as to mitigate the effects on adversely impacted communities and to provide incentives to use habitat- and bycatch-friendly gear.

negotiate with mothership companies, and therefore limits the ability of motherships to shop around for harvesters willing to fish at lower ex-vessel prices. If motherships begin with some initial allocation, they can vertically integrate and also engage in harvesting opportunities (if they own catcher vessels) to some degree independent of other harvesters. This increases the ability of mothership processors to “hold out” against harvesters while negotiating over ex-vessel prices. It is almost certain that the ability for mothership processors to negotiate lower prices increases as their ownership of quota increases and a 50 percent initial allocation is substantial.

An adaptive management provision may place downward pressure on ex-vessel prices. If used as envisioned, such an AMP will tend to assist certain (disadvantaged) mothership companies. However, this is true only if harvesters are prosecuting whiting subject to adaptive management, which comprises 10 percent of the Qs. A limit on the number of potential buyers may have a downward effect on prices paid for the adaptive management fish. However, the adaptive management provision is not likely to impact ex-vessel prices to the same degree as initial Qs to motherships, simply by virtue of the difference in volume attributed to motherships.

Over the long run, mothership companies may continue purchasing Qs in the whiting sector because of the relatively large size of the control limit. The 25 percent control limit specified for both the shoreside and mothership whiting sectors means that four entities could theoretically control the harvest of whiting in both sectors. This means that over time, ex-vessel prices in the shoreside whiting sector may fall to some degree since mothership companies have the ability to acquire additional quota, vertically integrate, and hold out against independent harvesters for more favorable prices.

If motherships are initially allocated Qs (Alternative 2c), they may play a greater role in directing the timing of harvests, since they could enter into harvest contracts that include strategic delivery times. In addition, initial allocation of Qs to motherships could enhance their ability to create joint ventures or other arrangements among motherships (horizontal integration) and between motherships and harvesters (vertical integration).

4.10.3.5 Alternative 3

For the mothership whiting fishery, Alternative 3 differs considerably from Alternatives 2a through 2c in that harvest cooperatives are established. The major effect on motherships is primarily in terms of the negotiating relationship over ex-vessel prices. With a long-term mothership linkage, the fishery could behave similarly to a bilateral monopoly, with a set of reasonably balanced buyers and sellers. The effect on bargaining position and the change in ex-vessel prices cannot be predicted, because it largely rests upon personal relationships and the bargaining skill of the negotiators. As noted above, the whiting ex-vessel price negotiation may be a function of relationships established between motherships and harvesters in a number of fisheries, including BSAI pollock.

There is a 20 percent accumulation limit with Alternative 3, the effect of which is to guarantee at least five motherships will operate in the sector. This is a smaller accumulation than any of the other alternatives, meaning that multiple motherships will remain in the fishery, and consolidation among mothership companies is not likely to occur. This is beneficial to some mothership companies that may stand to be in a position of being consolidated out of the fishery, but may not be beneficial to some other companies that are in a position of growing under a rationalized fishery.

Alternative 3 features an adaptive management provision. The adaptive management provision could be used to mitigate adverse impacts to mothership companies or communities. It could also be used to encourage gear switching or the development of gear with lower bycatch. Depending upon the objective of those administering the quota, the distribution of effects is likely to vary. An adaptive

management provision may place downward pressure on ex-vessel prices. However, this may only be true if harvesters are prosecuting groundfish subject to adaptive management, which comprises 10 percent of the QSs.

The relationship between harvesters and motherships that is formed through co-ops for harvesters in this alternative is different from the relationship established by issuing both sectors QSs, as in Alternative 3b. The ex-vessel prices that result through a harvester-processor linkage in the mothership sector could be different from the negotiated ex-vessel prices when both harvesters and motherships receive QSs. Harvesters and motherships that receive QSs can buy QSs from, and sell them to, a large number of potential entities; in contrast, harvesters and motherships in a cooperative structure with a linkage are bound to one another (though the linkage can be broken with some effort). This linkage means that negotiation and relationships between the harvester and motherships could have some influence over ex-vessel prices in the short term. Over the long term, harvesters and motherships can break that arrangement if the harvester fishes in the “noncooperative” portion of the fishery, though this fishery is a competitive, derby-style fishery, which makes it unattractive and arguably less profitable. Though there is an ability to break the linkage and seek higher prices elsewhere, doing so may be costly, meaning there is an ability for the linkage to influence matters over a long term.

The distribution of harvest opportunities under a cooperative structure with harvester-processor linkages is, in many respects, more similar to Alternative 2a, with 100 percent of the initial allocation going to permits, than to Alternative 2c where an initial allocation is made to both harvesters and motherships. This is because under a cooperative system with processor linkages, the harvester still controls the opportunity to harvest the available quantity. That quantity is not made available to motherships, as would be the case if QS was allocated to motherships.

As rationalization provides opportunities for the season to become elongated, there is a subsequent opportunity for consolidation of both harvesting and processing capital to occur. Those motherships that grow their production volume as a result of that consolidation are likely to see some reduction in their average costs as more product is produced over a given amount of capital. However, the mothership limits under this alternative make much mothership sector consolidation unlikely. A long-term mothership linkage has the potential to operate in a way that allows motherships facing consolidation out of the fishery to replace some of that value by selling their permit and associated linkages to another entity. In this way, the mothership permit with linkages acts as a type of asset that can be used to replace some of the revenue they may lose by being consolidated out of the fishery. In other words, long-term linkages to a mothership permit can take on some aspects of a resource access privilege because those linkages are somewhat difficult to break and are tied to a transferable permit. Since there are no limits on the number of mothership permits an entity can hold, mothership entities remaining in the fishery can acquire the permits of other entities which have consolidated out of the fishery (so long as they remain within accumulation limits). The linkages associated with that permit would remain, and those catcher vessels would be obligated to the new entity (unless the catcher vessel elects to fish in the noncooperative fishery and break that linkage). Therefore, while linkages may not act as an asset in the same way that IFQ may, there are some similarities that allow holders of mothership permits with linkages to sell that permit and associated linkages to offset some of the loss in revenues they may face by consolidating out of the fishery.

4.10.3.6 Alternative 4a

The elements in Alternative 4a reflect some features in Alternatives 2a through 3. Alternative 4a differs primarily in the results of the initial allocation formula, the presence of a grandfather clause, and the lack of an initial allocation to motherships but a 50 percent linkage of whiting. Other elements of this

alternative differ, but do not appear to have a noticeable effect on the outcome. A 30 percent accumulation limit means that at least four motherships will operate in the sector.

In Alternative 4a, motherships have a 50 percent linkage with harvesters, in contrast to the 100 percent linkage in Alternative 3. This disadvantages motherships in terms of ex-vessel prices (relative to alternative 3), because harvesters have an opportunity to seek better pricing arrangements for half their quota, rather than being tied to a single mothership. However, because it appears that relationships in the mothership sector are often extensions of relationships that exist in the Bering Sea pollock fishery, and because relatively large degrees of vertical integration are present in the mothership sector, the level of affiliation may not have a large effect on many mothership-catcher vessel relationships. However, because there are relationships between motherships and catcher vessels that do appear to be independent of relations in the pollock fishery, a lesser degree of processor affiliation will tend to disadvantage motherships in those negotiations relative to Alternative 3.

Those motherships that grow their production volume are likely to see some reduction in their average costs as more product is produced over a given amount of capital. For those motherships that consolidate out of the fishery, the linkages established in Alternative 4a may act similarly to Alternative 3, but the value of the permits is likely to be lower, because there is less catch history linked to that permit and, therefore, less certainty over deliveries to that permit. Therefore, for those motherships that attempt to replace some of the lost revenues as a result of being consolidated out of the fishery, the sale of their permits will fetch some replacement value, but probably not as much revenue as under Alternative 3.

4.10.3.7 Alternative 4b (Preferred Alternative)

Alternative 4b is intended to reflect the Council's final preferred alternative for rationalization of the LE trawl fishery. The Council's final preferred alternative as it applies to motherships includes several key components that are not found in the other alternatives. The initial allocation formula for catcher vessels is based on a longer qualification period (1994 to 2003) than the other alternatives. The formula is based on relative history rather than absolute history, there is an annual mothership declaration procedure rather than a mothership linkage and a usage limit that restricts the amount of whiting a mothership can purchase and process from catcher vessels in a given season. The elements that are expected to most impact motherships are the declaration procedure and the usage limit. Generally speaking, the mothership declaration procedure has some advantages over Alternatives 2a and 2b, but does not appear to be as beneficial to motherships as any of the other non status quo alternatives as it appears to be far less beneficial to the mothership than a long-term linkage provision. It also appears to be less beneficial than an initial allocation of Qs of 50 percent since such an allocation is far more secure than a linkage. It is not immediately clear how this alternative stacks up to the No Action alternative when viewed at the individual mothership level, though this option will result in greater efficiencies at a broad level through reductions in average costs for example.

The one benefit of the declaration procedure is that motherships will have some degree of certainty prior to the start of the season regarding from which catcher vessels they can expect to receive deliveries, and by extension, the amount of catch they might be expected to receive from those catcher vessels. This enables motherships to plan accordingly by purchasing adequate supplies for processing and packaging the fish, as well as acquiring adequate markets for selling the final processed product. This enables motherships to more effectively manage costs and develop more optimal business plans. It is unlikely that the declaration procedure will favor motherships to much degree when negotiating over ex-vessel prices. While the mothership and catcher vessel declaration is established prior to the season starting, ex-vessel price negotiations are likely to play out in a competitive process prior to the declaration being made. Since there are no penalty provisions for switching a different mothership in a subsequent year,

the mothership gains little to no power over price negotiations and other matters from the declaration provision as the catcher vessel can simply move in a subsequent year if it is unhappy with the relationship. This differs from a linkage provision where a vessel must participate in the noncooperative portion of the fishery in order to break the linkage. Since participating in that mode is arguably less beneficial to the catcher vessel, the mothership gains some negotiation power through the long-term linkage provision, while it does not gain much through a declaration process (though it does gain some business planning certainty that helps manage costs). However, as noted above, the negotiations in a declaration procedure are likely to result in a profit sharing arrangement rather than an absolute ex-vessel price in order to hedge against possible future swings in the market.

The accumulation limits under Alternative 4b establish a 45 percent usage limit for motherships. This usage limit is expected to allow for some consolidation of mothership activity, but will ensure that there are at least three motherships in any given year (assuming the entire mothership sector allocation is attained). This allowance for growth may benefit some companies, while adversely impacting others. If one company is able to grow operations to the full 45 percent level, some other companies will necessarily see a reduction in their volume. The mothership that is able to grow operations will be able to flow more production over a given platform (which reduces average costs), while other companies will see a reduction or elimination of deliveries (which increases average costs). In some cases certain motherships may elect to leave the fishery because there will likely be a reduction in the amount of capital necessary to process fish caught in the fishery. Consolidation among mothership operations would allow for a more cost efficient utilization of remaining capital. In any case, those companies that do not grow stand to lose volume and, thereby, lose a stream of revenues to which they have access under status quo conditions. Since motherships do not receive an initial allocation of catch history or a long-term linkage (which, if constructed in a certain way can act as a capital asset), those motherships simply lose revenue. While some of that revenue could be replaced with a sale of the permit, that permit will only have value of the purchaser believes that its purchase will provide him/her with a source of revenue. This is compared to a case where consolidation of mothership activity occurs under an alternative where motherships receive an initial allocation of catch history. In a case where motherships receive an initial allocation, they may still leave the fishery, but the revenue from selling or leasing that catch history can offset the revenues lost from leaving the fishery. Finally, while such consolidation could occur under status quo conditions, it seems more likely that consolidation will occur under rationalized conditions because of the enhanced ability for season timing to elongate under a rationalized fishery, reducing the need for much of the capital present in the fishery under status quo where large peak harvest volumes must be accommodated.

Under Alternative 4b, only selected species, rather than all, would be allocated catch history. In addition, at-sea bycatch would be allocated at the co-op level. The fact that mothership catcher vessels would not be responsible for the catch of some rarely encountered species, such as nearshore species and several types of flatfish, means that the probability is reduced of such an encounter prematurely closing the mothership whiting fishery. This means that the expected catch levels in the fishery are more likely to be realized from year to year in the mothership sector under Alternative 4b than Alternatives 2 and 3 because the risk to the fishery posed by catch events of infrequently caught species is reduced.

4.10.3.8 Comparative Summary of the Effects of the Alternatives

Alternative 1	<ul style="list-style-type: none"> Continued overcapitalization as a result of short season.
Alternative 2a	<ul style="list-style-type: none"> Higher cost of purchasing fish from harvesters compared to status quo. Potentially lower cost of production as a result of season extension.
Alternative 2b	<ul style="list-style-type: none"> Select, adversely impacted motherships receive quota through adaptive management, minimizing disruption of activity. Motherships that are not recipients of adaptive management quota may be affected similarly to Alternative 2a. Potentially lower cost of production as a result of season extension.
Alternative 2c	<ul style="list-style-type: none"> Motherships pay lower prices for fish from harvesters than in Alternative 2a. Potentially lower cost of production as a result of season extension. Motherships consolidated out of the fishery can replace that revenue stream through the sale or lease of IFQ.
Alternative 3	<ul style="list-style-type: none"> Motherships may pay lower prices for fish than in Alternative 2a, or may enter into profit-sharing arrangements with harvesters. Potentially lower cost of production as a result of season extension. Motherships consolidated out of the fishery may be able to replace some of their lost revenue by selling permits with linkages attached to them..
Alternative 4a	<ul style="list-style-type: none"> Motherships may pay lower prices for whiting than Alternatives 2a and 3a; some motherships may pay higher prices for whiting from some catcher vessels. Potentially lower cost of production as a result of season extension. Motherships consolidated out of the fishery may be able to replace some of their lost revenue by selling permits with linkages attached to them, though the value of those permits is likely to be less than in Alternative 3..
Alternative 4b	<ul style="list-style-type: none"> Higher cost of purchasing fish from harvesters compared to status quo, but similar to Alternatives 2a and 2b. Potentially lower cost of production as a result of season extension and reduced need for processing capital. Motherships that grow production may capitalize on new opportunities. Motherships that are consolidated out of the fishery may lose revenue that they generate under status quo conditions. More certainty over annual operations than Alternatives 2a and 2b through the declaration provision. More certainty over harvest volumes than Alternatives 2a and 2b due to the select set of species for which harvesters have catch history.

4.10.4 Cumulative Effects on Motherships

The effect of the alternatives on motherships is combined with past actions, current and future trends, and RFFAs to derive the cumulative effect. Each of these effects is measured using the potential impacts identified in Table 4-55, which include the (cumulative) effect on the net revenues for motherships of trawl-caught groundfish. This cumulative effects analysis uses the analysis contained in the section describing broad level effects of rationalization as well as the effects described in the analysis of alternatives.

4.10.4.1 Overview of Past Actions and Trends Affecting Motherships

Various past fishery management measures and other exogenous trends have affected motherships and other processors and have been instrumental in shaping the present structure of the industry. Many of these measures and trends were discussed in Chapter 3 and in the section on cumulative effects on trawl harvesters; the details can be found there. Some of the noteworthy details affecting motherships in particular are identified here in brief.

Harvest restrictions started to become prominent during the 1980s due to concern about depressed stocks. MPAs were implemented during the last decade, which closed off wide areas to trawl harvesters. Harvest levels and revenues for nonwhiting harvesters declined, and the industry found itself over-capitalized. Many were unable to cover fixed costs of vessel ownership. The 2003 trawl vessel buyback program had the effect of reducing harvest participants, including catcher vessels, and improved the viability of remaining harvesters. This reduced the number of motherships participating in the fishery because they rely on a minimum threshold number of vessels to remain viable.

A different picture has emerged within the Pacific whiting industry. Processor innovations helped to develop high quality surimi from Pacific whiting, largely for export to the Far East, and the domestic industry began to take hold in the 1980s and 1990s. A setback in the early 2000s was the result of an overfished declaration and concern over Mad Cow disease (Pacific whiting surimi producers used beef plasma in the production of surimi). Recent changes in processing methods and products have led to resurgence in the industry, considerably higher prices, and new entrants among mothership processors. There has also been greater Council involvement in harvest restrictions, including Amendment 15, which limited access to specific sectors of the whiting fishery.

A significant factor affecting the participation of motherships is the conditions and trends associated with the BSAI groundfish fisheries, particularly Alaska pollock. Rationalization of the BSAI pollock fishery in the 1990s, combined with increased demand and improved profitability conditions there, has had an important influence on the timing and participation of those motherships in the west coast whiting and nonwhiting fishery.

4.10.4.2 Trends and Actions Influencing Motherships

A number of exogenous trends are influencing the operating environment for mothership processors. The combined effect of these trends and actions become the cumulative effect of rationalization on shoreside processors. They are discussed in this section and include the following:

- Changes in use of ocean areas
- Increased protein demand and production costs
- Increased consideration of demand for ecosystem-wide fishery management approaches
- Increased public awareness and scrutiny of the fishing industry
- Climate change
- Short-term versus long-term trends

Ocean areas around the world are under increased pressure and scrutiny. Population growth combined with increased global concern for environmental protection is leading efforts to ensure fish populations are harvested responsibly without depleting the fishery for future generations, and that uses methods that will not cause environmental harm. Other uses for oceans, such as transportation, energy production, environmental recovery, and waste assimilation, can and will continue to lead to conflicts with traditional fishery practices. This trend will continue in the future. For the west coast fishery,

conflicts may increase in the future, and these could affect the supply of fish to processors, including motherships, impacting ability to use and send product to market.

Additional conflicts relate to the location of harvest operations for catcher vessels. Environmental awareness and the development of MPAs have affected, and will continue to affect, where harvest operations can take place. The farther that catcher vessels must travel, the less profitable the mothership operations.

As the world's population increases, there will continue to be a greater demand for protein sources. Fishery resources are generally considered to be increasingly important sources for meeting the growing world demand. This large-scale trend applies regionally as well: population growth rates in the western United States, particularly near coastal metropolitan areas, are expected to be among the highest in the nation. Demand for fish will increase accordingly; if the trend continues towards higher per capita consumption of fish, demand will increase even more.

Trends expected to affect the cost of processing in the future include the expectation that resource inputs will remain high relative to prices seen the past few decades. These include the expectation that steel, fuel, and many other inputs necessary to operate and maintain a processing facility will remain high in the future because of increased global demand for such inputs. Rationalization has the effect of mitigating some of the expected increases in cost that may be exogenous factors as well as factors that are part of Council actions. Since rationalization allows vessels to time deliveries and fishing activity in order to take advantage of market conditions, rationalization has the effect of mitigating some of the cost burden by allowing opportunities to optimize revenues for both harvesters and processors. While various input costs, such as energy, are generally expected to increase at rates higher than other costs, it is also expected that the value of fish products will escalate or remain relatively high on a global basis and the supply of whitefish from sources such as the North Atlantic remain depressed. This increased demand is expected to result in higher prices for raw fish products and this should offset the cost associated with relatively high fuel prices. However, the ability for processors to benefit from this expected increase is tied to harvester/processor negotiation power. This concept is closely related to the decision over the amount of Qs that should be allocated to harvesters versus the amount of Qs allocated to processors. Those alternatives that allocate relatively more to permits will tend to allow harvesters to benefit from this demand compared to those alternatives where processors are allocated relatively more.

Increased scrutiny of the fishing industry by the public is expected to continue, particularly scrutiny of bottom trawl gears. Such increased scrutiny may not necessarily lead to formal regulation changes, but may affect the marketability of processed fish from trawl-caught groundfish and groundfish caught with nontrawl gear. One possible outcome of increased scrutiny is a relatively higher price for nontrawl-caught groundfish. The net effect on motherships is not clear, but this trend could affect the source of fish for processors in the future.

Several additional factors that are largely exogenous to the effect of rationalization, but that may influence profitability of motherships, include the possibility of a stock being declared as overfished, the unexpected removal of a stock from overfished status, and the effect of climate change and variability on species abundance and location. While these factors are largely unpredictable, they are best considered within the cumulative effects section because they are not directly related to rationalization. If a stock becomes overfished, and a lower OY is implemented, harvesters are likely to see lower revenues due to a loss in harvest of that species, because that species constrains access to other stocks, or both. The inverse is true if a stock is taken off the overfished list. The effect of climate change and variability on fish abundance and location also influences processor profits. If conditions are such that groundfish migratory patterns differ substantially from one year to the next, motherships may be forced

to follow the migrations. This may or may not be possible, depending on environmental limitations, energy costs, and conditions in other fisheries in which the motherships participate.

Table 4-59. Trends and factors affecting mothership profitability and asset value.

Trends and Factors Affecting Mothership Profitability		Impacts
Due to Rationalization	<ul style="list-style-type: none"> Consolidation among the mothership sector 	
	<ul style="list-style-type: none"> Processing cost efficiency 	+
	<ul style="list-style-type: none"> Asset value 	-
	<ul style="list-style-type: none"> Changes in ex-vessel price negotiation 	Conditional
Exogenous to Rationalization	<ul style="list-style-type: none"> Changes in use of ocean areas 	-
	<ul style="list-style-type: none"> Increased global demand for protein 	+
	<ul style="list-style-type: none"> Rebuilding of depleted groundfish species 	+
	<ul style="list-style-type: none"> Increasing cost of inputs, including energy 	-
	<ul style="list-style-type: none"> Possibility that a stock unexpectedly becomes overfished 	-
	<ul style="list-style-type: none"> Climate change 	Unknown
	<ul style="list-style-type: none"> Increased public scrutiny of fishing industry 	Conditional

4.10.5 Summary of the Effects on Motherships by Alternative

Motherships stand to be impacted by each of the action alternatives due to a replacement of the current management system (Alternative 1, no action) that is responsible for much of the past and present status of motherships. Under nearly all action alternatives (aside from alternative 3), the season length of the fishery is expected to increase, leading to a reduction in capital necessary to handle the given volume. Some motherships may capitalize on this consolidation, while some motherships may simply leave the fishery and experience a loss in revenue and reduction in asset value—similar to what occurs for shoreside whiting harvesters under some alternatives. However, depending on the action alternative those that remain in the fishery may have enhanced power over ex-vessel prices when negotiating with harvesters.

When combined with past, present, and future conditions/actions, the effect of the action alternatives creates a system that replaces much of the management system responsible for the past and current status of motherships (Alternative 1, no action). When compared to future conditions, each of the action alternatives allows participants in the fishery the opportunity to adapt to future conditions as they change. Depending on the specific action alternative, motherships may or may not be able to capitalize on this adaptability.

4.10.5.1 Alternative 1 (No Action)

Cumulative effects on mothership processors of trawl-caught groundfish under no action, Alternative 1, would result from the ongoing effects of past and present actions and trends and RFFAs operating on the baseline conditions identified in Section 3.10. Actions, trends, and RFFAs affecting this environmental component have been identified in Section 4.10.4.

4.10.5.2 Alternative 2a

Alternative 2a implements a rationalization program that is expected to replace the management system responsible for the past and present condition of the fishery. This alternative does not make an initial

allocation to motherships, nor does it establish a declaration or processor linkage. Therefore, this alternative is expected to be the least advantageous to motherships compared to all other action alternatives. However, as a relatively large amount of vertical integration exists among the mothership sector, the effect of purely allocating to harvesters (and not including a linkage or declaration) may not have as large of an effect on motherships as shoreside processors. However, for those mothership entities that are not vertically integrated, the effect may be relatively adverse.

When compared to past, present, and future conditions/actions, the effect on motherships is a replacement of a system responsible for past and present conditions. The expected result is a decline in the number of motherships necessary to prosecute the fishery, and those motherships that leave are likely to experience a reduction in revenue. This places those motherships that leave the fishery in a position of being more dependent on fisheries in which they remain involved, such as Bering Sea pollock, and with a less diversified portfolio of fishery involvement. This means they may be less able to adapt to future conditions, should they change substantially from status quo. Those motherships that remain may be positively impacted through a reduction in average costs and increased volume per mothership entity, provided those that remain are vertically integrated to an extent that they can successfully negotiate with independent harvesters over ex-vessel prices. The effect on these motherships under future conditions is a system that is more adaptable to dealing with future change.

4.10.5.3 Alternative 2b and 2c

Like other alternatives, Alternatives 2b and 2c replace the management system responsible for much of the past and present status of motherships with another system that is expected to lead to a reduction in the number of motherships active in the fishery. Should such tendencies adversely impact motherships, they may be assisted by both Alternatives 2b and 2c, but in different ways. Alternative 2b would allocate adaptive management to motherships adversely impacted by rationalization, while Alternative 2c would make an initial allocation to motherships. The difference in the two alternatives is that Alternative 2c results in a larger amount of quota being allocated to motherships than would be allocated under adaptive management. Furthermore, the number of motherships receive quota through adaptive management is likely to be smaller than those receiving an initial allocation. Lastly, an initial allocation will tend to act as a capital asset, while adaptive management quota will not tend to have that impact.

Taken in the context of past, present, and future conditions/actions, Alternatives 2b and 2c replace the system responsible for past and present status of motherships with one that is expected to result in a decline in the amount of mothership capital necessary in the fishery. This can have benefits through cost efficiencies, but may adversely impact motherships that are consolidated out of the fishery unless those motherships receive an initial allocation through Alternative 2c. Should Alternative 2b result in keeping motherships that may otherwise depart in the fishery, then potential cost efficiencies may not be realized or may not be realized to the same degree.

When considering future conditions/actions, Alternative 2c will tend to place motherships in a better position of adjusting opportunities in response to changing conditions. Such conditions may mean such events as changing opportunities in other fisheries and/or changing markets. Alternative 2b does not result in the same degree of adaptability because most of the initial allocation is made to harvesters, thus lessening the degree of influence motherships have over fishery activity and the ability to align fishing activity in a manner advantageous to mothership operations.

4.10.5.4 Alternative 3

Alternative 3 replaces the management system responsible for much of the past and present status of motherships with another system that is expected to lead to a reduction in the number of motherships active in the fishery. This alternative establishes a long-term mothership linkage that grants negotiation power to motherships when negotiating over ex-vessel prices. This provision also has the potential to act as a capital asset since the permit to which the linkage is made is transferable and the linkage is difficult to break. This alternative provides an incentive for harvesters to race for fish due to the three whiting sector common bycatch limit, meaning the fishery may still be characterized by a short and intense harvest period. However, motherships still see an improvement under this alternative compared to other alternatives because of the linkage and because they can transfer or stack mothership permits—and associated linkages—to other motherships, meaning there are opportunities for capital consolidation along with increased certainty regarding the volume of deliveries that could be expected during the course of the fishery.

When combined with past, present, and future conditions/actions, Alternative 3 replaces the system responsible for much of the existing status of motherships. The long-term linkage provision provides motherships with added certainty over volume and added influence over harvest arrangements. However, some of this potential is eroded by the three whiting sector common bycatch limit and the incentives to race for fish with such a provision, meaning that opportunities for adjusting harvest timing in response to future changes in the fishery, future changes in other fisheries, and/or future changes in markets may be difficult.

4.10.5.5 Alternative 4a

Similar to other alternatives, Alternative 4a replaces the management system responsible for much of the past and current status of motherships with another system. Where Alternative 4a differs principally from other alternatives is in the partial mothership linkage and the implementation of bycatch limits that are cooperative-specific. The effect of the partial mothership linkage at 50 percent is expected to be substantially different than a full linkage due to the opportunities harvesters have in using the unlinked portion of their catch history in negotiating with motherships. However, the partial linkage still provides business-planning certainty to the mothership and still has the potential to act like a capital asset since the mothership permit is transferable, and the linkage is difficult to break. The cooperative level bycatch limit eliminates the race for fish incentive, leading to the expectation of an elongated mothership fishery and a decline in the amount of mothership capital necessary for the fishery.

When combined with past, present, and future conditions/actions, Alternative 4a creates a system that is expected to lead to a decline in the number of motherships necessary in the fishery. This creates cost efficiencies in the fishery and creates the potential for motherships left in the fishery to generate higher gross revenues through higher volume per mothership. However, the partial processor linkage provision places much of the negotiation power over prices in the hands of harvesters, potentially allowing harvesters to assume the revenues through that cost efficiency. The net effect of these potential outcomes is not clear when compared to the past and present status of motherships. However, the system created by this alternative is expected to mean that the sector is better able to adapt to changing future conditions. This may mean adjustments in harvest timing to respond to opportunities in other fisheries or to changing markets.

4.10.5.6 Alternative 4b

Similar to other alternatives, Alternative 4b replaces the management system responsible for much of the past and current status of motherships with another system. Where Alternative 4b differs principally from other alternatives is in the mothership declaration (rather than a linkage) and the implementation of bycatch limits that are cooperative-specific. The declaration provision provides motherships with relative certainty regarding deliver volumes during the course of a season, but does little to provide motherships with leverage in ex-vessel price negotiations with harvesters. The fact that bycatch is managed at the cooperative level means that the incentives for engaging in race for fish behavior are eliminated, leading to the expectation that the mothership fishery season will become longer, in turn reducing the need for mothership capital.

When combined with past, present, and future conditions/actions, Alternative 4b creates a system that is expected to lead to a decline in the number of motherships in the fishery. This has the potential to result in added cost efficiencies and increased gross revenues for those motherships that remain in the fishery. Those motherships that leave the fishery stand to experience a reduction in revenues with little ability to replace that revenue. This is because the mothership permit with a declaration is not expected to create the same type of asset value as a long-term linkage, principally because the declaration is easy to break. When considering future actions/conditions, Alternative 4b creates a system that makes the mothership sector more adaptable to changing conditions and more able to capitalize on opportunities (or avoid costs) that may arise. The declaration procedure allows motherships the ability to capitalize on this to some degree by binding harvesters and motherships together during the course of a year.

4.11 Trawl Catcher-Processors

In this section, we describe the impacts of rationalization on catcher-processors of Pacific whiting. This group comprises participants that both harvest and process Pacific whiting onboard the same platform and that hold LE trawl permits to do so. At least one company also participates in the mothership sector with a different vessel. Mothership impacts are covered in the previous section (page 445).

Rationalization, under any alternative, is only expected to result in minor changes to the catcher-processor sector, if at all. Rationalization may increase the certainty that catcher-processor participants have overfishing opportunities; however, because this sector currently acts like a rationalized fishery through the formation of the voluntary harvest cooperative, substantial changes are not expected to occur in this fishery. Establishing a system of IFQs may alter the harvest opportunities for companies currently engaged in the sector. For instance, the voluntary cooperative has formed catch-sharing arrangements among member companies. Some companies have entered into agreements where one company will harvest the catch share of another company. Basing an initial allocation of Qs on historical catch practices may fail to recognize some of these practices and disrupt the existing catch sharing arrangements. In addition, if sector- or cooperative-level bycatch limits are specified in a cooperative-based fishery, the certainty that participants in this sector have overfishing opportunities will tend to be greater compared to a case where a common bycatch limit is established for the three nontribal whiting sectors.

The section begins with a description of methods used to assess effects on catcher-processors and the metrics used to illustrate those effects. The variables and metrics used, some of which are also used in earlier sections, can be compared and contrasted among the alternatives. The broad-level effects of rationalization on catcher-processors are presented next (page 472), and contain a discussion of important general issues associated with rationalizing the fishery.

Following the description of broad-level effects, we assess the impacts on catcher-processors of the alternatives (page 475). This section begins by identifying the impacts that are expected to occur from each of the elements of the alternatives independently. We then provide an assessment of each alternative on catcher-processors. At the end of this section, we provide a side-by-side comparative summary of the effects of each alternative on groundfish trawl harvesters (page 481).

Finally, we assess cumulative effects of rationalization on catcher-processors. This cumulative effects section briefly summarizes the past and present actions with ongoing effects on catcher-processors, and the RFFAs that are anticipated to have effects. The combined effect of these past, present, and RFFAs are merged with the effect of the alternatives to arrive at the cumulative effect.

4.11.1 Methods for Assessing Impacts

Table 4-60 shows the impact mechanisms, metrics, and impact assessment methods used to evaluate trawl catcher-processors.

Table 4-60. Overview of analytical approach used to compare baseline and future conditions of trawl catcher processors under the alternatives.

Potential Impacts	Reasons or Mechanisms for Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data, Models, and Methods Used for Assessing Impacts
Changes in vessel profits and fleet efficiency	Fleet consolidation	Number of active vessels	Analysts assessment of fleet consolidation
		Fleet-wide costs	
	Distribution of harvest privileges	Number of initial QS recipients	Model of the effects of initial allocation of IFQ
		Ex-vessel value of QPs allocated to participants	
	Pace and location of harvesting	Length of season	Capacity analysis and timing of resource accessibility
		Geographic distribution of fishing effort	Analysts assessment of geographic shifts in fishing effort
	Flexibility in harvest timing	Opportunities for modifying harvest timing	Qualitative assessment
	Monitoring costs	Cost borne by trawl catcher-vessels to meet monitoring requirements	NMFS research on tracking and monitoring programs
Harvesting costs	Annual cost of harvesting activity	Analysts assessment of harvesting costs	
Ability to conduct business planning	Relative certainty over future fishing opportunities	Qualitative assessment	
Individual and collective harvesting risk	Likelihood of catch events that are greater than QPs	Relative risk to harvesters of exceeding QPs	Qualitative assessment
	Cost of covering deficits	Availability of quota for covering deficits	Qualitative assessment
	Risk associated with the presence of thin market conditions	Risk posed by trading quota in volatile markets	Qualitative assessment
Changes in fishing vessel safety	Fleet size; vessel operational flexibility; and financial ability to invest in vessel maintenance and safety equipment	Occurrence of safety-related incidents	Qualitative assessment based on literature and expertise of analysts

4.11.2 Broad-Level Effects of Rationalization on Catcher-Processors

In general, catcher-processors are expected to be directly affected by rationalization through the harvesting aspect of their operations rather than the processing aspect of their operations. The reason for this is that the alternatives being contemplated for the catcher-processor sector influence the manner in which harvesting privileges are issued and managed. Processing operations on board catcher processors may be influenced from changes in harvesting operations, but, in the end, any effect still occurs on board the catcher-processor vessel. For this reason, many of the effects of rationalization described under the section on LE trawl harvesters are applicable to catcher-processors.

Some effects may be felt in the catcher-processor sector due to a handful of key factors. These key factors include whether to issue IFQ or establish a framework for continued voluntary co-op formation; whether to manage bycatch limits at the co-op, sector, or fishery-wide level; and (if QS is issued) whether to manage all species in the ABC/OY table with quota, or whether to manage a subset of those species with quota. In addition, the initial allocation of IFQs and an adaptive management provision may have some impacts on the catcher-processor sector. Other elements of the alternatives are not expected to have an effect on the performance of the sector. These other elements include accumulation limits, grandfather clause, the number of trawl sectors, and area management.

4.11.2.1 Changes in Profit and Fleet Consolidation

The current voluntary catcher-processor cooperative has led to conditions in the catcher-processor sector that resemble a rationalized fishery. Because of this, further changes in the profitability of entities in this sector are not expected because of rationalization. In addition, further fleet consolidation, changes in the pace and location of harvesting, and changes in the flexibility of harvest timing are not expected because these factors have already changed because of the voluntary cooperative. Rationalization is not expected to result in modifications to the level and cost of monitoring that is currently onboard catcher-processors. Because each catcher-processor currently carries two at-sea observers, additional coverage will likely not be necessary. Therefore, costs borne by participants in the catcher-processor sector to meet at-sea observer requirements are not expected to change.

The formation of the voluntary catcher-processor cooperative led to a reduction in effort in the catcher-processor sector, an increase in the length of the season, and increased communication over—and performance in—bycatch reduction. All of these outcomes are typical of rationalization programs.

Figure 4-49 illustrates the change in seasonality of catcher-processor whiting harvests before and after the formation of the voluntary cooperative. As indicated in the figure, the season has spread out substantially since the formation of the cooperative with substantial portions of the harvest occurring from August to November, whereas little harvest occurred during this period before the formation of the cooperative. Though not shown in the figure, the number of vessels used to harvest the available whiting resource also decreased. Prior to the formation of the cooperative, 9 vessels per year were engaged in the harvesting of whiting on average, while after the formation of the cooperative 6.8 vessels per year on average were engaged in the harvesting of whiting.

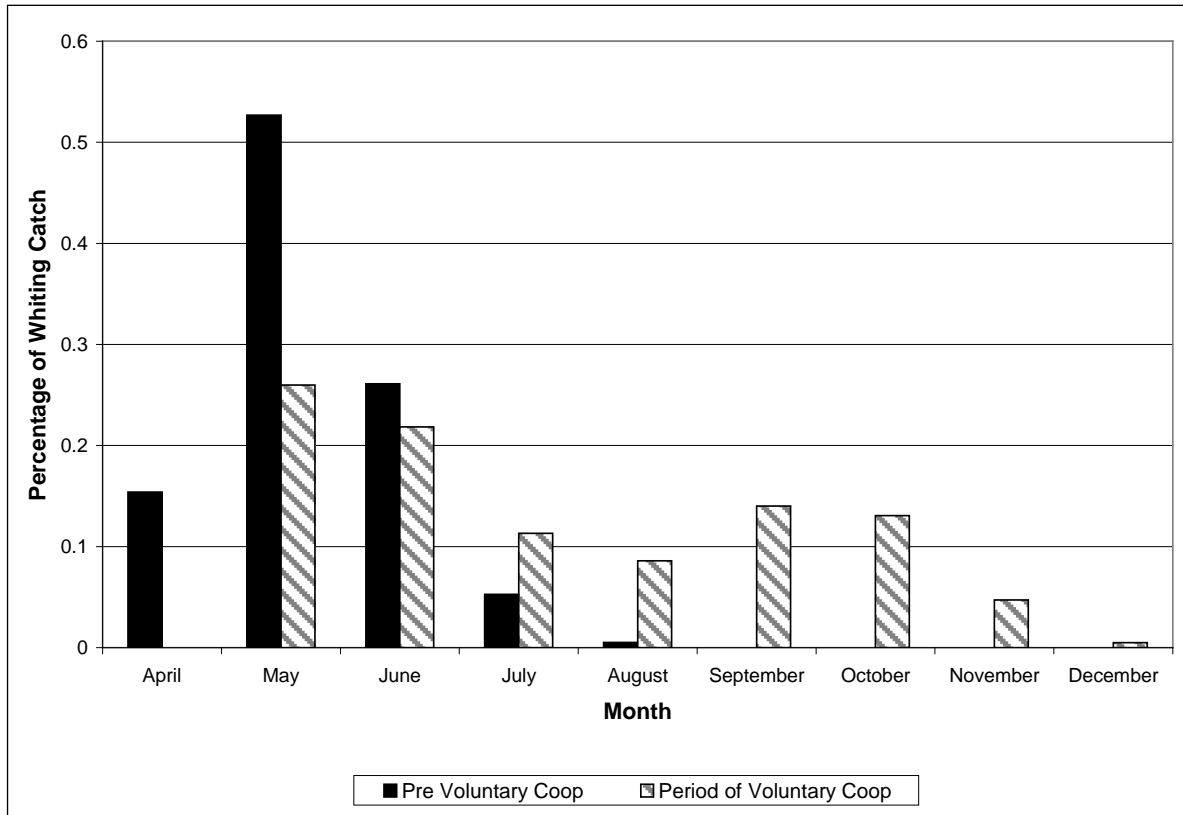


Figure 4-49. Seasonality of whiting harvest in the catcher-processor sector (before and after formation of the voluntary cooperative).

One factor that is related to profitability and fleet consolidation, however, is the possibility of other fishery sectors influencing the opportunities catcher-processors have over fishing activity. If common bycatch limits are specified for all three nontribal whiting sectors, then the actions of harvesters in one sector can impact the opportunities in another. These conditions encourage race-for-fish behavior because of bycatch, and profitability under race-for-fish conditions would be lower compared to a case where race-for-fish conditions do not exist.

The likelihood of catcher-processors engaging in race-for-fish behavior, therefore reducing profitability and increasing the number of vessels in the fishery, depends on whether participants in the catcher-processor sector believe they can successfully prosecute the fishery. The next section describing risk outlines this concept and its effects on profitability and fleet consolidation in more detail.

4.11.2.2 Individual and Collective Harvesting Risk

As outlined in Section 4.6 (page 284, impacts on LE trawl harvesters), catcher-processors may face a variety of risks that can influence the success of the program. Several sources of risk are possible, including risks to individuals and collective risks across all participants in the sector. For reference, Section 4.6.2.4 (page 301) describes risk-related impacts to LE trawl harvesters.

If an IFQ program is implemented, individual risks may exist if participants are held accountable and responsible for their catch of certain species. This is because of the uncertainty associated with fishing, and the fact that accidentally exceeding one's holding of quota—and trying to cover that deficit by

purchasing quota—could be costly depending on the species. If species such as overfished species, nearshore rockfish species, and flatfish are allocated to the catcher-processor sector in quantities that are similar to status quo harvests, then individuals may have to incur substantial costs if encountering more catch than expected.

Another source of risk in an IFQ-based program comes from the concept of thin markets. A thin market for IFQ could occur when allocations of some groundfish species are so small that there are a very limited number of suppliers. Such conditions often lead to volatile price fluctuations (of quota in this case) and quota transactions that involve strategic behavior. Thin markets can create cases where the market is not able to reach equilibrium, and transfers occur based on mechanisms other than market mechanisms (such as personal relationships). In addition, thin market conditions are related to the risk posed by individual accountability. Thin markets may make it problematic for vessels actually to find quota to cover catch deficits, and this poses a financial risk to harvesters. The species for which thin markets may exist in the whiting fishery are covered under Section 4.6 (page 284) describing impacts to LE trawl harvesters.

Catcher-processors incur collective risks if bycatch is managed as a pool. There are three options for managing bycatch in addition to allocating IFQ: managing bycatch at the cooperative level, managing bycatch at the sector level, and managing bycatch at the fishery level (across the three nontribal whiting sectors). Since the catcher-processor sector is made up of one voluntary cooperative, it is assumed that managing bycatch at the sector and cooperative level would result in the same effect on this sector. Therefore, only two bycatch management levels are examined.

In a co-op program, the type of individual risk described above is minimized through collective management that spreads the risk across the multiple participants in the co-op or fishery. However, if the risk is spread across too many participants, the ability of those participants to agree to a bycatch management plan may be jeopardized and there is a potential for a race for bycatch to develop among harvesters.¹¹⁰ The risk that a race for bycatch may develop depends on the number of co-ops or sectors to which a bycatch limit applies. If a bycatch limit is applied to a relatively small pool of vessels (e.g., to individual co-ops) the possibility of a race for bycatch developing is relatively small. Conversely, if a bycatch limit is applied at a relatively gross level (to all three commercial whiting sectors combined), it is much more likely that a race for bycatch would develop. Under these conditions, the profitability currently seen in the sector, and generally expected under rationalization, would likely be compromised. Racing for bycatch would entail the same outcome as a race for target species with more vessels participating than necessary, a shorter season, and less profitability in the sector than would otherwise be expected.

4.11.2.3 Safety

Fishing vessel safety is generally associated with the ability of vessels to maintain equipment and the flexibility vessels have in avoiding adverse weather conditions. In a rationalized fishery, profit per vessel is expected to increase, leading to better maintenance of equipment onboard vessels. However, since the catcher-processor sector already acts like a rationalized fishery, further improvements in maintenance due to higher profits is generally not expected to occur. In addition, since the sector already acts as a rationalized fishery, vessels need not fish in bad weather to compete with other participants in the sector. Therefore, rationalizing the fishery is not expected to result in a change in the

¹¹⁰ The term “race for bycatch” is used in this case to describe a type of behavior that occurs when harvesters do not believe that the bycatch limit will be successfully managed. In this event, harvesters believe that they face the risk of being preempted by the attainment of a bycatch limit and, therefore, race for fish to harvest their allocated target species.

timing of harvests. The risk factors described above can have an effect on safety, however. If participants race for bycatch, profitability may decline, and participants may feel the need to fish in poor weather (though the size of most catcher-processor vessels may make fishing in inclement weather a nonissue). This may also reduce maintenance, making vessels less safe than under a rationalized fishery with no incentive to race for bycatch.

4.11.3 Direct and Indirect Effects of the Alternatives on Catcher-Processors

In addition to the general effects described above, each of the alternatives is expected to impact catcher-processors in slightly different ways. These differences in the alternatives are due to variations in the elements that make up each alternative. In this section, we begin by summarizing the effect of elements in the alternatives on catcher-processors. This description serves as an introductory piece of analysis and overview of the way in which rationalization, in general, will impact this particular environmental component. A description of the impacts of each alternative follows (page 475). Alternatives 2a through 2c are grouped together, as are Alternatives 3 and 4a because the grouped alternatives are expected to affect catcher-processors similarly, except for the impacts of one common element, which is identified and discussed.

4.11.3.1 Expected Effects of Elements of the Alternatives on Catcher-Processors

The effect of the alternatives on catcher-processors is evaluated in two ways. First, we evaluate the specific elements, or program features, that are varied across the alternatives (these are the rows in Table 4-2). Second, we evaluate the grouped alternatives (see above).

How do IFQs and co-ops change things relative to status quo for catcher-processors?

Catcher processors may be affected by whether QS is issued to them or whether a LE system is put in place as a means of maintaining the voluntary cooperative. While the catcher-processor voluntary cooperative is expected to continue, permitting the co-op and allocating the entire sector quota to that co-op as an exclusive harvest privilege means the co-op would meet the definition of a LAPP. If the co-op dissolves, each individual permit holder would be allocated Qs under an IFQ program, which would also be defined as a LAPP. This may or may not result in increased costs for the catcher-processor sector. Under LAPP cost recovery provisions catcher-processors the incremental costs of the program could be subject to cost recovery. Since the catcher-processor sector already pays for at-sea observers, incremental costs could be minor if considered for the sector alone. If all sectors are considered part of a single LAPP, the catcher-processor sector could share in the incremental costs of other sectors. The Council will develop cost recovery provisions through a trailing action.

In addition, cooperative formation may have slightly different outcomes than an IFQ program. One reason for the differences is the relationships that develop among fishery participants in cooperative programs compared to IFQ programs (discussed in detail under the section comparing IFQs and cooperative systems). As discussed in earlier sections, cooperatives rely on close-knit relations and good communication for success, while IFQs encourage a more individual perspective and, therefore, may rely less on good relations between harvesters. Such relations, or lack thereof, may have an effect on how participants prosecute the fishery. For example, close-knit relations and good communication may result in a different response time in the aggregate when the fleet is encountering bycatch, compared to a fishery where participants are more independent and may communicate somewhat less.

Finally, issuing IFQs may lead to the termination of the current voluntary cooperative, because it may not be necessary for prosecuting the fishery under an IFQ-based program. The implication of terminating this cooperative is not immediately apparent.

How does initial allocation affect catcher-processors?

The initial allocation of QSs to catcher-processors may alter current harvest arrangements that currently exist under status quo opportunities. Figure 4-50 illustrates the difference between average metric tonnage taken per catcher-processor business entity, and the tonnage that would have been allocated to each entity during that period if an IFQ program was implemented based on the initial allocation formula specified. It shows the outcome of the initial allocation formula relative to the harvest quantities each entity made over the 2004 to 2006 period. These figures assume the same volume taken from 2004 to 2006 would be taken in an IFQ-based fishery. This information shows that one company may be allocated less annual harvest volume than was harvested on average from 2004 to 2006. Three other companies would be allocated more than harvested during that period.

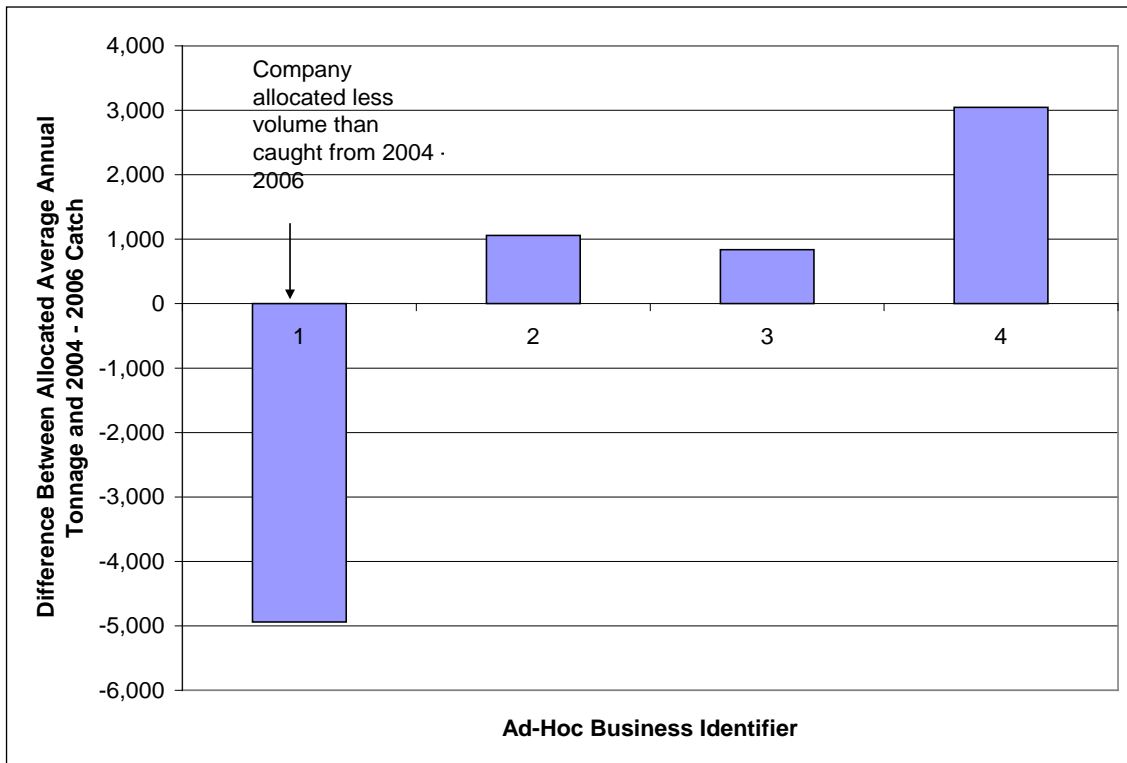


Figure 4-50. Comparison of catch amounts under status quo and an IFQ program.

How will the species covered through the program affect catcher-processors?

The species directly managed in the catcher-processor sector will also have an impact on the outcome of the program. As illustrated in Section 4.6.2.4, several types of species may constrain harvest activities in the catcher-processor sector if managed directly with IFQ. While the list of species that may constrain harvest activities is not repeated here, requiring that participants in the catcher-processor sector cover their catch of flatfish and nearshore rockfish with QSs in general may prove to be equally burdensome as requiring that overfished species be managed under IFQs. This assumes that the allocation to the sector of these species would be on the same order of magnitude as current catch levels.

The implication of covering flatfish and nearshore rockfish species with Qs is that participants in the sector may have to incur a substantial cost by purchasing quota if inadvertently encountering these stocks and going into deficit. Because of the small quantities allocated to the sector, quota for these species may be difficult to acquire. In the worst case alternative, catcher-processors may not be able to acquire quota of these species even if they have funds to do so, simply because that quota may not be available.

Bycatch management may influence the success of the catcher-processor sector. Managing bycatch across all three whiting sectors can induce race-for-fish conditions because of a race for bycatch. While the catcher-processor sector has effectively operated as a rationalized fishery with the common bycatch limit present under status quo, increasing concern over the common bycatch limit has been expressed through public testimony at Council meetings since the premature closure of the whiting fishery in 2007 as a result of bycatch. The potential for a race for fish because of bycatch occurring likely depends on the size of the bycatch limits relative to the size of the whiting tonnage allocated to the catcher-processor sector. If catcher-processors believe that it is likely they can take their allocation without being preempted by the attainment of a bycatch limit, then they are likely to continue fishing in a rational, paced manner that is similar to the manner exhibited since the formation of the voluntary cooperative. If a rationalization program is put in place with bycatch limits that are common to the three whiting sectors, then the outcome for the catcher-processor sector is likely to be same or highly similar as under the status quo management system.

How will an adaptive management provision affect catcher-processors?

An AMP may impact the catcher-processor sector by redistributing a portion of the catcher-processor allocation to particular vessels. The actual impact of an adaptive management provision on the catcher-processor sector ultimately depends on the objectives of the AMP and the way in which the adaptive management quota is used. Several potential objectives have been discussed, including using the adaptive management quota for community protection, using adaptive management quota to assist adversely impacted processors, and using adaptive management for salmon and overfished species bycatch reduction. In the catcher-processor sector, it is unclear how the adaptive management quota would be used to achieve community protection and to protect adversely impacted processors. Since catcher-processors are not associated with particular ports—except perhaps those in the Puget Sound region—it is unclear what using adaptive management quota for community protection would achieve. The same is true for mitigating against adverse impacts to processors, since the processing in the catcher-processor sector is vertically integrated on the same platform as the harvesting. Using the AMP for overfished species and salmon bycatch reduction may, however, have an effect. There are several potential ways of using adaptive management quota to facilitate bycatch reduction. A benchmark could be set, for example, that grants quota from the AMP to individual vessels if they bring their bycatch rate below a certain level. Another method of using the adaptive management quota could be to grant adaptive management quota to vessels that propose the testing of new gears for exploring bycatch reduction. In either case, the use of an AMP is likely to have a distributional effect where certain participants are recipients of the adaptive management quota and other participants are not.

How will the other program elements affect catcher-processors?

Other elements are not likely to have a noticeable effect on catcher-processors. The accumulation limits specified for the catcher-processor IFQ alternative would allow two vessels to harvest the entire sector allocation, and the control limits could allow two companies to own the entire quota. Both cases are substantially more per vessel and entity compared to status quo, which operates as a rationalized fishery. Therefore, these accumulation limits are not expected to be restrictive. The presence of a grandfather clause is not expected to have an effect on the performance of the catcher-processor sector because the

accumulation limits are relatively large, making a grandfather clause irrelevant. The number of trawl sectors specified for the program is not expected to impact catcher-processors because neither the three or four sector alternative impacts the catcher-processors sector directly (both alternatives only contemplate a differentiation or aggregation of the two shoreside sectors). If, however, the three-sector alternative means that the shoreside whiting sector shares bycatch quota with the nonwhiting sector, then this may reduce the overall pool of bycatch available to the at-sea sectors if bycatch management is being contemplated as a common, three-sector pool.

4.11.3.2 Alternative 1 (No Action)

Effect of Alternative 1 on vessel profits and fleet efficiency

The effect of Alternative 1 on vessel profits and fleet efficiency means the continuation of the existing management structure. Under this structure, the catcher-processor sector has been able to form a voluntary harvest cooperative that operates like a rationalized fishery. Under this structure, the season has been extended and the race-for-fish conditions present in the fishery prior to the formation of the cooperative have been eliminated. It is generally accepted that profits and efficiency have improved as a result of the cooperative. The continuation of the existing management structure (and harvest cooperative) is expected to result in similar levels of vessel profit and fleet efficiency as one of the rationalization alternatives. However, Alternative 1 has a risk that one sector can preempt the catch available to catcher-processor participants, and the risk of this event occurring can mean that profits expected in one year may not be realized. This risk exists because of the common bycatch limit that is applied to all three nontribal portions of the whiting fishery.

The risk to profits posed by Alternative 1

The risk of one sector taking the majority, or all, of the three-sector bycatch limit means that the other whiting sectors could experience a form of preemption. This can occur because the attainment of the bycatch limit means all three sectors of the directed whiting fishery will close, and, if one or more sectors have not attained their allocation, then that sector will not realize the profits that may have been expected at the start of the year. The risk of this occurring may change the behavior exhibited by catcher-processor participants and this change of behavior (in an extreme example) could mean that catcher-processor participants begin to exhibit race-for-fish behavior by fishing more intensively at the start of the season out of fear that another sector could preempt their fishing opportunities. This behavior means more intensive and costly fishing and more capital being used than necessary. Both of these factors are likely to reduce the profits that could otherwise be generated in the fishery if such behavior does not occur.

Effect of Alternative 1 on safety

Onboard vessel safety is closely tied to the amount of profit generated by vessels (and the subsequent ability to pay for maintenance) and the amount of time spent fishing during hazardous weather conditions. Ignoring the risk factors discussed above, the profits generated under Alternative 1 are not expected to result in levels of maintenance that differ substantially than the other alternatives. Alternative 1 is also not expected to result in increased levels of fishing during hazardous weather conditions relative to the other alternatives. However, if the risk factors discussed above change behavior, vessel profits may in fact be less under Alternative 1 compared to a alternative where bycatch management is sector-, co-op-, or vessel-specific, and maintenance may be somewhat lower as a result. Furthermore, increased effort at the start of the season may mean more effort spent fishing during hazardous conditions since the incentive to fish early in the season is similar to that incentive created through race-for-fish conditions.

4.11.3.3 Alternatives 2a through 2c

Effect of Alternatives 2 and 3 on vessel profits and fleet efficiency

Alternatives 2 through 2c issue IFQ to catcher processors. Four entities receive Qs under this option. Those four entities have collectively used nine catcher-processing vessels to generate the catch history upon which that IFQ would be based. The largest entity would receive less than the control limits, meaning that the control limits are not expected to constrain any business entities. For confidentiality purposes, the actual estimate of quota distributed to each entity is not illustrated. The fact that the largest entity is apparently expected to receive less than the control limit makes the presence of a grandfather clause irrelevant.

Issuing IFQ is not expected to affect profitability substantially in the catcher-processor sector. IFQ issuance may result in the termination of the voluntary cooperative, and this could have some effects on profitability if there are existing profit-sharing arrangements; however, it is not immediately clear whether those arrangements exist and whether such arrangements would change if the cooperative was terminated.

The risk to profits posed by Alternatives 2a through 2c

The fact that individual entities are allocated quota means that the risk of a race for bycatch developing is minimal. Some circumstances could lead to a race for bycatch as described previously. These circumstances include the possibility of a disaster tow by a catcher-processor that is large enough to close the entire sector. The fact that bycatch encounters are sometimes large and unexpected means that a disaster tow event is possible. However, the individual accountability associated with individual quota increases the risk to each catcher-processor, and the burden they must bear for encountering large amounts of nontarget species. Therefore, issuing IFQ is likely to encourage behavior that is substantially risk averse, decreasing the possibility of a disaster tow occurring, but potentially increasing the financial burden individual catcher-processors must bear from encountering higher than expected amounts of bycatch species.

All groundfish species and Pacific halibut are covered with QS under Alternatives 2a through 2c. This poses risks to individual participants in the catcher-processor sector because of the inexact method of extracting fishery resources and the fact that many of these species are likely to be allocated to the catcher-processor sector in very small quantities. In general, increasing the number of species covered in the program increases the level of accountability, but can also reduce flexibility and impose risk. The imposition of risk on harvesters is one mechanism that results in many of the desired outcomes of rationalization, and therefore imposing risk is not necessarily adverse. However, the risk and constraints catcher-processor participants face under Alternatives 2a through 2c are substantially greater than status quo, which is also a rationalized fishery. The fact that participants in the catcher-processor sector would be responsible and accountable for approximately 40 species means a tenfold increase in the number of species participants in the sector must successfully manage. Assuming many of these species (flatfish, nearshore rockfish, and overfished species) are allocated in small quantities means an increase in the number of species that may prematurely close the fishery if inadvertently caught in sufficient quantities.

One potential method of managing constraining bycatch species in an IFQ program is through voluntary formation of risk pool, or voluntary, arrangements formed by participants for sharing risk. Such pools rely on the collective negotiation of bycatch management terms and terms for sharing quota among participants as necessary. These negotiations rely on there being a similar set of objectives and

relatively balanced negotiation power. Factors influencing the successful formation and maintenance of these risk pools include the manner in which constraining species are allocated to catcher-processor participants. If those constraining species are allocated equally, or on a pro rata basis, to their whiting allocation, then the ability to voluntarily form and maintain risk pools may be greater than if constraining species was allocated less equally.

Effect of Alternatives 2a through 2c on safety

Alternatives 2 and 3 are not expected to have a noticeable effect, if any, on vessel safety. Because Alternatives 2 and 3 generally are not expected to result in a race for fish, nor are they expected to decrease revenues compared to status quo, there do not appear to be mechanisms adversely impacting safety.

4.11.3.4 Alternatives 3, 4a, and 4b

Effect of Alternatives 3, 4a, and 4b on vessel profits and fleet efficiency

The effect of Alternatives 3, 4a, and 4b are likely to result in the same level of profit and fleet efficiency as under status quo, where status quo operates as a rationalized fishery because of the voluntary cooperative. The LE system established for catcher-processors under these alternatives creates a framework that protects the existing cooperative from new entry and, thereby, makes it unlikely that a new entrant would disrupt the existing cooperative's operations. It may be possible for a new participant to purchase a LE permit for the catcher-processor sector and enter the sector. If that is the case, there is a possibility that the new participant may not join the cooperative. Alternatively, if an existing catcher-processor sector participant decides to leave the cooperative, participants in the sector may begin to fish competitively. The likelihood of these events occurring is not known. However, the establishment of a LE system for catcher-processors increases the likelihood that the catcher-processor sector will remain a voluntary cooperative, compared to a case where there is no catcher-processor LE. Therefore, while there is some possibility that events could occur which could disrupt the existing cooperative or lead to its termination, this is less likely with a LE system in place. Because of these reasons, profits and fleet efficiency should be equivalent to status quo, with more certainty that the current level of profitability will continue. However, certain factors may jeopardize the profits that participants in this sector currently realize, and they are discussed below.

The risk to profits posed by Alternatives 3, 4a, and 4b

The risks that participants in the catcher-processor sector face under Alternatives 3, 4a, and 4b are largely a function of how bycatch is managed. Under Alternative 3, bycatch is managed in common across all three nontribal whiting sectors. Under Alternatives 4a and 4b, bycatch is managed at the cooperative level. Since the catcher-processor sector is expected to remain as a single voluntary cooperative under Alternatives 3, 4a, and 4b, bycatch management at the cooperative level is assumed to be the equivalent of managing bycatch at the sector level. In other words, the catcher processor sector is assumed to be managed under a single bycatch limit under both Alternatives 4a and 4b.

The risk faced by participants in the catcher-processor sector differs between Alternative 3 and Alternatives 4a and 4b. Under Alternative 3, there is the risk that all three nontribal whiting sectors will engage in a race for bycatch. This may occur if participants across the three sectors cannot agree to bycatch management terms and it appears unlikely that the whiting allocations can be reached prior to the attainment of a bycatch limit. Under this outcome, participation in the catcher-processor sector may increase and harvest activity is likely to become concentrated toward earlier months—similar to the pattern exhibited prior to the formation of the voluntary cooperative.

The risk faced by participants in the catcher-processor sector under Alternatives 4a and 4b is different in that other sectors are unlikely to affect the harvest opportunities of participants in the catcher-processor sector. It is more likely, however, that participants in the catcher-processor sector will have the ability to preempt harvest opportunities for others in that sector. If one catcher-processor catches an unexpectedly large amount of bycatch species, the sector (or co-op) level bycatch limit may not be large enough to cover it, depending on the size of that catch event relative to the bycatch limit. If this event occurs, it may prematurely shut down the catcher-processor sector but it is less likely to spill over into other fishery sectors compared to a race for bycatch among the three nontribal whiting sectors.

Empirical evidence has shown that participants in the catcher-processor sector are able to achieve lower rates of bycatch than other fishery sectors and have less frequent disaster tow events than other sectors. This has been attributed to the fishing capability of catcher processors. Vessel size and horsepower allows catcher-processors to fish at deeper depths and in worse weather (later in the season), and both factors have been linked to bycatch reduction. This means that the probability of a large catch event occurring in the catcher-processor sector is likely less than in other sectors. This lower probability of an unexpectedly large catch event means that the risk associated with Alternative 4a is less for the catcher-processor sector than the risk associated with Alternative 3.

Effect of Alternatives 3, 4a, and 4b on safety

Alternatives 3, 4a, and 4b are not expected to have a noticeable effect on vessel safety because Alternatives 3, 4a, and 4b are generally not expected to result in a race-for-fish, nor are they expected to decrease revenues compared to status quo.

4.11.3.5 Comparative Summary of the Effects of the Alternatives

Alternative 1	<ul style="list-style-type: none"> • Continuation of existing cooperative and associated profitability • Risk of a race for bycatch developing among sectors, leading to decreased profitability
Alternative 2a	<ul style="list-style-type: none"> • Similar profitability as with voluntary cooperative • Low risk of a race for bycatch, but high risk on individual entities
Alternative 2b	<ul style="list-style-type: none"> • Same as Alternative 2
Alternative 2c	<ul style="list-style-type: none"> • Same as Alternative 2
Alternative 3	<ul style="list-style-type: none"> • Continuation of existing cooperative • Risk of a race for bycatch developing among sectors, leading to decreased profitability
Alternative 4a	<ul style="list-style-type: none"> • Continuation of existing cooperative • Low risk of a race for bycatch
Alternative 4b	<ul style="list-style-type: none"> • Continuation of existing cooperative • Low risk of a race for bycatch

4.11.4 Cumulative Effects on Catcher-Processors

The effect of the alternatives on catcher processors is combined with past actions, current and future trends, and RFFAs to derive the cumulative effect. Each of these effects is measured using the potential impacts identified in Table 4-60, which include the (cumulative) effect on vessel profits and fleet efficiency, on individual and collective risk, and on safety.

In some respects, the effect of rationalization on catcher-processors can be viewed as formalization of conditions that currently exist in the catcher-processor sector under voluntary terms, rather than an action that is additive to present conditions. Since the catcher-processor sector operates under voluntary terms that effectively make that sector appear rationalized, formally implementing a rationalization program (or implementing conditions that facilitate the continuation of the voluntary cooperative) may mean the sector operates the same as under status quo conditions, but without the risk (or with a lower risk) of the rationalized behavior of catcher-processor participants falling apart. Therefore, implementing the rationalization structure found in the alternatives may be only slightly affect conditions in a cumulative sense.

4.11.4.1 Trends and Actions Influencing Vessel Profits and Fleet Efficiency

Several trends and actions not associated with rationalization are expected to continue, or be implemented in the future, which are expected to have an effect on vessel profits and fleet efficiency. These include the following:

- Relatively high cost of inputs (such as fuel)
- Increased competition for ocean space (state MPAs, wave energy, offshore resource exploration)
- Increased global demand for protein
- Rebuilding of depleted groundfish stocks
- Consumer awareness and scrutiny of the fishing industry
- Implementation of Amendment 21 (intersector allocation)
- Amendment 15 (sunsets with trawl rationalization implementation)
- Ongoing harvest specifications process and OY setting
- Climate change and the effect on species abundance and location
- The possibility that a stock is unexpectedly declared as rebuilt or overfished

A rationalization program implies that Amendment 21 is implemented. Intersector allocations are a necessary component to rationalization because issuing QPs relies on there being a known quantity of fish to distribute across QS holders. Because Amendment 21 will ultimately decide the amount of fish available to trawl harvesters, it has a direct effect on the amount of revenue that can be generated in the fishery. The Council has elected not to revisit the allocations of Pacific whiting and sablefish that currently exist; therefore, the amount of whiting available to the catcher-processor sector is not likely to be affected by the Amendment 21 process. However, other species may constrain access to the Pacific whiting resource, and the level of allocation of these stocks to the catcher-processor sector may dictate the ability for participants to access the Pacific whiting resource. It is not possible at this time to determine whether Amendment 21 would lead to an allocation of a nonwhiting stock that would constrain the catcher-processor sector, so the effect of Amendment 21 is largely unknown.

Rationalization of the catcher-processor sector is not expected to result in added observation or monitoring requirements as this portion of the fishery is already managed with at-sea observers and total catch monitoring. Depending on the form of rationalization that is implemented (either a LE system designed to facilitate the continuation of the existing cooperative, or an IFQ system) fees may be imposed upon catcher-processor participants for cost recovery, and these fees would add to the cost catcher-processor participants already bear for VMS and at-sea observers.

Trends expected to affect the cost of trawling (that are independent of rationalization) in the future include the expectation that the demand for resource inputs will remain high relative to prices seen throughout the 1980s, 1990s, and early 2000s. These include the expectation that steel, fuel, and many

other inputs necessary to operate and maintain a trawl vessel will remain high in the future because of increased global demand for such inputs. It also means that the prices for fish products may remain relatively high, especially since the supply of whitefish from places like the North Atlantic are expected to remain relatively low. These factors mean an increased cost of engaging in fishing activities, but also higher gross revenues from fishing. The net effect is, therefore, unknown.

Other factors expected to continue into the future, which influence the cost of fishing, include increased competition for space in ocean areas (because of wave energy projects, marine reserves, and offshore nonrenewable resource exploration and development). These types of projects will tend to have the result of decreasing the amount of area trawl harvesters may have access to, potentially affecting where harvesters operate and making it more costly to prosecute fishing activity.

Higher populations of rebuilding species may lead to alleviation in the constraining nature that several rebuilding species play on access to the whiting resource, however this depends on the bycatch rate of rebuilding species as they rebuild relative to the OY of those species. If the bycatch rate increases at the same rate as the OY, then the rebuilding period is not likely to result in any alleviation in the constraint those species have on Pacific whiting opportunities. In fact, if the bycatch rate increases more quickly during the rebuilding period than the OY (which can happen for a variety of reasons, including the fact that stock assessments lag the conditions found in the present day by at least two years), rebuilding may actually lead to a larger constraint on fishing than experienced under present day conditions. This term is often called the rebuilding paradox. However, it is reasonable to assume that after rebuilding stocks are declared rebuilt, the constraining nature of these rebuilding stocks will be alleviated.

Public scrutiny of the fishing industry appears to be growing. Groups like the MSC help allow the public to make more informed decisions about purchasing sustainably harvested seafood. A fishery with a MSC certification label may be expected to access different markets than a fishery not certified, and these markets may result in greater revenues to participants in that fishery. As of the drafting of this document, the Pacific whiting mid-water trawl fishery was undergoing the certification process. If this fishery is certified, participants may stand to gain access to more valuable markets. Other aspects of public scrutiny may impact catcher-processor participants in other ways that may or may not result in formal changes in regulations. In general, such scrutiny may mean that it is more difficult to prosecute fishing activities, or fishing industry representatives spend more time dealing with public relations issues. In any event, these types of issues may tend to increase the cost and effort associated with fishing activity.

At times, substantial revisions can be made to the allowable catch of fish species, including nongroundfish, requiring that management and fishing opportunities respond. Such changes can mean fairly noticeable changes in the opportunities harvesters have in prosecuting fish resources, and this will influence the opportunities available to nontrawl harvesters. While actual changes in the available catch of various species in the future cannot be clearly predicted, it is certain that allowable catch levels will be adjusted through time, requiring that management measures and fishing opportunities be adjusted. This means variation in revenues associated with participants in the catcher-processor sector over time.

Several additional factors that are largely exogenous to the effect of rationalization, but that may influence profits and fleet efficiency, include the possibility of a stock unexpectedly being declared as overfished, the unexpected removal of a stock from overfished status, and the effect of climate change and variability on species abundance and location. While these factors are largely related to uncertainty, they are best examined in the cumulative effects section because they are not directly related to rationalization, but may affect the profits and fleet efficiency in a rationalized fishery. If a stock becomes overfished and a lower OY is implemented, catcher-processor participants are likely to see lower revenues either because a species constrains access to whiting, or a reduction in available catch

(if Pacific whiting becomes overfished). The inverse is true if a stock is taken off the overfished list. The effect of climate change and variability on fish abundance and location also influences profit and fleet efficiency. If conditions are such that groundfish migratory patterns differ substantially from one year to the next, the ability of harvesters to make informed decisions about fishing location and the species caught at those locations will become compromised. This can have the effect of increasing the amount of effort (and cost) harvesters must exert in performing fishing activities and result in lower revenues. However, it is not known if these types of climactic events on fish resources will actually occur, so the effect of climate change and variability on trawl harvesters is not known.

Table 4-61. Factors affecting revenues and fleet efficiency.

Factors Affecting Revenues and Fleet Efficiency		Impact
Due to Rationalization	<ul style="list-style-type: none"> Level of bycatch management (individual, coop, sector, fishery) 	Conditional
Exogenous to Rationalization	<ul style="list-style-type: none"> Relatively high cost of inputs (such as fuel) 	–
	<ul style="list-style-type: none"> Increased competition for ocean space (state MPAs, wave energy, offshore resource exploration) 	–
	<ul style="list-style-type: none"> Increased global demand for protein 	+
	<ul style="list-style-type: none"> Rebuilding of depleted groundfish stocks 	+
	<ul style="list-style-type: none"> Consumer awareness and scrutiny of the fishing industry 	Conditional
	<ul style="list-style-type: none"> Implementation of Amendment 21 (intersector allocation) 	Conditional
	<ul style="list-style-type: none"> Amendment 15 	+
	<ul style="list-style-type: none"> Ongoing harvest specifications process and OY setting 	Unknown
	<ul style="list-style-type: none"> Climate change and the effect on species abundance and location 	Unknown
	<ul style="list-style-type: none"> The possibility that a stock is unexpectedly declared as rebuilt 	+
<ul style="list-style-type: none"> The possibility that a stock is unexpectedly declared as overfished 	–	

4.11.4.2 Trends and Actions Influencing Individual and Collective Risk

Several trends and actions are expected to continue, or be implemented in the future, which affect the amount of risk catcher-processors face. These include the following:

- The rebuilding of depleted groundfish stocks
- Amendment 15
- Climate change and the effect on species abundance and location
- The possibility that a stock is unexpectedly declared as rebuilt or overfished

Rationalization can have the effect of imposing additional risk on participants in the catcher-processor sector. Some risks can be described as collective when one group of participants can be affected by the actions of another. Others can be described as individual risk when the aspect of individual accountability combined with catch uncertainty creates the potential for individual participants to have an overage. This can be costly if the quota for that species is expensive or if the participant faces an enforcement action. The level of individual and collective risk largely depends on several factors including the degree of catch uncertainty relative to the OY of each species, the type of species covered with IFQ, and the level of bycatch management in a cooperative program.

When combined with other actions and trends, the risk faced by catcher-processor participants is not expected to be much different than the incremental effect associated with rationalization of the fishery. Furthermore, a rationalization program could be implemented that does not change the amount of risk

catcher-processor participants face at all relative to status quo. No change relative to status quo would occur if the Council adopted a cooperative program for the catcher-processor sectors and spread bycatch management across the three whiting sectors (i.e., retained the three-sector bycatch limit).

Amendment 15 limited access to nontribal sectors of the Pacific whiting fishery. Prior to the implementation of this amendment, there was a risk of new entry into the catcher-processor sector of the whiting fishery. One possible response to a new entrant is the break-up of the existing voluntary cooperative. While the likelihood of such a break-up is not known, there was a risk of such an event occurring. In that event, it is likely that the catcher-processor sector would have engaged in race-for-fish behavior, which is likely to lead to higher rates of bycatch than a fishery operating more rationally. Higher bycatch rates could lead to premature closure of the fishery compared to a case where lower bycatch rates occurred. Therefore, it is reasonable to state that Amendment 15 has had the effect of reducing the risk of the catcher-processor sector reverting to a race-for-fish fishery and, as a result, has reduced the risk of bycatch cap attainment prematurely closing the directed whiting fishery.

Several additional factors that are largely exogenous to the effect of rationalization, but that may influence risk, include the possibility of a stock becoming declared as overfished, the removal of a stock from overfished status, and the effect of climate change on species abundance and location. While these factors are largely related to uncertainty, they are best examined in the cumulative effects section because they are not directly related to rationalization, but may affect the degree of risk catcher-processor participants face in a rationalized fishery. If a stock becomes overfished and a lower OY is implemented, additional risk can be imposed if catch uncertainty is high relative to that OY. However, the level of risk faced depends on the level of uncertainty relative to the OY level that may be specified by the Council, which cannot be predicted here. The inverse is true if a stock is taken off the overfished list. The effect of climate change on fish abundance and location also influences the degree of risk. If conditions are such that groundfish migratory patterns differ substantially from one year to the next because of changes in climate and oceanographic conditions, the ability of catcher-processor participants to make informed decisions about fishing location and the species caught at those locations could become compromised. This could have the effect of increasing the uncertainty associated with harvesting and influence the degree of risk associated with fishing activity. However, it is not known whether climatic events will affect groundfish resources in this manner, and, therefore, the effect of climate change is largely unknown.

Table 4-62. Cumulative factors affecting revenues and fleet efficiency.

Factors Affecting Revenues and Fleet Efficiency		Score
Due to Rationalization	Level of bycatch management (individual, coop, sector, fishery)	Conditional
Exogenous to Rationalization	Relatively high cost of inputs (such as fuel)	–
	Increased competition for ocean space (state MPAs, wave energy, offshore resource exploration)	–
	Increased global demand for protein	+
	Rebuilding of depleted groundfish stocks	+
	Consumer awareness and scrutiny of the fishing industry	Conditional
	Implementation of Amendment 21 (intersector allocation)	Conditional
	Amendment 15	+
	Ongoing harvest specifications process and OY setting	Unknown
	Climate change and the effect on species abundance and location	Unknown
	The possibility that a stock is unexpectedly declared as rebuilt	+
The possibility that a stock is unexpectedly declared as overfished	–	

4.11.4.3 Trends and Actions Influencing Vessel Safety

Safety conditions are largely related to profitability, the subsequent ability to pay for and conduct maintenance, and the ability to avoid fishing in hazardous weather conditions. As a result, many aspects affecting safety are the same as those factors affecting vessel profits and fleet efficiency. Rather than repeating the factors that are expected to result in changes in vessel profits and fleet efficiency, the reader is referred to the subsequent section describing the effect on profits and fleet efficiency. Factors improving profits and fleet efficiency should be beneficial toward safety conditions, while those that may adversely affect profits and fleet efficiency should be adverse toward safety conditions.

Factors that may lead to fewer occurrences of vessels fishing in hazardous weather conditions are limited to those factors directly related to the effects of rationalization. Therefore, the cumulative effects are the same as the incremental effect of rationalization.

4.11.5 Summary of the Effects on Catcher-Processors by Alternative

The cumulative effects of all of the alternatives is not expected to differ substantially by alternative, except in the way in which nontarget species are managed and whether catcher-processors are managed with IFQs or harvest cooperatives. In general, implementation of any of the action alternatives is not expected to alter the way the catcher-processor fishery is prosecuted under Alternative 1 (no action), except with regard to Alternative 3 (which may mean that catcher-processors race for fish to some extent via bycatch, thus eliminating some of the potential cost efficiency improvements that may be realized) and Alternatives 2a, 2b, and 2c that implement IFQs for catcher-processors and require that they are accountable for all groundfish species in the ABC/OY table.

4.11.5.1 Alternatives 2a, 2b, and 2c

Implementing an IFQ system on catcher-processors has the potential to alter the way in which the existing sector prosecutes its available harvest. This alteration may come in the form of a break-up of the existing cooperative, though it is not immediately clear what the implication of breaking up the cooperative could be, nor is it clear how likely that potential is. Having the catcher-processor sector be accountable for all species in the ABC/OY table imposes risk to individual catcher-processors that may come in the form of large expenditures to acquire QPs in order to cover catch deficits or face an enforcement action.

When taken in the context of past, present, and future conditions/actions, Alternatives 2a through 2c change some of the conditions that have led to the existing status of the catcher-processor sector. The implementation of an IFQ system has the potential to change the arrangements that currently exist in the catcher-processor sector, though those changes are not expected to lead to a reversion to race for fish conditions prior to the formation of the voluntary cooperative. The principal impact is expected to come in the form of enhanced risk (in the form of higher costs to cover catch events) to individual catcher-processor entities and this is expected to add to costs that some catcher-processors face for participating in the fishery when and if those inadvertent catch events of infrequently encountered species occurs. Under conditions expected of the future, the IFQ system allows the catcher-processor sector flexibility to adapt harvesting strategies to respond to changing conditions that may mean changes in other fishery opportunities or changes in markets.

4.11.5.2 Alternatives 3, 4a, and 4b

Alternatives 3, 4a, and 4b all result in an impact on catcher-processors that is equivalent to Alternative 1 (no action), except for the way bycatch is managed in Alternative 3. In Alternative 3, bycatch is managed as a common pool across all whiting sectors, leading to conditions that encourage a race for fish via bycatch. The result of these alternatives is a continuation of the existing catcher-processor cooperative and effects that look similar, or identical, to Alternative 1.

When combined with past, present, and future conditions/actions, these alternatives result in a system that continues the recent past and present status of the catcher-processor sector (that timeline since the voluntary cooperative has been in effect). This cooperative structure creates conditions that allow the catcher-processor sector the ability to adapt to changing conditions in the future, such as changing OYs (ACLs), opportunities in other fisheries, and changing markets.

4.12 Processing and Other Labor

The proposed action is expected to affect labor indirectly through changes to the harvester and processor sectors. The action alternatives are expected to be indirectly affected by the allocation of QS or co-op processors' ties. Otherwise, effects attributable to the specific program features that differentiate the alternatives cannot be discerned. For this reason, broad-scale effects of the action alternatives against status quo, or Alternative 1. A discussion of effects by alternatives appears at the end of this section.

4.12.1 Methods for Assessing Impacts

Table 4-63 is a schematic of the way in which effects to labor are evaluated here. Fundamentally, the effects on labor due to trawl rationalization will be changes in personal income and employment, but whether the result is an increase or decrease in either depends both on the characteristics of the firm employing the labor and how the rationalization program affects its decisionmaking. Because of differences in the operational characteristics of processors of whiting versus nonwhiting groundfish processors, labor in these two sectors in turn may be affected differently. No matter the type of processor, labor will be indirectly affected by whether QSs are allocated to processors. With respect to harvester cooperatives for the whiting sector, a requirement for vessels to be tied to a specific processor could have a similar effect. Under the preferred alternative, which includes a co-op for the whiting at-sea sectors, a one-year obligation is required in the mothership sector. The current single co-op for the catcher-processor sector, which would continue, is voluntary. Allocating QSs to processors or requiring processor ties would give them more leverage in negotiations with harvesters, likely increasing profitability. This would affect business planning in ways that are likely to affect wages paid and the number of processing-related jobs. Although measurement criteria are listed, because the evaluation is qualitative, there are no numeric predictions of changes in these metrics.

Table 4-63. Impacts, mechanisms and metrics for labor.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Increase/decrease in income and employment in processing and related occupations	Economic performance (e.g., productivity) of processing firms affecting labor productivity	<ul style="list-style-type: none"> • Change in the number and location of related jobs 	<ul style="list-style-type: none"> • Qualitative assessment based on expert opinion
	Changes in the operational characteristics of processing facilities	<ul style="list-style-type: none"> • Change in wages and salary in related occupational categories 	<ul style="list-style-type: none"> • Projections of geographic shifts in delivery and fishing activity
	Change in number of processing facilities		<ul style="list-style-type: none"> • Indirect effects from impacts on processors
	Change in the location of processing facilities		

4.12.2 Direct and Indirect Effects of the Alternatives on Labor

The principal difference among processing firms likely to affect labor is the size of their processing facilities and the degree to which they are able to switch production to different product forms. Shore-based whiting processors currently must handle large volumes of fish in a relatively short period because the whiting fishery tends to function like a derby with harvesters competing to catch the available quota. During the part of the year when there is no whiting fishery, processors have an incentive to diversify into processing other products in order to maximize returns to the larger plant capacity they have to invest in. Similarly, their labor demand will vary through the year, to the degree they are unable to keep their plant at operational capacity. For example, if the plant cannot be put to another use outside of the whiting season, such as processing nonwhiting groundfish or Dungeness crab, most of the jobs in the facility will be seasonal. This is less of a problem in the at-sea sector because motherships and catcher-processors are mobile and can be deployed to the Alaska pollock fishery. (Furthermore, the measures proposed for the catcher-processor fleet largely maintain the status quo so related processing labor would be unaffected.) Processors specializing in nonwhiting groundfish deal with lower volumes and a steadier supply because of cumulative trip limits under Alternative 1, No Action. They may also require somewhat different types of labor than whiting processors if their operation is less mechanized and they deal with a greater variety of species and product forms.

The decision to allocate QSs to processors, and how much is allocated to them, affects their bargaining position vis-à-vis harvesters (Section 4.4). The processor tie requirement in the mothership and shore-based cooperative alternatives may have a somewhat analogous effect. Any resulting increase in bargaining power will tend to reduce ex-vessel prices and increase processor profit margins. Changes in processor profit margins are expected to have an indirect effect on processor labor. It is reasonable to expect that changes in profit margins for processors will have a corollary impact on wages paid to laborers, though perhaps not at a one-to-one ratio.

To the degree that increased profitability stimulates new capital investment, to increase either the scale or scope of current operations, could affect labor demand. Investment to scope could mean the development of new product forms and new markets, possibly accompanied by greater specialization in one product category and an adjustment in the skill required of processing laborers. Investments to increase the scale of operations (the ability to process larger volumes) could also create greater demand for skilled labor, if larger operations are more mechanized. A move to specialize, whether or not accompanied by the development of new product forms, could likewise create demand for skilled labor, perhaps of a different sort. For example, such operations might be less mechanized but require more

skilled hand-processing of fish. In either case, the final effect on employment and income would be related to changes in productivity. This could reduce overall employment if fewer people are needed per unit of product processed. While an increase in demand for more skilled jobs would imply higher wages and an increase in personal income, the degree to which this occurs would depend on labor supply and the degree to which firms are willing to pass on productivity gains to workers in the form of increased wages. Increased labor supply would tend to decrease wages. The pool of available labor could increase for closely related reasons if processing firms lay off workers because of productivity increases. However, labor availability would probably be more affected by general trends in employment and the wages workers would be willing to accept. Changes in the meatpacking industry offers an example of how a variety of factors, including industrial consolidation and greater availability of immigrant labor, have led to a decline in wages without substantial gains in productivity (Kutalik 2008).

One of the broad effects of rationalization is to even out the supply of fish over the year. As discussed above, this is more of a factor in the whiting fishery since it tends to operate as a derby fishery. If plants are able to operate for a larger part of the year with less variation in throughput, this would make employment less seasonal, that the degree to which needed plant capacity or the number of plants is reduced as a result (and the correlation between physical capacity and labor requirements) could result in fewer jobs, but ones that are more stable. The net effect on personal income partly depends on whether seasonal workers are under-employed (because they cannot find comparable off-season work). Steadier supply might contribute to the ability of processors to specialize or develop new product forms and markets. If this demands skilled labor, it could lead to wage increases.

A rationalized fishery may facilitate long-term planning leading to new investment, the development of new product forms and new markets. The phenomenon would be more likely if processors are allocated Qs because of the greater control it would give them over the timing and location of deliveries and the price paid. A desire to increase efficiency and profitability could lead to the consolidation of operations, meaning fewer, but perhaps larger, processing facilities. Another factor that could influence the location of facilities would be the potential change in trawl vessels' homeports because of fleet consolidation and the comparative advantages of some ports (Section 4.14.5). Allocation of Qs to processors could temper this effect if they want to maintain facilities in less advantageous ports. Whatever the outcome, these factors could change which communities the jobs are in and the overall number of jobs. If the consolidation of processing facilities results in greater mechanization, this could change the types of jobs in demand and related jobs in the same way as discussed above.

If geographic shifts in fish delivery and processing activity occur as a result of rationalization, processing labor is likely to be affected on a regional scale. Based on the regional comparative advantage analysis, some processing centers in central and southern California may see some amount of groundfish processing decrease and as a result the demand for processing labor in these areas may decline. Conversely, other areas of the coast may see an increase in the amount of delivery and processing activity, meaning the demand for processing labor may increase leading to more processing labor jobs and/or increases in the wages paid to processing laborers.

4.12.3 Cumulative Effects on Processing and Other Labor

Labor is affected by a multitude of factors in addition to rationalization. The opportunities that laborers in the processing industry have are affected by harvest volumes, harvest timing, and the degree of mechanization found in the workplace, among others. Skilled processing labor relies on a relatively stable degree of employment and recent management actions taken in the groundfish fishery designed to minimize the catch of depleted stocks has made opportunities available to processing labor relatively

less stable than had been the case historically. One goal of the groundfish fishery is to have a year-round fishery, and the effect of this goal would be to sustain skilled labor throughout a year. Actions taken in 2004 and 2005 restricted the amount of fishing at the end of the year, and processing labor likely suffered as a result due to lack of volume during the end of the year.

Reductions in harvest volumes of nonwhiting groundfish have also affected labor because of less volume for processing and a reduction in the demand for labor to handle such volume. Inversely, the development of the Pacific whiting fishery increased the demand for a different kind of labor in west coast processing facilities. Laborers involved in the shoreside whiting industry use more mechanized equipment and only handle whiting seasonally. These workers may be engaged in other processing activities (such as sardines or Dungeness crab) during other times of the year. These laborers are generally considered different from those that may engage in the hand filleting nonwhiting groundfish species.

Laborers are also affected by opportunities outside the seafood industry. Such laborers may elect to engage in other forms of employment, for example. As a result, the trend of increasing population in coastal communities and the potential for diversification of coastal economies through such industries as tourism are likely to change the opportunities for laborers. When combined with the effect of rationalization, the overall status of labor is highly uncertain.

4.12.4 Summary of the Impacts of the Alternatives on Processing Labor

As discussed above, the action alternatives are likely to affect labor differently compared to the no action alternative, Alternative 1. The action alternatives could reduce labor demand overall, but remaining jobs could be higher paying (due to productivity increases) and more stable (due to more continuous supply of fish). These effects would be felt in the whiting sector, because it tends to operate more like an Olympic fishery under the no action alternative, Alternative 1. There may be no difference between the no action alternative and the action alternatives for processing labor in the nonwhiting sector, because cumulative trip limits under no action tend to result in a more even supply of fish throughout the year. Exogenous factors producing cumulative effects are likely to be greater than direct and indirect effects of the alternatives, but would have the same magnitude of effects across all of the alternatives. Principal exogenous factors are harvest specifications, which affect the volume of fish available for processing, and broad changes in labor demand across the economy, affecting employment.

The feature of the action alternatives most likely to affect labor income and employment compared to the no action alternative (Alternative 1) is allocation of IFQs to processors or the nature of the co-op tie. Allocation of IFQs to processors or a stronger delivery obligation for harvesters in co-ops would give processors more bargaining power over harvesters with respect to prices. Resulting increases in revenues or profits could positively affect wages paid. Processor allocations/affiliations under the alternatives are as follows:

- Alternative 1 (no action) has no processor allocations/affiliations.
- Alternatives 2a and 2b do not allocate IFQ to processors.
- Alternative 3 allocates 25 percent of nonwhiting groundfish to processors and requires a 100 percent processor affiliation in co-ops for mothership and shoreside whiting sectors.
- Alternative 4a allocates 50 percent of whiting IFQ to shoreside processors and includes a 50 percent processor affiliation in the whiting mothership sector.
- Alternative 4b (preferred alternative) allocates 20 percent of whiting IFQ to shoreside processors; mothership co-op require only an annual declaration.

Based on the discussion above, Alternative 3 could have the least adverse/most beneficial impact on processing labor compared to the other action alternatives; Alternatives 2a and 2b could have the least beneficial/most adverse impacts; Alternative 4a and 4b would be intermediate.

4.13 Input Suppliers

As with processing and other labor (Section 4.12), while there are likely to be substantial effects to input suppliers, it is not possible to discern effects among the alternatives, because the differences in program features are not great enough to vary what are expected to be only indirect effects.

Businesses that supply inputs to groundfish trawl harvesters may be indirectly affected by trawl rationalization if the program causes behavioral changes in trawl groundfish harvesting operations. At the level of the firm, these effects depend on an input supplier's size and location. While a variety of businesses supplies inputs to the trawl sector, for many, the trawl sector accounts for a small proportion of sales, either because they sell to firms and individuals across the economy (e.g., grocery wholesalers/retailers), or because they sell to harvesters in many other fisheries (e.g., marine electronics retailers). Smaller, specialized retailers located in ports where groundfish trawlers are an important component of the local fleet (in terms of purchases, not necessarily number of vessels) would be more affected by changes in demand for inputs. Those most affected depend on the trawl sector for a large proportion of their sales. The types of suppliers most affected by the proposed action would be the following:

- Small retailers of specialized equipment and materials (e.g., ship chandlers, hardware stores).
- Dockside fuel suppliers.
- Suppliers of specialized services (e.g., welders, riggers, equipment installers).
- Equipment manufacturers for whom groundfish trawl vessels account for a large proportion of sales (e.g., boat builders, net manufacturers). These manufacturers fabricate specialized equipment and sell either directly or through local retailers.
- Firms that contract observers to the groundfish trawl sector.
- Brokerage firms that handle the sale/transfer of IFQs.

Although crew labor is generally considered a variable input, effects on crew are discussed in Section 4.7.

4.13.1 *Methods for Assessing Impacts*

Table 4-64 shows how impacts to input suppliers are evaluated. The impact mechanisms are related to the type of input. Certain inputs can be related to variable costs and capital investment. Food, fuel, and other expendable supplies, services, as well as certain equipment that must be regularly replaced, are variable costs related to operations. Capital investment represents large fixed costs such as the purchase of new vessels or processing facilities.

Contracting of fishery observers is also a variable cost related to fleet-wide days at sea. The provision of fishery observers will, however, be affected by other factors aside from vessel operations related to the implemented monitoring and reporting program, so it is considered separately.

Brokerage firms handle the transfer of IFQ (Qs or QPs), and their fee structure is related to sale/transfer activity. Although such transactions could be negotiated by the IFQ owner and potential purchasers, information constraints (knowing who wants to buy what and at what price) would likely

make the use of a broker more cost effective in many cases. IFQ sales would be related to consolidation as some permit owners sell out and exit the fishery. Such sales could also occur if those operations that stay in business need to rebalance their IFQ portfolio, for example to match a particular fishing opportunity in which they want to specialize. QS leasing would essentially serve the same functions without permanent transfers and such arrangements could also be mediated by brokers. QP sales would most likely occur to cover unexpected overages.

Table 4-64. Overview of analytical approach used to compare baseline and future conditions of input suppliers under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes in the economic performance (e.g., profitability) of individual input suppliers	Consolidation of harvesting sector as well as spatial redistribution of fishery related activity	Fuel expenditures Food expenditures Expenditures on services (maintenance and repair) Expenditures on frequently replaced equipment and materials	<ul style="list-style-type: none"> • Qualitative assessment based on expert opinion • Projections of geographic shifts in delivery and fishing activity
	Changes in the economic performance (e.g., profitability) of harvesters and processors	Capital investments made by processors and harvesters	
	Reporting and monitoring requirements	Expenditures on observers	
	Transfers of Qs and QPs and cumulative trip limits	Ex-vessel value of transfers	

4.13.2 Direct and Indirect Effects of the Alternatives on Input Suppliers

Consolidation means that fewer vessels would operate in the groundfish trawl fishery. This is expected to lead to an overall reduction in demand for inputs specifically related to the trawl fishery. However, if vessels leaving the groundfish trawl fishery continue to operate on the west coast in some fashion (in other fisheries, for example) the drop in demand could be modest, since many inputs are not so specialized as to be used exclusively when trawl fishing. By the same token, if the vessels leave the region or are scrapped, this would contribute to a fall in demand for inputs. The relocation of vessels is related to consolidation and the comparative advantage of ports and would adversely affect retailers and service providers located in disadvantaged ports.

Fuel represents a major variable cost in fishing operations. Local fuel suppliers would be similarly affected by vessels relocating. Since fleet consolidation is intended to increase efficiency, it is expected to reduce overall demand for fuel. For example, a fewer number of larger vessels would likely use less fuel overall. An ability to optimize fishing activities over the course of the year, which, as discussed elsewhere, would be a bigger factor in the whiting fishery, could also decrease fuel expenditures. This would tend to occur as vessels fish at a more rational pace and optimize their costs relative to revenues. This could mean that the overall amount of time spent at sea decreases as effort is spread across more months of the year. Input suppliers that operate on a larger regional scale (such as net manufacturers that sell to vessels all along the west coast) would be largely unaffected by shifts in the location of vessels but could be adversely affected if fewer of these types of inputs are needed.

Trawl rationalization is expected to increase the profitability of harvesters, and processors depending on the allocation of IFQ. This could lead to greater capital investment, benefiting some input suppliers. Harvesters remaining in the fishery could invest in new vessels, or vessel configurations better matched to changes in operational characteristics resulting from rationalization (e.g., change in the pace of fishing, specialization). For the most part, processors have investments in plants and equipment that may be impracticable or not cost-effective to move if they relocate operations or consolidate to certain locations. This could stimulate the purchase of land, buildings, and equipment.

Observer coverage will undoubtedly increase under a rationalization program. An increase in observer coverage levels could be counterbalanced somewhat over the long term if the fleet consolidates to a fewer number of vessels. Thus, firms that contract fishery observers are likely to benefit from trawl rationalization.

Any of the alternatives that include IFQs will benefit brokerage firms that handle IFQ transactions. The level of transfer activity, which dictates the fees they receive, depends on the level of consolidation and the need for operators to balance share portfolios to match the mix of species they plan to harvest or actually harvest (the latter might be covered by QP purchases instead, but such transfers could still involve brokerage firms). Portfolio rebalancing is likely to be an ongoing activity but, over the long term, would tend to involve transacting fewer shares as portfolios better match harvesters' operational characteristics. Consolidation will likely occur over the long term but involve a larger volume of shares overall.

4.13.3 Cumulative Effects on Input Suppliers

Input suppliers represent a fairly broad category of entities affected by rationalization of the west coast trawl fishery. As a result, the cumulative effects of rationalization are relatively broad and may differ among the various types of input-supplying entities. Input suppliers are impacted via a second order effect on harvesters and/or processing entities. Therefore, cumulative effects on harvesters and processors may be reflected in input suppliers. Input suppliers may be exclusively tied to the seafood industry, or may be diversified into other industries. As a result, factors other than those related to fisheries may affect input suppliers.

Over time, activity in the west coast seafood industry has varied and the effects on input suppliers have varied as a result. Harvest restrictions in the west coast groundfish and salmon fisheries have led to a reduction in fishing effort, participation, and landings. The reduction in effort and participation is directly related to the demand seafood industry participants have for inputs such as gear and equipment, services, and fuel. As a second-order effect, this has likely affected input suppliers who relied on participants in those fisheries. Inversely, the recent success of the Dungeness crab fishery, the domestication of the Pacific whiting fishery, and the reemergence of the west coast sardine fishery may have offset much of the losses input suppliers suffered declines in more traditional groundfish activities and in salmon fisheries, though the effect almost certainly differs across the various types of input suppliers.

Exogenous actions (including RFFAs) expected to influence input suppliers include harvest reductions, which have affected groundfish harvesters and processors, harvest reductions in salmon fisheries, counteracting increases in Dungeness and sardine landings, and broad changes in the economy affecting demand for goods and services. Overall input suppliers will be differentially affected depending on their degree of specialization. (Less specialized input suppliers would be less vulnerable to changes in the seafood processing industry but still affected by broad-scale economic changes such as a national recession.)

4.13.4 Summary of the Impacts of the Alternatives on Input Suppliers

In the discussion above, consolidation in the harvester fleet is identified as a principal factor producing indirect effects on input suppliers. Consolidation could reduce demand for both variable inputs (e.g., fuel, supplies) and fixed inputs (e.g., new equipment) compared to the no action alternative (Alternative 1); however, increased profitability could partially offset this reduction. Remaining fishery participants may replace fixed capital more rapidly, for example by purchasing new equipment or vessels. Cumulative effects are due to the economic performance of the seafood industry and the broader economy affecting demand. Reporting and monitoring requirements and IFQ transfers could have a positive impact on input suppliers providing related goods and services compared to the no action alternative (Alternative 1).

Program features affecting consolidation are accumulation limits, grandfather clause, and number of sectors. Use of IFQ as the catch control tool could increase demand for brokerage services compared to the no action alternative. The application of IFQ also varies among the action alternatives. The same reporting and monitoring program is included in all the action alternatives, so they do not differ in terms of effect but collectively would increase demand for observer coverage and related inputs compared to Alternative 1 (no action).

Alternative 2 would likely result in the greatest level of consolidation because it has relatively higher control limits, a grandfather clause, and merges shoreside whiting and nonwhiting into a single sector (allowing greater consolidation within the one sector). Greater profitability of remaining firms could at least partially offset this adverse effect.

Alternative 3 has the lowest accumulation limits, no grandfather clause, and four sectors. It also has an area management provision whereby nonwhiting sector IFQ is differently denominated. This could increase IFQ trading and thus demand for brokerage services. This alternative may have the least adverse effect on input suppliers.

Alternative 4 has accumulation limits intermediate between Alternatives 2 and 3. Alternative 4a has the grandfather clause, while Alternative 4b (the preferred alternative) has a divestiture provision, which would allow use of QPs over the limits for up to four years at the outset of the program. A single shoreside sector would be created, combining whiting and nonwhiting managed with IFQs. Alternatives 4a and 4b would likely be intermediate in the level of consolidation compared to Alternatives 2 and 3. Effects on input suppliers would likely be modest and both beneficial (brokerage and observer services) and adverse (fewer harvester firms purchasing products and services partially or wholly offset if increased profitability increases purchases by remaining firms) compared to Alternative 1 (no action).

4.14 Communities

In this section, we describe the impacts of the alternatives on communities. The MSA defines a fishing community as “a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community” (MSA §303(a)(9)). In interpreting this definition, NMFS has stated that “A fishing community is a social or economic group whose members reside in a specific location...” (63 FR 24211). As such, we interpret community to mean a geographic location, as opposed to an occupational community or a community of interest.

This section begins with a discussion of how trawl communities are identified, followed by a discussion of methods and metrics used to illustrate impacts. Next, we discuss the broad-level effects of rationalization on communities, including lessons learned from other rationalization programs. This section provides a big-picture look at issues, independent of the differences between the alternatives. Community impacts depend in large part on impacts to harvesters and processors, captains and crew, nontrawl harvesters, shoreside processors, etc.

Following the description of broad-level effects, we assess the impacts of the alternatives (see page 498). This section begins with a discussion of the community implications of each alternative, followed by a discussion of each element in the alternatives. Following this section, we discuss impacts on specific communities, when possible.

At the end of this section, we provide a summary of the effects of trawl rationalization on each trawl community identified. Finally, we assess cumulative effects. This section briefly summarizes past and present actions with ongoing effects on communities, and RFFAs that are expected to affect communities. The effects of these past, present, and RFFAs are combined with the effects of the alternatives to arrive at cumulative effects.

The trawl rationalization process could have a profound impact on many coastal communities that depend on trawling as a source of revenue. If the history of the implementation of other IFQ programs is a guide, rationalization will result in social impacts being felt in a range of communities, as fewer vessels participate in the fishery and fewer communities are the sites of processing effort. Trawl rationalization is expected to result in changes in the spatial distribution of effort and processing, along with consolidation of vessels and processors. These changes will have both positive and negative impacts on fishing communities.

The transition to a trawl IFQ program is intended to result in an overall gain in value of the fishery. As fishermen find creative ways to avoid overfished stocks and access underutilized target species, overall harvest levels are expected to increase. At the same time, catch and efficiency will increase, along with participants' ability to pursue value-added opportunities. There will be fewer, yet more stable, jobs across a range of sectors, and a redistribution of income and revenue opportunities will occur. The elements of rationalization that relate to community impacts are outlined in more detail below.

4.14.1 Methods for Assessing Community Impacts

In this section, we describe the methodology for assessing the impacts of rationalization on trawl communities. Section 4.14.1.1 explains how trawl communities were identified. Section 4.14.1.2 discusses impacts, mechanisms, and metrics.

4.14.1.1 Identification of Trawl Communities

Trawl communities were defined based on whether they were a principal port for active trawlers. A principal port is one where the majority of a trawl vessel's whiting and nonwhiting landings took place from 2004 to 2007. Ports meeting this principal port criterion include Astoria, Bellingham Bay, Blaine, Brookings, Charleston/Coos Bay, Crescent City, Eureka, Fort Bragg, Ilwaco, Monterey, Morro Bay, Moss Landing, Neah Bay, Newport, Princeton/Half Moon Bay, San Francisco, and Westport.

Of these ports, Blaine and Monterey were removed from the list of current trawl ports. Blaine was removed because the last remaining processor of trawl-caught groundfish closed in late 2006, and trawlers that delivered to that processor have started delivering to Bellingham. It is possible that Blaine

will once again be an active trawl port if a processor reopens there. Monterey was removed because trawlers have generally stopped delivering there. Other communities, such as Port San Luis/Avila, were recently considered trawl ports, but over time, trawl activity has dissipated, and now only marginal amounts of landings occur in these ports. No trawlers currently use these ports as their principal port, so these ports are not defined as trawl communities.

Morro Bay is a special case. Trawl activity was nearly eliminated in Morro Bay due to a The Nature Conservancy buyout in 2006, in which seven trawl permits and four trawl vessels were purchased by the nonprofit (these permits are now held in San Francisco, where The Nature Conservancy is located). However, The Nature Conservancy has indicated that it plans to use those permits and associated IFQ on vessels fishing out of Morro Bay in the future. Therefore, this community is identified as a trawl community.

In addition to these ports, we consider impacts to Anacortes and Seattle. Anacortes is primarily a business center for the at-sea whiting fishery, while Seattle is both a business center and a home base for the at-sea fleet. Table 4-65 (in geographical order) summarizes the primary trawl activities of each community.

Table 4-65. Principal groundfish ports.

Port name	Whiting	Nonwhiting
Bellingham, Washington		X
Anacortes, Washington	X	
Neah Bay, Washington		X
Seattle, Washington	X	
Westport, Washington	X	X
Ilwaco, Washington	X	
Astoria, Oregon	X	X
Newport, Oregon	X	X
Charleston/Coos Bay, Oregon	X	X
Brookings, Oregon		X
Crescent City, California	X	X
Eureka, California	X	X
Fort Bragg, California		X
San Francisco, California		X
Moss Landing, California		X
Princeton/Half Moon Bay, California		X
Morro Bay, California		X

4.14.1.2 Impacts, Mechanisms and Metrics

Table 4-66 summarizes potential impacts, mechanisms for such impacts, and metrics and methods for assessing impacts. Impacts fall under six general topics: changes induced from changes to trawl harvesters, changes induced from changes in the processing sector, impacts to nontrawl communities and fisheries, cultural and social changes, changes in municipal revenues and community stability, and infrastructure impacts.

Table 4-66. Overview of impacts, mechanisms, and metrics used to assess community impacts.

Potential Community Impacts	Mechanisms for Impacts	Metrics or Indicators	Data, Models, and Methods for Assessing Impacts
Changes in amount of trawl vessel activity	Fleet consolidation Geographic shifts in delivery activity	Vessel and permit count, type, and location	Consolidation model; Geographic shifts in fishery patterns; Initial allocation of IFQs
Changes in crew wages and number of crew jobs	Fleet consolidation Changes in crew compensation structure	Estimated income in harvesting sector, fleet consolidation data; number and location of crew employed; hours of crew employment	Consolidation model; Input from key informants
Changes in the relationships between crew and captains	Changes in compensation structure	Wages paid to crewmembers	Literature review of Ethnographic information; Qualitative assessment
Changes in the level of processing activity	Consolidation of processing sector; changes in bargaining power over ex-vessel prices, changes in the timing of deliveries	Number and type of active processors; municipal income data	Geographic shifts in fishery patterns; Consolidation model
Changes in the number of processing jobs and the seasonality of processing jobs	Changes in volume of landed catch; changes in the location of delivered catch; changes in the timing of harvest	Number and type of employment in processing sector; amount of seasonal/temporary employment vs. permanent employment	Geographic shifts in fishery patterns; Catch estimate model; qualitative assessment
Cultural and social changes	Families may experience increased stress due to economic and cultural change	Relationship between economic change and family stress	Qualitative assessment from relevant ethnographic studies
	Community identity may change if certain fishery sectors are lost	Relationship between potential loss of an industry and community identity	Qualitative assessment from relevant ethnographic studies
Changes in municipal revenues and community stability	Public revenues may be lost if trawl or processing sector shrinks	Estimated municipal revenues; raw and processed product cost/value	Income impacts derived from other EIS sections
	Depending on the importance of a “working port” to tourism to a community	Information on how important the local fishery is to the tourist industry	Qualitative discussion; community profiles; consolidation and geographic shift models.
Infrastructure impacts	Infrastructure may be lost if trawl or processing sector is reduced	Quality of infrastructure; vessel numbers, pounds of harvested species, change in landing patterns	Qualitative discussion; consolidation and geographic shift models.
Impacts to nontrawl communities and fisheries	Nontrawl communities may be affected by increased competition, impacts on infrastructure in trawl communities (resulting from gear switching and other fishery shifts)	Estimates of gear switching and shifts to other fisheries	NWFSC Consolidation Model; Geographic shifts in fishery patterns; Initial allocation of IFQs; NWFSC community profiles

4.14.2 Broad-Level Effects of Trawl Rationalization on Communities

As described in previous sections, a rationalized fishery is expected to change profit motivations and increase individual accountability, which, in turn, will change the way fisheries are pursued. These changes will tend to indirectly impact communities. The magnitude and location of fishing effort and processing, the volume and type of species harvested and processed, harvesting methods, and the number of vessels used to pursue fishing activity may all be affected. If rationalization is implemented, these changes will take place no matter which alternative (or alternative) is selected. However, options within the alternatives—such as accumulation limits, an adaptive management provision, and processor shares—will also influence communities.

In addition to a literature review, models were used to analyze the impact of the initial allocation of IFQ, the amount of fleet consolidation expected to occur, the potential for shifts in the location of fishing effort, the potential for changes in revenue and catch as a result of changes in bycatch rates, the comparative advantage of ports and regions in a rationalized fishery, and the regional economic impacts of trawl fishing activity. Theoretical tools were used to describe the outcomes of negotiation and power shifts between harvesters and processors. These models and tools are described in more detail in Appendix C, with some results described below.

Briefly, the main lesson learned from the literature on rationalization programs is that managers must balance the desire for increased efficiency in the fleet as a whole with the desire to protect communities by using limits on consolidation and transferability. A General Accounting Office study (2004) neatly summarizes both the lessons learned from other rationalization programs and the tradeoffs that must be considered:

While an IFQ is a fishery management tool put in place to protect the resource, as well as reduce overcapacity, these laudable goals may have unintended consequences: the loss of communities historically engaged in or reliant on fishing and reduced participation opportunities for entry-level fishermen or fishermen who did not qualify for quota under the initial allocation. New IFQ programs or modifications to existing programs may be designed to address these problems by incorporating community protection and new entry goals. However, because the goals of community protection and new entry run counter to the economic efficiency goals, fishery councils face a delicate balancing act to achieve all goals. (page 29)

Similarly, a NRC study notes the following:

Achieving the goals of increased overall economic efficiency, more effective enforcement or administration, or more effective conservation through the use of IFQs may lead to reduced breadth of participation by fishermen, reduced total employment in the harvesting sector, and other shifts in the distribution of benefits from the fishery. The critical point is that these trade-offs be clearly identified, estimated prior to decisionmaking, and monitored subsequent to program implementation to provide information for adjusting the program over time and for designing subsequent programs(NRC 1999).

Concerning both the New Zealand and B.C. halibut programs, Dewees (1998) notes the following:

Probably the most important part of IFQ implementation involves the stakeholders deciding what they want the fishery to look like. Methods of initial quota allocation, aggregation limits, and transferability are the key issues that will affect outcomes. For

example, if the goal is to sustain communities, some quota could be allocated to the community rather than to individuals. . . .

Below is a more detailed description of observed and anticipated outcomes of rationalization. Because of the cascading and interconnected nature of these impacts, we start with the major impacts of rationalization (consolidation and geographic shift) and move through impacts on harvesters and processors before discussing related impacts on communities, families, and nontrawl communities.

4.14.2.1 Community Impacts from Fleet Consolidation

Varying levels of consolidation have been documented in all existing IFQ programs, and models predict consolidation in the west coast nonwhiting groundfish trawl fleet of approximately 55 to 66 percent. The distribution of consolidation is of vital importance to communities. The literature suggests that consolidation tends to happen quickly after rationalization is implemented, even with limits in place.

Consolidation in the trawl sector is expected to increase revenue in the fishery, and to lead to a decline in the number of vessels. On a fleetwide scale, the reduction in the number of vessels engaged in the fishery is expected to reduce annual fixed costs. The distribution of this reduction is of particular importance to communities. Some communities—particularly those with robust existing infrastructure, efficient fleets, and close to fishing grounds with low bycatch constraints—will benefit, while other communities with less efficient fleets, less infrastructure, and near higher bycatch areas, will likely contract.

Accumulation limits are an anticonsolidation measure that could benefit some communities by reducing fleet consolidation and maintaining a minimum number of businesses involved in the fishery. Accumulation limits and expected levels of consolidation are discussed below, in Section 4.14.4, under “*How will accumulation limits affect communities?*”

Case studies of rationalization programs around the world have documented varying degrees of consolidation. McCay (1995) writes “...a review shows that the general pattern is one of consolidation and rationalization of harvesting capacity, though there are some exceptions.... Rapid consolidation may occur even though the system is designed to limit transferability.” Since each IFQ program reviewed takes place in a different fishery, with a different socioeconomic context and different program design, it is important to consider these differences before generalizing. However, it is clear that constraints on consolidation can have an important impact on communities. For example, in the Icelandic cod fishery, massive consolidation led to a relatively small number of large companies owning the majority of the quota; in 1994, 70 percent of the smallest IFQ holders held just 10 percent of IFQs. This has led to public discontent, strikes by fishermen, the loss of fishing activity, and high rates of unemployment in small communities (Palsson and Helgason 1995). In the Atlantic surf clam and ocean quahog fishery, McCay et al. (1995) found “a very rapid decline in the number of vessels actually involved in the fishery,” declining from 135 vessels in 1990 to fewer than 50 in 1994. They note that, by 1995, nine firms controlled 82 percent of the IFQ for surf clams, and 10 firms controlled about half the IFQ for ocean quahogs. Still, Adelaja et al. (1998) argues that monopolies did not develop in that fishery. Wilen and Casey (1997) found a small amount of consolidation in the B.C. halibut fishery, where relatively strong anticonsolidation measures were included in the program design.

As predicted, economic efficiency of the fleet as a whole does seem to increase under rationalization. Several of the case studies described below document increased efficiency in the fishery. McCay et al. (1995) writes that in the surf clam and ocean quahog fishery, both fishing hours and productivity per vessel increased.

4.14.2.2 Community Impacts from Geographic Shifts in Fishing Effort

As a result of consolidation and increased efficiency, shifts in the geographic distribution of fishing and processing activity are expected to result from rationalization. In some areas, the presence of constraining overfished species will be an important factor. Vessels that traditionally operate in areas with relatively high bycatch rates (such as Neah Bay) will find themselves at a disadvantage. They are more likely to reach their quota of constraining stocks earlier, and be forced to stop fishing earlier than vessels in other areas. As a result, vessels will likely modify their behavior to decrease bycatch of overfished species. This could be achieved by switching to nontrawl gear, changing the location of fishing, moving to another port, or selling Qs to another vessel and leaving the fishery. These actions could affect the trawlers' home and delivery ports, as well as other nontrawl ports that depend on the infrastructure present in nearby trawl ports.

Such geographic considerations are likely to be influenced by market conditions as well. If a vessel fishes in an area with a relatively high bycatch rate for overfished stocks, but is economically efficient and delivers to a port with good market conditions, then it may find ways to adapt in order to continue to fish in that area while avoiding bycatch.

Quota allocation may also affect geographic shifts. Depending on the allocation formula, some permit holders and catcher vessels may receive a greater or lesser amount of allowable catch than under status quo conditions. In addition, they may receive a different mix of species allocated as quota compared to the mix of species currently harvested. In the long run, transfers of fishing privileges should occur in a way that is more optimal to individual harvesters, but that transfer will act as a cost to some individuals and as a benefit to others, with subsequent impacts on their ports and processors.

Consolidation is likely to have a geographic effect as well. Based on analysis of cost-earnings data, vessels of a particular size are more cost efficient than others. This relative degree of cost efficiency will mean that ports with a relatively large presence of efficient vessels may see less consolidation than those ports with less efficient vessels. If enough vessels are lost from a particular community, it may mean a decrease in the amount of fishing related activity occurring in that area.

4.14.2.3 Community Impacts as a Result of Changes in Fishing Employment

Studies of existing IFQ programs have documented impacts on fishing employment that include job loss, shifts in the compensation system from shares to wages, higher wages for remaining crew (despite lower crew shares), longer hours, changing skill requirements, changes in bargaining power between quota owners and crew, and quota owners charging crew for use of quota. Researchers have also observed the development of new businesses based on leasing quota rather than harvesting.

The consolidation occurring in the trawl sector, and resulting impacts on fishing employment, will have varying effects by community. As some vessels become more efficient and others drop out of the fishery, there will likely be a loss of skipper and crew employment opportunities in some communities, and a gain in others. Unemployment caused by rationalization could lead to secondary impacts on community businesses if residents lose purchasing power; for example, during the implementation of rebuilding plans for overfished groundfish species, Goblirsch (2002) reported impacts on such businesses as car dealerships and restaurants. On the other hand, the crewmembers who remain in the fishery may earn more income and work more hours. Since crew are not individually licensed, trends in crew employment are difficult to track, but it seems reasonable to expect that the communities expected to benefit from rationalization will experience increased crew wages and crew hours; conversely, those that are expected to lose trawl activity will also lose crew employment opportunities.

Copes (1997:68) notes that a loss of fishing employment can have particularly negative impacts in isolated communities where there are few alternative employment opportunities. McCay et al. (1995) estimated a one-third decline in labor in the Atlantic surf clam and ocean quahog fishery between 1990 (when rationalization was implemented) and 1992. Surveys indicated that displaced workers tried to stay in the fishing industry but were unable to find work, in part because of downturns in other fisheries in the region. This is particularly relevant to the west coast due to the widespread closures of the salmon fishery in 2008 and 2009.

4.14.2.4 Other Impacts on Communities and Harvesters

Other community-related impacts on harvesters include new economic hurdles for those who are not allocated quota, increased incentives to switch gear types in some communities, changing crew needs for those switching gear, impacts of gear switching on suppliers, changes in ex-vessel prices, impacts of leasing, and increased (or decreased) safety. The potential development of CFAs could also affect harvesters and communities. CFAs are discussed in more detail in the section on RFFAs, below.

Hurdles for New Entrants

Under rationalization, harvesters who do not receive an initial allocation of quota will find it difficult to participate in the trawl fishery due to the cost of entering into the fishery. Even under status quo, however, would-be participants have to purchase a permit to participate, which is also a barrier to entry. McCay (1995) writes: “After the initial allocation, it is usually difficult for others to acquire shares because of the large value immediately created.” The GAO review of IFQ programs (2004) similarly notes the following:

IFQ programs have also raised concerns about opportunities for new entry. As IFQ programs move toward achieving one of their primary goals of reducing overcapitalization, the number of participants decreases and consolidation occurs, generally reducing quota availability and increasing price. As a result, it is harder for new fishermen to enter the fishery, especially fishermen of limited means, such as owners of smaller boats or young fishermen who are just beginning their fishing careers.

Gear Switching

Regional differences in bycatch rates may encourage some vessels to remain in the same port, but switch to other groundfish gear to reduce bycatch. For example, some vessels operating in high bycatch areas may choose to use pot gear instead of trawl gear. This could lead to new skill requirements for crewmembers and differences in the number of crew required on a vessel. Pot fishing could result in higher prices, since fish caught with pot gear tend to be of better quality, but will also likely result in a decrease in harvest volume since pot gear is less effective at catching many types of flatfish. Such a reduction in harvest volume may translate into fewer jobs on shore that would otherwise be needed to handle, process, and transport the harvest volumes associated with trawl gear. However, communities as a whole could be expected to benefit from gear switching options if the only alternative is a departure of fishing activity from that port because of bycatch issues.

Gear switching could have secondary impacts on suppliers. For example, price differences for different types of gear could reduce or improve supplier profits. In addition, suppliers may need to form new relationships with wholesalers and manufacturers of new gear types. If gear switching occurs suddenly, a supplier could be stuck with gear that cannot be sold.

Changes in Ex-vessel Prices

Ex-vessel price is generally expected to increase relative to status quo if the entire allocation of IFQ is made to permit holders. Again, the distribution of these benefits to communities will depend on the distribution of consolidation and geographic shift. In addition, as processor initial allocation is increased, ex-vessel price is expected to decrease. In a cooperative program with linkages between harvesting and processing entities, it is unclear what will happen to ex-vessel prices.

Impacts of Quota Pound Transfers (Leasing)

In a rationalized fishery, QPs may be transferred to others, creating a short-term means of providing alternative income to QS owners and allowing QP purchasers (lessees) to fish without the cost of purchasing QSs outright. However, Pinkerton and Edwards (2009), in their study of the B.C. halibut IFQ program, note that for fishermen leasing QSs, the cost of the lease can erode ex-vessel profits. In addition, quota owners benefited at the expense of skippers and crew. Pinkerton and Edwards write (2009) “There is now a widespread industry practice of taking a lease fee ‘off the top’ as a trip cost (subtracting it from the amount to be divided among the crew), even if a fisherman-skipper owns the quota (and thus pays the lease fee to himself)... Thus even owner-operated vessels which do not have to lease quota usually pay reduced wages to crew. The existence of the IFQ system has altered accounting practices in ways which fundamentally alter wealth distribution.” The authors cite a NRC study (NRC 1999) that notes the following:

Leasing of QSs should generally be permitted but, if necessary, with restrictions to avoid creation of an absentee owner class. Making shares freely transferable is generally desirable to accomplish the economic goals of an IFQ program. However, if it is desired to promote an owner-operated fishery or to preserve geographic or other structural features of the industry, it may be necessary to restrict long-term transfers of QSs to bona fide fishermen or to prohibit transfers away from certain regions or among different vessel categories.

QP transfers (leases) may impact communities in a couple of ways. First, new entrants may initially enter the fishery as lessees, and it may be difficult for them to purchase their own QSs without assistance. Without new entrants, communities may gradually lose fishing enterprises and fishing knowledge. In other cases, community members may no longer see fishing as a viable career path because the cost of owning quota is too daunting. In addition, communities wishing to form CFAs will have to overcome the same cost hurdle.

The adaptive management provision may mitigate some of the costs for lessees and new entrants. Assuming that the provision is used to allocate QPs to new entrants for free (or for a relatively low cost), it will serve as a lever to help new entrants or CFAs to become QS owners.

Safety

Safety onboard fishing vessels is generally expected to improve as a result of rationalization. Vessels do not fish in hazardous weather conditions to the same degree after the fishery is rationalized, and vessel owners are more able to maintain vessels and safety equipment. This maintenance is directly associated with the amount of net revenue generated by fishery participants, and therefore, a fishery that experiences an increase in net revenue will likely experience a decrease in safety-related incidents. In a survey of Alaska halibut fishermen under an IFQ program, Knapp (1999) found that more than 85 percent of halibut fishermen said IFQs had made fishing for halibut safer. Knapp noted that persons who liked or disliked IFQs for other reasons were more or less likely to state that IFQs made fishing

safer. However, when asked about the most positive impacts of the IFQ program, safety was mentioned most frequently. On the other hand, McCay et al. (1995) found that crew felt that safety had declined in a rationalized Nova Scotia fishery, because crew worked longer hours and experienced more fatigue.

4.14.2.5 Impacts on Fishery Processors, Infrastructure, and Suppliers

In summary, a wide variety of potential impacts on processors has been predicted and documented in other rationalization programs. Like fishing businesses, processors are expected to consolidate and possibly move. This will have subsequent impacts on processor labor and municipal revenue. In addition, infrastructure could be positively or negatively impacted by geographic shift, having ripple effects on local nontrawl communities as well as the trawl sector. Businesses that support the trawl sector will also be impacted, depending on their location, specialization, and reliance on the trawl sector.

Processors

Other rationalization programs show mixed results related to seafood processors. Impacts will depend on the extent to which processing companies gain and control Qs. In Alaska, sources suggest that halibut and sablefish processors were negatively impacted by an IFQ program because harvesters were able to leverage higher prices from processors (Matulich and Sever 1999). In British Columbia, some processors benefited from trawl IFQs, while others were negatively affected because of a change in the seasonality and distribution of landings.

Changes that have been projected include changes in bargaining power between processors and harvesters; regional shifts in landings due to market restructuring; regional impacts depending on how IFQ is initially distributed; changes in quality, quantity, and mix of catch as operations become more flexible and market-driven; changes in harvest timing; potentially lower processor costs; and changing product output mix.

Many of these potential changes could have ripple effects on communities, particularly if processors relocate, consolidate, or change their hiring practices. If increased profitability stimulates development of new product forms and new markets, the ability to process larger volumes, increases in the scale of operations, and increased specialization could affect the demand for labor. For example, new skills may be required in some cases; in other cases, increased mechanization may mean a loss in jobs combined with a need for different skills. While an increase in demand for more skilled jobs would imply higher wages and an increase in personal income, the degree to which this occurs would depend on labor supply and the extent to which firms are willing to pass productivity gains on to workers in the form of increased wages. At the same time, the pool of available labor could increase if processing firms lay off workers because of productivity increases. Increased labor supply tends to decrease wages. However, labor availability would probably be more affected by general trends in employment and the wages workers would be willing to accept. Changes in the meatpacking industry offer an example of how a variety of factors, including industrial consolidation and greater availability of immigrant labor, has led to a decline in wages without substantial gains in productivity (Kutalik 2008).

In addition to changing labor demands, changes in the processing sector could affect municipal income to communities. For example, revenue from landings taxes may increase as the catch of nonwhiting increases in some ports.

Some specific effects on processors that may affect communities include the possibility of consolidation among whiting processors and the possibility of increased processed volume among nonwhiting processors. As discussed under the section on processors, it is likely that the rationalization of the

whiting fishery will end the current condensed season because of the elimination of derby fishing. This extension in the season means that less processing capital will be necessary to handle the given volume, potentially leading to consolidation of processing activity. If consolidation means the closure of an existing plant (or plants), this could have adverse impacts on communities where those plants are located. However, plants that remain in the fishery could be more profitable because of a decrease in the cost associated with processing activity, and this could potentially benefit those communities where remaining processors are located.

In the nonwhiting processing industry, harvest volumes may increase because of a decrease in constraining species bycatch and a subsequent increase in underutilized target species catch. This increase in target species catch may mean more utilization of processing capital and processing activity, meaning that the possibility of capital consolidation in the nonwhiting sector is less than in the whiting sector. However, geographic shifts in fishing effort could lead to consolidation in processing activity at a localized or regional scale and an expansion in processing activity elsewhere.

Infrastructure

Infrastructure includes physical infrastructure such as docks and marinas; support services, such as gear stores, fuel stations, and ice suppliers; and fish buyers and processors. Due to consolidation and geographic shift, some communities could lose infrastructure or experience a decrease in the quality of infrastructure. In addition to affecting the communities where this takes place, this could affect local nontrawl communities that depend on infrastructure in trawling communities. For example, the loss of an ice plant in a community could affect all fisheries in that community, as well as neighboring communities. On the other hand, communities that host the remaining trawl fleet could see improved infrastructure as a result of increased profits and market stability. The development of associations that act on behalf of the community (such as Community Fishing Associations) could help stabilize fishing infrastructure if standards are placed upon CFAs which help facilitate such stabilization. CFAs are discussed in more detail under the section describing Cumulative Effects as CFAs are still in the development stage and have not been acted on by the Council.

Suppliers

Impacts on input suppliers are described in detail in Section 4.13 (page 491). Clearly, fewer vessels operating in the trawl fishery will lead to an overall reduction in demand for support resources. The relocation of vessels is related to consolidation and the comparative advantage of ports and would adversely affect retailers and service providers located in disadvantaged ports.

Businesses that support groundfish trawl harvesters may be indirectly affected by trawl rationalization if the program causes behavioral changes in trawl groundfish harvesting operations. These impacts will depend on an input supplier's size and location. Although a variety of businesses support the trawl sector, for many, the trawl sector accounts for a small proportion of sales, either because they sell to firms and individuals across the economy (e.g., grocery wholesalers/retailers), or they sell to harvesters in many other fisheries (e.g., marine electronics retailers). Smaller, specialized retailers located in ports where groundfish trawlers are an important component of the local fleet (in terms of purchases, not necessarily number of vessels) would be more affected by changes in demand for inputs. Those most affected depend on the trawl sector for a large proportion of their sales. The types of suppliers most affected by trawl rationalization would be the following:

- Small retailers of specialized equipment and materials (e.g., ship chandlers, hardware stores).
- Dockside fuel suppliers.
- Suppliers of specialized services (e.g., welders, riggers, equipment installers).

- Equipment manufacturers for whom groundfish trawl vessels account for a large proportion of sales (e.g., boat builders, net manufacturers). These manufactures fabricate specialized equipment and either sell directly or through local retailers.
- Firms that contract observers to the groundfish trawl sector.
- Brokerage firms that handle the sale/transfer of IFQs.

If vessels leaving the trawl fishery continue to operate in some fashion (in other fisheries, for example), the drop in demand could be modest, since many support resources are not exclusive to trawl fishing. Similarly, if vessels leave the region or are scrapped, demand for support would shrink.

Fuel represents a major variable cost in fishing operations. Consolidation is intended to increase efficiency, so it would be expected that overall demand for fuel would decline (for example, fewer large vessels would use less fuel overall). An ability to optimize fishing activities over the course of the year, which would affect the whiting fishery more than the nonwhiting fishery, could also decrease fuel expenditures. This would occur if the overall amount of time spent at sea decreased as it was spread across more of the year, because vessels could more effectively harvest fish as a result. Input suppliers that operate regionally (such as net manufacturers that sell to vessels all along the west coast) would be unaffected by shifts in the location of vessels but could be adversely affected if fewer of these types of inputs are needed.

Trawl rationalization is expected to increase the profitability of harvesters and processors, depending on the allocation of IFQ. This could lead to greater capital investment, benefiting some input suppliers. Harvesters remaining in the fishery could invest in new, larger vessels, or vessel configurations better matched to operational changes resulting from rationalization. The movement or consolidation of processors could also stimulate the purchase of land, buildings, and equipment in the communities where consolidation takes place.

4.14.2.6 Effects on Community Stability and Culture

Community stability is often cited as a goal in natural resource management, particularly forestry (Robbins 1987; Schallau 1989a; Schallau 1989b). A community stability program was initially included in the package of rationalization options, but was removed by the Council in March 2007 and replaced with an adaptive management proposal that could be used to serve a variety of purposes. CFAs are a possible outcome and may be related to the AMP. If adaptive management quota is used to help establish CFAs, the two tools could be used together, with the AMP helping to facilitate the formation of community associations, and the CFAs operating under goals and objectives designed to facilitate community stability. This is described further under Cumulative Effects.

Rationalization could have both positive and negative impacts on community stability, depending on the distributional impacts of the program and the inclusion of mitigating measures such as the AMP and CFAs. In communities where fishing is culturally important, the loss of trawl activity is likely to be a hardship. This is discussed in further detail below, under cultural impacts. However, under the status quo, fishing community residents have reported a lack of community stability due to fluctuations in fishing activity and an inability to plan for the future (Goblirsch 2002).

It is misleading to discuss potential community impacts of rationalization without also discussing the current challenges facing fishing communities. During the past decade, the groundfish fishery has experienced major declines in harvest levels, increasing regulation and area closures, and a 2003 buyout of trawl vessels. Many communities have already lost large portions of their trawl fishery, either through the trawl buyout or through dissipation of the fleet caused by declines in harvest limits. Thus,

some have already begun to adapt (for better or worse) to the loss of the trawl sector. Any stability that remains in these communities is largely due to diversification, both within fisheries and outside the fishing industry. In some ways, rationalization is expected to improve stability in those communities that benefit from the program. By allowing for better business planning, higher wages for those remaining in the fishery, and better stewardship of the resource, rationalization should increase stability in those communities that benefit from rationalization.

However, it is clear that some communities will lose harvesting and processing activity; and with the loss of this activity, infrastructure that supports other fisheries is likely to suffer. Whether these communities would continue to decline under the status quo is arguable, but it is likely that current trends in increased regulation and decreased harvests would continue, at least until overfished groundfish species are rebuilt.

Not surprisingly, impacts on communities from rationalization depend in large part on a community's dependence on the sector being rationalized. In Iceland, where (in 1996) approximately 73 percent of the value of goods exported consisted of fish and fish products, and approximately 11 percent of the population was employed in fishing, rationalization had exceptionally negative impacts on small communities that depended on fishing (Palsson and Helgason 1995, NRC 1999). Since west coast communities are not as dependent on fishing as Icelandic communities, similar impacts are not likely here; however, vulnerable communities could experience declines if trawl activity is lost. In the United States, McCay et al. (1995) provides an example from the Atlantic surf clam and ocean quahog fishery where "the sell-out of the IFQ and harvesting and processing capital by a large multinational corporation resulted in the complete cessation of clamming and processing for one major coastal community of New Jersey for at least a year." Other potential problems noted by McCay (1995) include the loss of professional expertise, knowledge, and traditional culture in families and communities if IFQs lead to large-scale sell-outs. For this reason, many IFQ systems include special features to preserve community perceptions of equity, at least during the early period of the program. However, McCay notes that many of these equity preservation measures lose their effectiveness over time and may be abandoned as operators find innovative ways to get around them.

4.14.2.7 Cultural Impacts

Fishing, in all its diversity, is culturally important to the communities that will be affected by trawl rationalization. The cultural importance of fishing is reflected in community symbolism, such as statues or memorials to fishermen lost at sea (Seattle, Newport, and San Francisco), municipal celebrations like the Blessing of the Fleet (Ilwaco, Westport, Newport, San Francisco, and Morro Bay), and other activities such as the Brookings 10K Salmon Run, Newport Seafood and Wine Festival, Charleston Seafood Festival, Coos Bay Salmon Derby, Seaman's Day (Warrenton), Astoria-Warrenton Crab and Seafood Festival, World's Largest Salmon Barbeque (Fort Bragg), and Morro Bay Harbor Festival.

In none of the trawl communities possibly affected by rationalization is trawling the sole fishing activity. The communities where the most trawl fishing activity takes place, such as Newport and Astoria, are also the communities where the most other fishing activity takes place. Both Newport and Astoria are expected to benefit from rationalization. For diverse communities, a decline in trawl fishing activity might not change a community's symbolic identification with fishing, although it could have substantial impacts on the economic structure of all fisheries if it leads to a decline in infrastructure, and social impacts on those directly affected by rationalization.

Most trawl communities have a long history of involvement in other fisheries. Virtually all of the communities analyzed here had active Native American subsistence fisheries stretching back hundreds, if not thousands, of years. Commercial fishing on the west coast largely began in the mid- to late-

1800s, following a gold rush that directly or indirectly affected the entire west coast. Salmon was the mainstay for most early fisheries from San Francisco north; further south, fisheries relied more on CPS such as sardines, as well as abalone and other species.

Trawling came relatively late to the west coast. The first sporadic trawl efforts began shortly after World War II, mostly in Oregon and Washington, and targeted pink shrimp. Foreign trawl effort in west coast waters began in the mid 1960s, and the passage of the MSA in 1976 began the process of domesticating the trawl fishery. Low interest loans and subsidies helped the trawl fishery and processing industry grow in the late 1970s. Meanwhile, a joint venture fishery allowed domestic catcher vessels to deliver product to foreign factory ships for processing. By the late 1980s, processing infrastructure had developed sufficiently to support the domestic trawl fleet, and foreign trawlers disappeared from the EEZ by 1991.

Based on the brief history of trawling relative to other fisheries, it seems likely that even communities that lose trawl activity would retain their identification as fishing communities. The number of trawlers remaining in most communities is relatively small, and other recreational and commercial fisheries would remain. However, as noted above, if infrastructure that depends on the trawl fishery is lost (e.g., a processor or a cold storage facility), other fisheries that depend on such infrastructure could also be affected, leading to further impacts on community identity. Even in communities where the loss or decline of the trawl fishery does not have a significant impact on community identity, families who are affected by the social change of leaving the trawl fishery could be affected. Such impacts are described in the next section.

The literature describes equity issues that may arise depending on how initial allocation is conducted and how the ability to lease is managed (Pinkerton and Edwards 2009). Differences between those initially receiving quota and those not receiving quota can lead to conflict and perceptions of unfairness. Creed (1994) conducted research in two fishing villages of southwestern Nova Scotia that suggested that the egalitarian ethos of those communities was severely constrained by the ability of a few processors and entrepreneurs to take advantage of the IFQ system, which exacerbated differences in wealth and status within the community. Similarly, Macinko (1997) notes that one impact of the way initial allocation was conducted in the Alaska halibut/sablefish IFQ program was to introduce “heightened social divisiveness within fishing communities and within the management process between haves and have-nots.” As described above, Pinkerton and Edwards (2009) describe equity problems associated with the leasing of quota, where quota owners benefited while skippers and crew earned less and lost bargaining power. This could potentially create divisions in the community and would alter the culture of the fishing industry itself.

4.14.2.8 Impacts on Families

Families could be negatively affected by the loss of trawl and processing activity in communities that do not benefit from rationalization. In communities that do receive quota, the literature documents complications in family fishing businesses arising from the increasing value of fishing quota. Such complications relate to the “newly taxable dimensions of exit and the newly costly conditions of entry” (McCay 1995).

Since rationalization is expected to increase efficiency in the fleet as a whole, the mechanism for leaving the fishery will be to sell quota and associated vessels and equipment, so economic impacts of leaving the fishery will be somewhat mitigated. However, the noneconomic impacts of leaving the fishing industry may be substantial. For example, a person leaving the harvesting sector and selling or leasing quota could experience a major change in personal identity and job satisfaction. In addition, the daily life of a fishing family, particularly a fishing family that has been involved in fishing for a

substantial amount of time, could be expected to change dramatically if the family were to leave the fishing industry altogether. In some communities, loss of fishing jobs has been linked to increased marital stress and divorce (Goblirsch 2002). Similarly, losses of businesses that depend on the trawl fishery can also cause social and economic upheaval. McCay (1995) writes, “Among the social implications of IFQs in fisheries are job losses, changing social relationships of production, changing social structures within communities, and increased concentration of rights, power and wealth within an industry.” McCay continues (1995) as follows:

ITQs have potentially profound consequences for fishery-dependent families and communities, consequences which are likely to vary according to the design of the ITQ regime, the prevailing kinship, inheritance and taxation systems, and other factors... Generally, with the rising value of ITQs, retirement and succession within family businesses have become problematic, and the solution of incorporation has its own costs that make it unacceptable to some, including, Hoefnagel writes (1994), ‘the implied socio-cultural shifts and the potential loss of fishing rights for those members of the household—wives and daughters—not normally engaged in fishing.’ Death and divorce can also force the exit of otherwise healthy firms from the fishery, as people find themselves forced to sell fishing rights to meet inheritance taxes or divorce settlements. Thus, a family-based fishery business may be particularly vulnerable to the newly taxable dimensions of exit and newly costly conditions of entry.

4.14.2.9 Impacts on Tourism

Tourism is also increasingly important to many west coast communities. Tourism magnifies and exaggerates community symbolism; tourist operations often focus on whatever is symbolic to a community, whether it is fishing vessels, loggers, or the Golden Gate Bridge. In fishing communities, tourism businesses are usually centered on a wharf or port area. Bellingham, Seattle, Newport, Morro Bay, and San Francisco are examples of communities where port areas are centers of both fishing activity and tourism. Such tourism may include fishing-related activities, whale watching, viewing commercial fishing vessels at work, dining, or shopping for fishing-related curios.

In some communities, such as Newport and Morro Bay, fishery-related tourism, including the draw of a working waterfront, is an important factor in the local economy. Langdon-Pollock (2006) writes, “The working waterfront also attracts the tourism industry to [Newport]. Tourists visit Newport to observe harvesters and processors on the bay front, participate in charter fishing activities, and purchase fresh fish directly from fishermen on the fishing vessels or from seafood markets. While the tourism industry does not provide many ‘living wage jobs’ to local residents, it does produce a lot of revenue for the overall community.” If a large sector of the fishing industry were to disappear, tourism revenues could be lost.

4.14.2.10 Impacts to Nontrawl Communities

Impacts on nontrawl commercial harvesters are discussed in detail in Section 4.8. The discussion is based on the NWFSC Consolidation Model, models looking at geographic shifts in fishery patterns, initial allocation of IFQs, regional impacts from rationalization, and potential gear, area, and species conflicts that arise through the gear switching provisions of the rationalization alternatives.

Nontrawl communities could be affected by rationalization in several ways:

- **Increased competition.** If the intersector allocation process allocates species (such as nearshore rockfish) to the trawl sector that they currently cannot target, they may be able to switch gears through the rationalization process and target these species, thereby competing with existing nontrawl fisheries.
- **Gear conflicts.** The gear switching provisions in the trawl rationalization program may induce more fixed-gear effort than under status quo, potentially leading to on-the-water conflicts over available space for these gear types.
- **Impacts on the support sector.** The support sector (gear stores, repair shops, etc.) could be impacted by gear switching and by geographic shifts in fishery patterns.
- **Infrastructure impacts.** Nontrawl communities that depend on nearby trawl communities for processing or other support services could be affected by changes in those trawl communities. For example, trawl processors may also purchase fish from nontrawl communities. If these processors are adversely impacted, this could, in turn impact the nontrawl communities that depend on those processors.
- **Marketplace impacts.** Nontrawl commercial harvesters' profits may be affected if trawl vessels change production in such a way that trawl vessel catch competes with nontrawl catch in the marketplace.

These impacts could have the subsequent effects on communities and families that are described above.

4.14.3 Decision Points Affecting Communities

Communities will be affected by five major decisions made by the Council during the trawl rationalization planning process. These are as follows:

- IFQs or co-ops
- Initial allocation
- Accumulation limits/grandfather clause
- Area management
- Adaptive management

These decision points will be described in more detail in the section below that discusses alternatives. In addition, a 2004 GAO study (GAO 2004) reviewed an array of community protection measures used in domestic and international quota programs. Some of these measures are being considered by the Council; some were considered and rejected during the scoping process, and still others could potentially be implemented later. The study listed several methods for protecting communities and facilitating new entry into IFQ fisheries. The “easiest and most direct way to help protect communities,” the study noted (2004), was to allow communities themselves to hold quota, and to decide how to use it to protect local fishermen (for example, by keeping quota in the community or leasing it to local fishermen). This action could also be taken after implementation of an IFQ program. One potential mechanism for communities to own quota is through a CFA, which could acquire Qs through the AMP, when enacted; through divestiture; or through direct purchase.

Other community protection methods have been used elsewhere. They include rules to protect certain groups of fishery participants (such as small boat fishermen), rules governing who is eligible to hold and trade quota, temporary prohibitions on quota sales for a given time after implementation (the Council's preferred alternative contains a two-year moratorium on quota sales), geographic restrictions on quota transfers, limitations on quota leasing, separate quotas for different sectors of the fishery, owner-on-

board requirements, and restricting landings to certain ports. Although these actions protect communities to a certain extent, many also decrease overall economic efficiency or are difficult to implement (such as the owner-on-board provision).

4.14.4 Direct and Indirect Effects of the Alternatives on Communities

In addition to the general effects described above, each of the alternatives would impact communities in different ways. The alternatives result in different impacts because of variations in the elements of those alternatives. This section analyzes the direct and indirect impacts of the alternatives on communities.

In this section, we begin by describing the manner in which each of the elements of the alternatives would be expected to impact communities. This description of expected effects serves as an overview and introduction to the way in which the elements of the alternatives would impact this particular environmental component. Immediately following the overview of how the elements of the alternatives impact communities is a description of the impacts of each alternative. Where appropriate, these impacts are compared to status quo conditions and to the other alternatives. Following the description of impacts of each alternative is a comparative summary of the effects of each of the alternatives.

How do IFQs and co-ops affect communities (relative to status quo)?

Changing the catch control tool in the fishery to IFQs and/or harvest co-ops is expected to impact communities in a variety of ways described throughout this section. Apart from this primary question, the main difference among the alternatives here is whether to have co-ops or IFQs for the whiting sector, and, if so, whether these co-ops should be for the at-sea whiting sector (Alternative 4) or the entire whiting sector (Alternative 3).

The relationships and profits generated in an IFQ system versus a cooperative system with processor linkages may result in some differences that are recognized in a community. A cooperative structure with processor linkages may lead to profit sharing arrangements, where profits are shared between motherships or shoreside processors and catcher vessels. Under an IFQ system, the first receivers of quota would benefit, and revenues generated from the harvest of that QS would tend to stay with the QS owner. The effect on communities from these decisions will most likely reside principally with the decision to use IFQs versus cooperatives with linkages in the shoreside portion of the whiting fishery. The at-sea portion of the whiting fishery is primarily based in the Puget Sound region, which has a large and diverse economic base, meaning changes to the fishery structure are not likely to resonate with those communities on the whole. The shoreside fishery is more closely tied to coastal communities of which fishing is often a relatively large piece of the economy. In those communities where fishing is a relatively large piece of the economy, changes in the relations between harvesters and processors may be felt.

How does initial allocation affect communities?

Initial allocation and qualification could have significant impacts on communities by benefiting some harvesters (and their communities) and putting other harvesters and communities at a disadvantage. Astoria, Bellingham, Brookings, Coos Bay, Eureka, Fort Bragg, Newport, San Francisco, and Moss Landing are expected to benefit from initial allocation, regardless of whether some of the QSs are equally allocated. Princeton/Half Moon Bay may benefit, depending on the allocation rule. Neah Bay, Westport, Ilwaco, Crescent City, and Morro Bay are expected to receive less than the average amount of quota allocated to all communities.

Under Alternatives 2, 3a, and 3b, initial allocation is based purely on catch history. Distribution of the initial allocation across members of various communities would be less equal, although individual fishermen might see it as more representative based on their past performance. Under Alternative 3, buyback history would be divided and shared equally in the nonwhiting fishery. Alternative 4a would share buyback history equally in the shoreside fishery, while Alternative 4b (Council preferred alternative) would allow equal sharing of buyback history in the non catcher-processor sectors. Some communities could benefit from this more equitable distribution while others may see it as a loss. For communities, the differences between Alternatives 3 and 4 are minimal.

One factor that might influence communities is the ability of harvesters to form voluntary associations to manage risk. The term “risk pools” has been used to describe these arrangements. Such risk pools could contribute to stability in the communities that host them. If the initial allocation of groundfish—particularly constraining stocks—allows a relatively small number of entities to receive a large amount of constraining species quota, harvesters could have difficulty forming and maintaining voluntary risk pools.

With a quota allocation to processors, it is likely that processors will adjust operations so that ports where processing plants are already located will receive more landings. Therefore, ports without processors (such as Neah Bay, Brookings, and Crescent City) may see a reduction in landings with a processor allocation.

How will accumulation limits affect communities?

As discussed above, accumulation limits could have an important impact on communities. A vessel limit would set a minimum on the number of vessels in the fishery and spread the amount of fishing activity across a wider number of entities. With higher vessel accumulation limits, consolidation would tend to restructure the fleet toward the most economically efficient vessels, increasing fleet-wide economic efficiency and decreasing the number of vessels. Although vessel accumulation limits tend to lower economic efficiency and restrict profitability for the average vessel, they could help retain vessels in communities because more vessels would remain.

As noted above, the Council also is considering control limits, or a limit on the amount of quota an individual entity could hold. These are different from vessel limits. Under the preferred alternative, aggregate control caps for the shoreside nonwhiting groundfish fishery are 2.7 percent of the total QSs, while for the shoreside whiting fishery the cap would be 10 percent of the total QSs. A control cap applies to any QSs owned by an individual or controlled by that individual under the form of a corporation; it prevents one individual (or corporation) from controlling an excess of quota. Under the preferred alternative, excess QSs would need to be divested during years three and four of the program. This could provide new avenues for community involvement in the fishing industry that could benefit communities both socially and economically.

Theoretically, if there were no control limits (which is not an option included in this EIS), one community or company could buy up all the QS, to the detriment of all other communities and businesses. Therefore, control limits may indirectly protect some communities while preventing others from having a large influence over the harvest. Alternative 2 allows the most accumulation of IQ, Alternative 3 allows the least. Alternative 4 lies in the middle. Alternative 4b, the preferred alternative, has a 2.7 percent control cap and a 3.2 percent vessel limit for the shoreside nonwhiting groundfish fishery, a 10 percent control cap and 15 percent vessel limit for the shoreside whiting fishery, a 45 percent processing cap for motherships, and a 20 percent ownership limit and 30 percent usage limit for mothership catcher vessels.

Because of the nature of vessel efficiency in this fishery, the number of vessels is not expected to fall so far that the consolidation limits will be reached. It is possible that the number of vessels could diminish by 50 to 66 percent, to a nonwhiting fleet size of 40 to 60 vessels, however this number is based on several assumptions that seem unlikely in practice—namely that all nonwhiting trawlers will become specialists and abandon participation in other fisheries. It is almost certain that nonwhiting vessels will continue participating in other fisheries, meaning the fleet size should stay above the 40- to 60-vessel estimate. The number would have to diminish to about 30 vessels to reach the proposed fleet consolidation limits. Vessels that are larger or smaller may find it more profitable to sell Qs and leave the fishery rather than remain. In the whiting fishery, fleet size may shrink from 37 vessels to 23 in the shoreside fishery and from 20 vessels to 14 in the mothership fishery. Some communities will experience the negative impacts of losing fishing activity, while others will benefit from the increased revenue of the successful fishing enterprises that remain.

The question of who is eligible to own quota is applicable here. Under the preferred alternative, any individual or legal entity eligible to own a U.S.-documented fishing vessel is also eligible to own IFQ. The IFQ owner need not actually own a U.S.-documented fishing vessel to own Qs or QPs. This option is the most open and flexible, but does not require any connection to fishing in order to own IFQ. Qs would behave more like shares of stock in a company, which anyone can own, and could be bought, sold, or traded through a broker. If a significant number of Qs are owned by nonfishing entities, this could reduce fishing income for communities.

How will a grandfather clause affect communities?

All alternatives except Alternatives 3 and 4b (the preferred alternative) include a grandfather clause. Alternative 4b has no grandfather clause, but allows entities to divest their excess Qs in years three and four of the trawl rationalization program.

The grandfather clause affects the initial allocation of quota and accumulation limits by allowing some entities to have quota in excess of accumulation limits, based on their history. More highly productive vessels and processors would be able to maintain that relatively large degree of production, thereby temporarily protecting the status quo. This effect would be transitory, in effect slowing the shift from the status quo to a new market-based system. Over time, the grandfather clause would expire, and the excess quota would be redistributed through the market.

A grandfather clause could also influence the negotiations that occur between harvesters and processors over ex-vessel prices. With a grandfather clause, large producers could be in a strong position during such negotiations. Community impacts of such negotiations would depend on the locations of the processors and harvesters involved.

A grandfather clause is related to the concept of risk pools, described above. A grandfather clause may increase the negotiation power of individuals, potentially disrupting the ability of harvesters to form risk pools for dealing with low OY species if the grandfathered quota holder can exert a dominant position over the risk pool arrangement. Communities that stand to benefit from the presence of these risk pools may be better off without a grandfather clause—particularly for constraining species.

Having no grandfather clause (as in Alternative 4, and, after a period of two years, in Alternative 4b) could make it more difficult for highliners and large processors to maintain historic levels of production. No grandfather clause could also limit the amount of quota in a community; for example, a community with several large producers would receive fewer benefits than if there were a grandfather clause. Instead, excess quota would be distributed among IFQ holders. In general, a grandfather clause might

distribute quota less equally among communities, but perhaps more representatively, based on past performance. A grandfather clause could also benefit vulnerable communities with a few large producers that might suffer if there were no grandfather clause and excess quota were distributed to less vulnerable communities.

Under Alternative 6, there is no grandfather clause, but individual and corporations are given two years in which to divest their excess quota. This divestiture could help communities if the QSs being divested are kept within the community.

How do processor allocations/ties affect communities?

An initial allocation of QSs to processors and/or processor linkages in a co-op program would allocate quota to processors and, for the co-op alternative, create affiliations between harvesters and processors, influencing relationships and negotiations over ex-vessel prices. With no processor ties or quotas (as under Alternatives 2a and 2b), harvesters in co-ops would have more bargaining power. They could deliver to places of their choosing and might be able to leverage higher prices from processors. If there are processor ties and/or processors own QSs (under Alternatives 2c, 3, 4a, and 4b [for whiting]), processors may be better able to influence where deliveries are made. The more QSs processors have, the more bargaining power they have. Such leverage will affect their profitability, and processor ownership of QSs may provide them with more flexibility for consolidation or movement. Many processors have corporate owners and may not necessarily be tied to an individual community. Therefore, an allocation of quota to processors does not necessarily lead to quota remaining in a particular community. Similarly, some permit owners do not live in the community where their vessels are located and are also free to move their harvesting operations to a different community. The initial allocation provides only the starting point. Over time, processors or harvesters may acquire greater proportions of QSs than reflected by the initial allocation.

With whiting co-ops and processor linkages (Alternatives 3, 4a and 4b), harvesters may find it more difficult to change processors, which could affect communities positively (if such linkages discourage harvesters or processors from leaving a community) or negatively (if local harvesters are forced to sell product for less than another processor might offer). A whiting processor could move, but a move outside of the current geographic distribution (southern Washington to northern Oregon) is unlikely due to geographic constraints and availability of infrastructure to support a large whiting processor.

How will the species covered through the program affect communities?

The species covered by the program could have an impact on communities, particularly in regard to risk imposed by the coverage of some species with IFQ. The number of species managed in the nonwhiting fishery is the same across all alternatives except Alternative 4b, which would only cover select groundfish species and Pacific halibut in the shoreside sectors. Alternative 4b would not include rarely encountered, nonoverfished species, and therefore would reduce risk to harvesters who caught these species incidentally.

In Alternative 3, bycatch is pooled across the three whiting sectors, possibly leading to a race for fish (because of a race for bycatch). The entire whiting sector could close early once the bycatch cap is reached, impacting shore-based whiting communities such as Ilwaco, Astoria, Westport, Newport, Coos Bay, and to a lesser extent Eureka, Crescent City, and Fort Bragg, which have engaged in some whiting processing. California whiting fisheries occur early in the year and are small; therefore, the California fishery and associated communities might not be affected by a fishery-wide bycatch cap. Under Alternative 2, bycatch is managed at an individual vessel level, which does not create a race for fish.

With all the alternatives, geographic shifts are expected to occur as fishing effort shifts to avoid bycatch, and because of regional differences in consolidation and economic activity.

Nontrawl communities are concerned that if trawlers have an incentive to fish for nearshore species, competition with nontrawl fisheries (like Port Orford's) could occur. Trawlers would probably have to switch gear types to target such species, because of their association with habitat not easily trawled. Targeting opportunities on these nearshore species would occur only if allocations that are larger than current catch levels are made to the trawl sector. Whether such allocations occur will be decided separately from the rationalization process, as part of the Intersector Allocation process, or as part of the routine biennial management of groundfish.

In general, the more species covered, the more constraints there would be on individual vessels' harvesting opportunities. The fewer species covered, the more flexibility vessels would have, though at the extreme, a lack of species covered with Qs could lead to a race for fish. In dealing with species with small allocations, quota may become costly, and markets may become unstable and less efficient. Quota to cover catch deficits may also become unavailable. Communities might benefit from the increase in flexibility from having fewer species covered, but limiting the number of species increases the chances that the trawl sector will impact other sectors through competition over fish resources.

For some species, a disaster tow" is possible. If it is difficult to purchase protective quota, and, with the risk of a disaster tow, harvest activity may creep earlier in the year and take on the characteristics of a derby fishery, because a disaster tow would mean that harvesters risked being preempted by other harvesters. It is difficult to judge the potential impacts of this possibility on communities, but if a disaster tow causes the fishery to close prematurely, communities would certainly be impacted.

How do the number of trawl sectors influence communities?

This section addresses the difference between having three or four trawl sectors. All the alternatives except Alternative 3 combine shoreside whiting and nonwhiting into one sector. Under Alternative 3, these are divided into two sectors. The main issue here is how much flexibility to allow. In general, combining these into one sector allows for more flexibility because of fewer separations between sectors and, therefore, fishing opportunities.

With a divided shoreside sector (Alternative 3), the Council would allocate between the shoreside whiting and nonwhiting fishery those nonwhiting species taken in both fisheries (directly in the nonwhiting fishery and incidentally in the whiting fishery). If the incidental catch allocations provided to the shoreside whiting sector were not sufficient to take all of the whiting, the sector would not be able to acquire additional quota to cover the incidental catch, and whiting would go unharvested. At the same time, if the whiting sector were allocated more than the amount needed to cover incidental catch, there would be no mechanism for moving the excess back to the shoreside nonwhiting fishery for its use, and the excess allocation would go unharvested.

Managing the fishery as a single sector is expected to increase the likelihood that available harvest is fully taken and to ensure that the allocation is distributed to that segment of the shoreside fishery that is able to generate the most profit from its use. Most likely, this means that total community benefits would be greater with a single shoreside sector.

Additionally, if shoreside whiting and nonwhiting are separated, as in Alternative 3, new and existing harvesters who wanted to target both types of fish would need to buy quota in both sectors. For example, in some years, the bycatch of sablefish in the whiting fishery has been relatively large. Under a three-sector alternative, shoreside whiting harvesters could purchase enough sablefish quota to cover

their bycatch and resume targeting Pacific whiting. If there are four trawl sectors, then the shoreside whiting sector could have trouble fishing if sablefish bycatch is higher than expected, as described above.

One purpose of having four sectors would be to restrict the ability of one sector to acquire large amounts of quota and therefore limit the access of the other sector to quota or to fishing opportunity. This could have both positive and negative impacts on communities if such an occurrence is possible. However, as discussed under the section describing the impacts to harvesters, rationalization is expected to align the profitability of nonwhiting and shoreside whiting harvesters, meaning that it is unlikely one type of shoreside harvester would have more ability to purchase quota over a harvester specializing in the other type of shoreside activity.

How will an adaptive management provision affect communities?

The AMP is a trailing amendment that will be finalized during the two years after trawl rationalization goes into effect. Adaptive management allows a certain amount of quota to be used to protect vulnerable communities from the adverse effects of trawl rationalization, favor harvesting techniques and technologies that reduce environmental impacts, and support existing business relationships between harvesters and processors. If adaptive management were targeted toward gear incentives, community impacts would be hard to judge, other than noting that communities with creative and proactive vessel owners might benefit. If adaptive management is used to mitigate adverse impacts on processors, a very small number of processors would benefit, but communities could benefit if those processors are more likely to stay put. Communities could benefit if adaptive management quota were used to create or strengthen entities or associations that are important within a community. For communities there is no difference between Alternatives 3 and 4, except that with the adaptive management set-aside in Alternative 4b, some communities would benefit and others would have their quota reduced in order to pay for the adaptive management provision.

How will area management affect communities?

Area management refers to the splitting of Qs between the north and south, as in Alternatives 3 and 4a. For the last few years, there has been less trawl activity off central and southern California, and more in northern California and Oregon. This option would essentially freeze this ongoing south-to-north shift, and may reverse it, depending on how quota is distributed. This could benefit central and southern California communities by lessening the ability of northerners to accumulate southern QS.

How will a carry-over affect communities?

Carryover increases flexibility for individual harvesters, because QSs would be carried over from one year to the next (but for one year only). A carryover allowance allows harvesters to avoid penalties associated with a deficit condition. In general, flexibility creates options that typically lead to better economic conditions. Communities would benefit from carryover.

How will tracking and monitoring affect communities?

Tracking and monitoring will reduce the short-term profitability of harvesters, because they will have to pay for part of the tracking and monitoring effort. In the long term, however, at-sea monitoring will help ensure the continued viability of stocks. Better catch accounting improves stock assessments, even if the primary objective for such accounting is not biological but administrative. The option will not affect communities differentially; however, those communities where trawl groundfish is harvested and/or

harvested in small amounts may be impacted if the costs of tracking and monitoring no longer make such activities profitable (see small purchaser analysis in Appendix H).

4.14.4.1 Alternative 1 (No Action)

Many fishing communities are faltering under the status quo. The need to protect overfished species has led to increasingly strict regulations, including lower harvest limits, gear restrictions, and no-trawl zones. The lack of long-term planning ability has made it difficult for both fishing and support businesses to remain viable, and the number of trawl vessels has been shrinking (in part due to the 2003 buyout). The effects of these changes are captured in public testimony received at Council meetings and through written comments on past actions. Public testimony under groundfish management agenda items has repeatedly emphasized the difficulties communities and businesses experience in the face of increasing regulation. A summary of major themes presented in public testimony during the 2007-08 groundfish specification process (PFMC 2006) includes comments on the following:

- The negative cumulative effects of both Federal regulations (such as closed areas, fathom restrictions, season restrictions, and VMS) and nonfederal actions (cable crossings, proposed state restrictions) on fisheries, businesses, and communities
- Crumbling infrastructure (processors, buyers, ice plants, and businesses that support processors closing or consolidating, docks and harbors not being maintained; market infrastructure collapsing);
- Recreational and commercial fishing vessels going out of business or being forced to diversify;
- Fishing-related businesses, such as gear stores, boat repair shops, tackle shops, and fishing equipment manufacturers, and nonfishing-related businesses, such as hotels, restaurants, and car dealerships, feeling the impacts of reduced fishing income, including laying off employees or closing
- Decreasing tax bases due to business closures
- Increasing social tensions in communities, such as psychological impacts, marital tension, divorce and suicide
- Difficulty in making business decisions and planning for the future
- Further dependence on groundfish due to salmon cutbacks

Although these effects relate to all groundfish fisheries (not just the commercial trawl fishery), they give an indication of the state of the status quo in west coast fishing communities.

4.14.4.2 Alternative 2a

Under this alternative, which is the most liberal of the alternatives, the differential distribution of community impacts would be most pronounced. The provisions contained in this alternative, such as higher accumulation limits, a grandfather clause, and carryover, would allow more consolidation in the fishery than other options. As a result, some communities (such as Astoria and Newport) would benefit from the consolidation of fishing activity, while others with less trawl activity and less efficient fleets could lose their trawl fishery altogether. Available information suggests a general regional shift in trawl fishing activity toward ports found in Oregon and northern California. That activity may be drawn from ports in central California. The lack of area management and the lack of an adaptive management provision provide little recourse for readjusting the location of trawl fishing activity should communities in one region be adversely impacted.

4.14.4.3 Alternatives 2b and 2c

The differences between Alternative 2b and 2c are that Alternative 2b includes an adaptive management provision (targeted at processors that are adversely impacted by a rationalization program), and Alternative 2c provides an allocation to processors (but no adaptive management provision). The two methods have substantially different philosophies, and presumably different impacts. The initial allocation of Qs to processors would tend to leave many aspects of the outcome up to private industry and the market, whereas an AMP would allow the Council more direct influence over impacts of the program on processors, leading to indirect effects on communities.

While Alternatives 2b and 2c are likely to have different effects on communities, it is not immediately clear what those effects will be. Some effects are likely to be distributional with fishing activity concentration being different in Alternative 2b compared to Alternative 2c. For example, Alternative 2b might have a distributional effect that is similar to Alternative 2a in an aggregate sense since most of the quota will be in the hands of harvesters, but with a small subset of quota being directed to a small set of processors through the adaptive management provision, indirectly affecting a small set of communities. Alternative 2c might look different from this as processors hold a relatively greater proportion of Qs and use them in a way that benefits them, resulting in a geographic outcome different than Alternatives 2a and 2b.

4.14.4.4 Alternative 3

Alternative 3 has the most constraints of all the alternatives and would distribute IFQ more evenly among communities. This alternative uses market-mitigating factors and harvest co-operatives (instead of IFQ) for the whiting fishery. Harvest co-operatives are like a community where members collectively decide the prosecution of fishing opportunities. Under an IFQ system, in contrast, harvesters would be expected to act more independently and the difference in organization among the industry may have some impacts on communities. This alternative gives a relatively large influence over harvesting activity to processors by giving them relatively large IFQ allocations and requiring that co-ops be linked to shore-based processors and motherships. This means that communities with processors may stand to be impacted in a relatively beneficial manner compared to alternatives without these processor provisions.

Alternative 3 is likely to result in a wider distribution of fishing activity because of a lack of a grandfather clause and relatively small control and accumulation limits. This would tend to distribute quota among a greater number of entities, and, to the extent that a greater number of entities means a wider geographic distribution, a relatively wider set of communities may be the site of fishing activity. However, the fact that four trawl sectors are established and with no carryover inserts a factor of risk for some trawl vessels. If this risk results in adverse impacts to trawl harvesters being realized (such as premature closure of the fishery), communities may be affected indirectly.

The adaptive management provision present under this alternative may be used to mitigate against adverse impacts to communities, but may be used for other purposes. The presence of this provision can prove useful to those communities that may be adversely impacted, but may mean a reduction in some activity from those communities better positioned to take advantage of a rationalization program.

4.14.4.5 Alternative 4a

Many elements of Alternative 4a can be viewed as falling between Alternatives 2a and 3. This is because Alternative 4a allows for more market-driven outcomes than Alternative 3. While the adaptive management provision is only applied to the shoreside sectors, the same level of community impact is

expected to occur as with an adaptive management provision that applies to all trawl sectors. This is because the at-sea fisheries are heavily associated with the Puget Sound region and any application of adaptive management to those sectors is not likely to change that regional association.

The grandfather clause in this alternative allows historically large producers to retain a relatively large amount of QSSs initially allocated to them. This would tend to have a beneficial impact to communities where those entities do business, meaning that communities with a relatively heavy involvement in trawling may be more likely to continue that role than if a grandfather provision is not made available.

4.14.4.6 Alternative 4b (Preferred Alternative)

Alternative 4b contains elements of alternatives 3 and 4a, as well as new variations on processor allocations and covered species. Two notable changes include an initial allocation of whiting to shoreside processors of 20 percent (less than in other alternatives, but more than some others) and the exclusion of some groundfish species under the rationalization program, instead of including all species in the ABC/OY table.

Together, a combined shoreside sector, a reduced list of IFQ species, and the equitable distribution of bycatch species in the non catcher-processor sectors mean that this alternative poses the least risk to harvesters (and subsequently their communities) of all the alternatives. These factors tend to reduce the risk of the catch of one species prematurely closing the fishery and help ensure that risk pools are formed and remain relatively stable. This alternative also contains an adaptive management provision that could aid some communities, and allocates quota more equivalently across communities through equal distribution of buyback quota.

This alternative establishes IFQ for both the shoreside whiting and nonwhiting sectors of the trawl fishery, effectively combining both shoreside sectors into one. Combining these shoreside sectors allows them to trade quota with one another, reducing the risk of one sector catching the entire quota of a particular constraining species and being unexpectedly shut down. Furthermore, a subset of species is covered with IFQ, rather than all species in the Council's ABC/OY table for groundfish. The species not covered by IFQ are rarely encountered, nonoverfished species. However, harvesters will still be responsible for overfished species. For these species, quota may become costly, and quota to cover catch deficits may potentially become unavailable. Dealing with overfished species—and the risk posed to harvesters by such species—is affected by the way in which overfished species are initially allocated. The allocation based on a bycatch rate in the nonwhiting portion of the fishery, and on a pro rata distribution for the whiting portion of the fishery, tends to match up overfished species quota relative to what harvesters “need” on a relative basis. This helps ensure negotiations over risk pooling are stable and that a single entity cannot dominate those negotiation. Fostering the development of risk pools helps reduce risk to individual fishermen and their communities.

Accumulation limits for shoreside fisheries groundfish fisheries are set at a 2.7 percent control limit and a 3.2 percent vessel limit for nonwhiting. The shoreside whiting fishery has a 10 percent control limit and a 15 percent vessel limit, while motherships cannot process more than 45 percent of the catch, and catcher vessels have a 20 percent ownership/30 percent usage limit. Accumulation limits could have an important impact on communities, as discussed in detail above.

Under this alternative, the initial allocation of IFQ to the non catcher-processor sectors divides the buyback portion of catch history equally. Distribution would be more equal than if buyback quota were distributed based on catch history, but individual fishermen might see it as less representative based on their past performance. Some communities could benefit from this more equitable distribution while others may fare better under a catch history based distribution.

Alternative 4b includes no grandfather clause provision but allows two years for entities to divest their excess Qs. While such a divestiture provision may mean that quota leaves particular communities, allowing for divestiture provides for an opportunity for that quota to remain in a community. This is different than a case without a grandfather clause and without a divestiture period where quota would automatically be redistributed across initial recipients, potentially reducing the amount of harvest in some communities relative to current conditions.

This alternative includes an adaptive management provision for shoreside nonwhiting species. This allows a certain amount of quota potentially to be used to help adversely affected communities and/or provide incentives to use habitat- and bycatch-friendly gear. The benefits of the adaptive management provision (if used for communities) are entirely distributional at the community level: some communities would benefit, and others would have their quota reduced in order to pay for the adaptive management provision.

Shoreside processors are allocated 20 percent of the shoreside whiting IFQ. Processors will have more influence in negotiations over ex-vessel prices than if they received no IFQ, and may be better able to influence where deliveries are made. Such leverage could make their operations more efficient. However, consolidation in the processing sector is still expected to occur and this consolidation of shoreside whiting processors will have an effect on communities.

Gear switching is assumed to exist for this alternative. Gear switching could benefit communities by allowing more harvesting flexibility and this flexibility may mean an increase in target species (because gear switching allows more tools for balancing catch accounts) and/or higher prices for landed species. However, wide-scale gear-switching may mean that landings in some communities would decline if harvesters moved toward gears that do not catch species such as flatfish as effectively. This would tend to reduce the need for processing labor and as a result decrease the number of fishing related jobs in some communities.

This alternative includes a limited carryover provision. Carryover provides flexibility in making harvesting choices across years and would benefit communities by allowing more flexibility and, by extension, more profitable fishing enterprises.

4.14.5 Impacts on Specific Communities

Next, we review each trawl community, reviewing its levels of dependence and vulnerability, along with expected effects of trawl rationalization as revealed by alternative. Much of the information on the current status of these communities comes from the short-form community profiles prepared by NWFSC. Additional details about the current status of these communities are included in Section 3.14 (page 163) (affected environment), and in Appendix C.

The Comparative Advantage model (described in Appendix C) uses four variables to assess the relative advantage or disadvantage of each port. The four variables are 1) bycatch rates of constraining stocks that are in preferred fishing grounds of various ports, 2) relative economic efficiency of vessels in that port, 3) the relative amount of fishing business and infrastructure in that port, and 4) the initial distribution of QS to those ports relative to status quo, and relative to the distribution made to other ports. Appendix C details how these variables were measured.

The model shows that Bellingham, Neah Bay, Newport, and Princeton/Half Moon Bay have greater than 50 percent of their nonwhiting trawl catch occurring in areas identified as moderately high or high

bycatch areas. This gives them a disadvantage compared to other communities. The Newport fleet fishes in a moderately high bycatch area; it is so designated because it is made up of species (Pacific ocean perch and darkblotched) that are less constraining to harvest activity than other species. See Table C-6, Appendix C.

Although these ports are engaged in relatively high constraining bycatch areas, other factors influence the comparative advantage that vessels have in a rationalized fishery. These include fleet efficiency, the amount of infrastructure that exists in various ports, and the amount of groundfish allocated to entities and its location.

4.14.5.1 Efficiency

The efficiency of the local fleet will affect how a port fares as a result of rationalization and consolidation. Using information from the cost efficiency and fleet consolidation model (described in Appendix C), the relative efficiency of vessels delivering to various ports can be assessed. The efficiency score is best measured as a state variable (versus a relative variable). Those ports with the largest number of efficient vessels score high, while those ports with the smallest number of efficient vessels score low. Using this method, the ports of Astoria and Coos Bay, for example, score high, while Neah Bay scores low.

While this information is based on vessels that currently exist in the fishery (in the longer run, we would expect newer, more efficient vessels to be constructed), the initial state can have long-term impacts. Ports with relatively efficient trawl vessels at the start of a rationalization program may end up better off than ports with relatively inefficient vessels. Tables C-3 and C-4, in Appendix C, show that none of the trawl ports on the west coast has a fleet that is more than half composed of efficient vessels; Coos Bay/Charleston has the most, at 48 percent of its fleet. However, merely comparing percentages of efficient and inefficient vessels is misleading, since the total number of vessels in a community's fleet also contributes to the overall score. For example, using a relative method, Neah Bay is the next most efficient, with 43 percent of its fleet passing the efficiency test. However, Neah Bay has only seven vessels that have delivered to the area in recent years (the actual number of vessels homeporting there is less) and the port has minimal infrastructure. Coos Bay has 27 vessels making deliveries and extensive infrastructure.

4.14.5.2 Infrastructure

The amount of agglomeration in shoreside business and infrastructure in various ports has an effect on the longer-term ability of those ports to maintain fishing activity. Ports with larger degrees of agglomeration will be more able to attract and maintain fishing activity. From north to south, Bellingham, Seattle, Astoria, Newport, Coos Bay, Princeton/Half Moon Bay, and San Francisco have high levels of infrastructure, with facilities such as cold storage and maintenance. Westport, Eureka, Crescent City, Fort Bragg, Morro Bay, and Moss Landing have medium levels of infrastructure. Neah Bay and Brookings have low levels of commercial infrastructure.

4.14.5.3 Proximity to Markets and Transportation

The remoteness or connectedness of various ports to the market will alter the impacts of rationalization. Most coastal communities are fairly removed from major markets. Bellingham, Seattle, Fort Bragg, Moss Landing, Princeton/Half Moon Bay, and San Francisco are the most well-connected in terms of market proximity.

4.14.5.4 Initial Allocation of Harvest Privileges

The initial allocation of quota will favor some geographic areas over others. Using the initial allocation rules being considered, Figure 4-51 through Figure 4-54 show the amount of QPs that would be allocated to each port if existing harvest volumes are maintained.

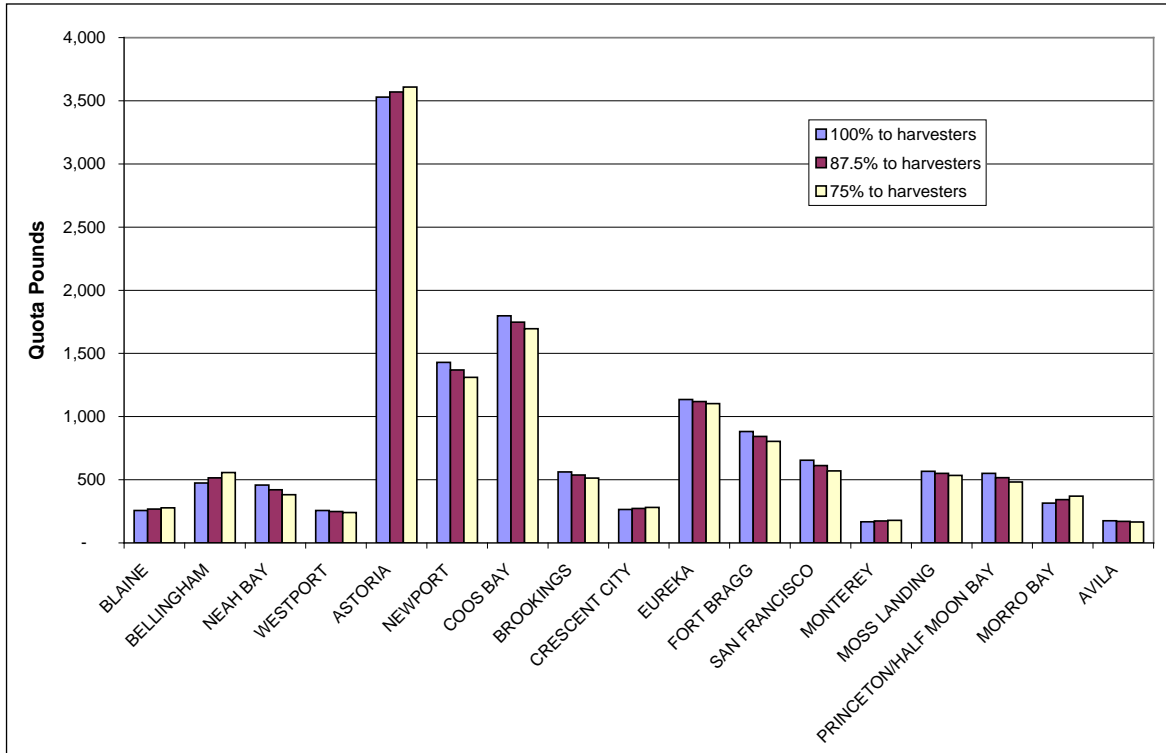


Figure 4-51. Nonwhiting allocation with equal sharing of buyback history.

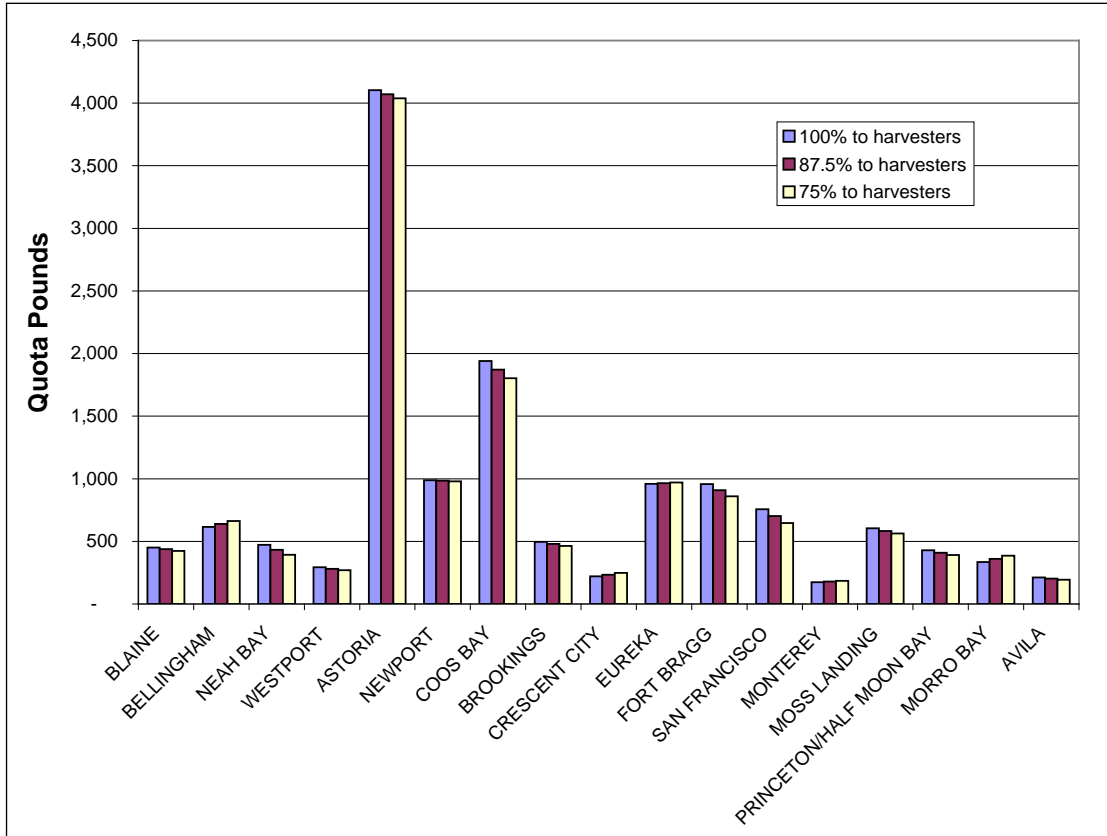


Figure 4-52. Nonwhiting allocation based entirely on catch history.

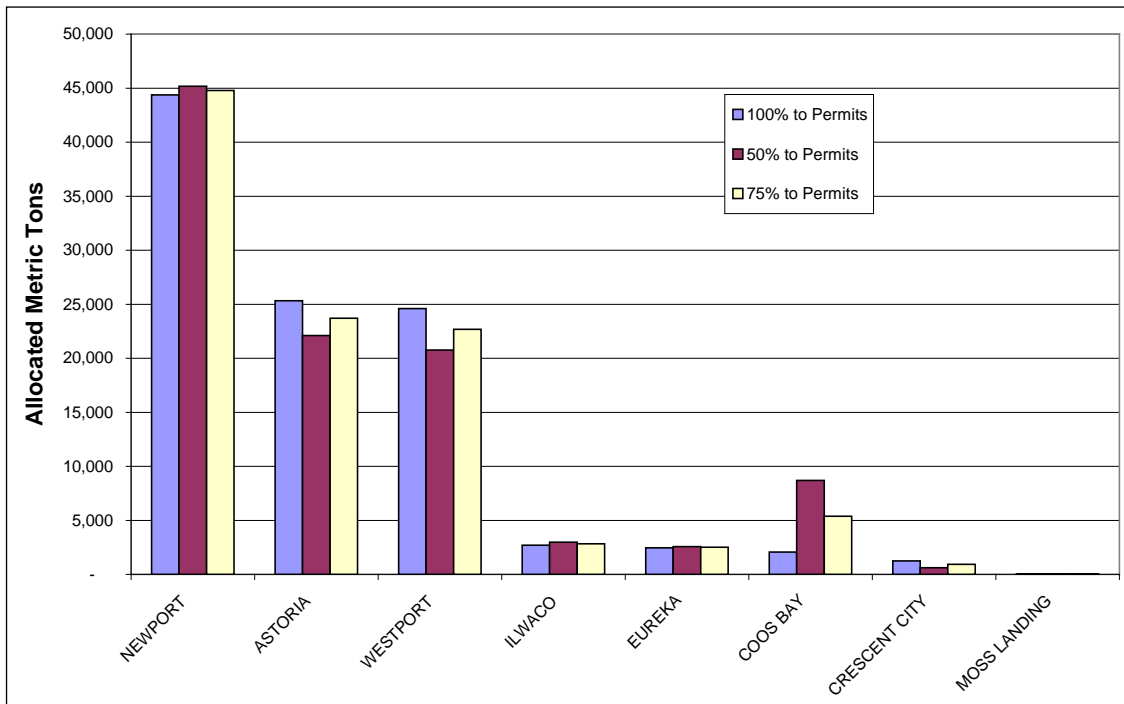


Figure 4-53. Shoreside whiting allocation based entirely on catch history.

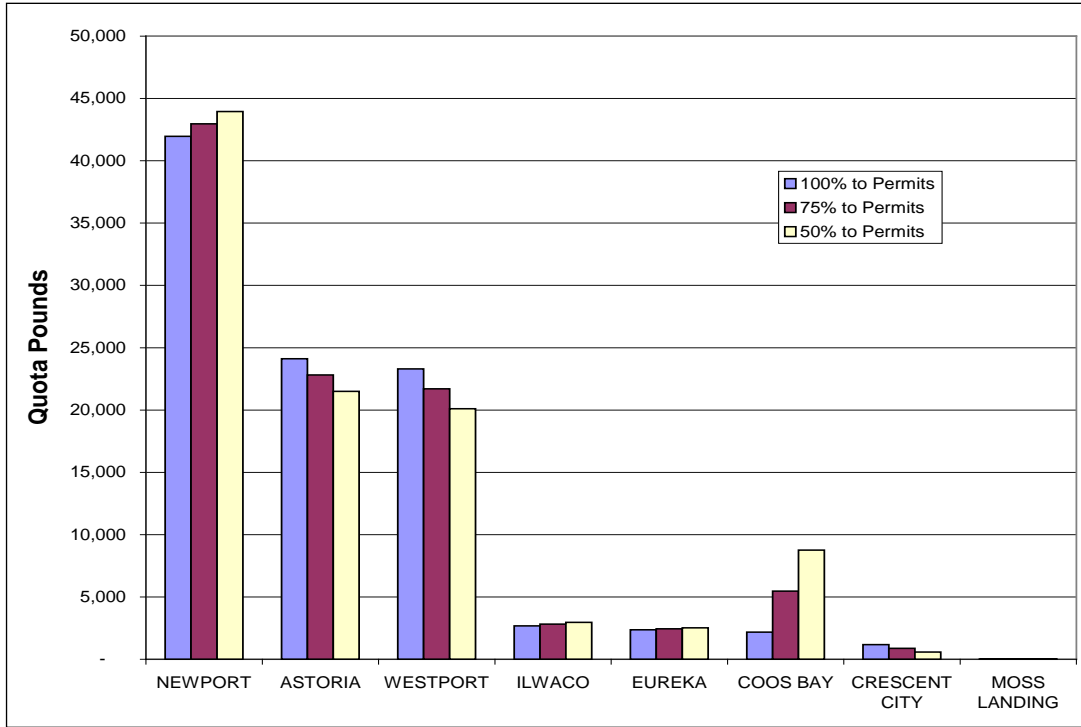


Figure 4-54. Shoreside whiting allocation with equal sharing of buyback history.

The figures above show that regardless of the type of initial allocation, a large share of quota will end up in specific ports. With equal sharing of buyback history (Figure 4-51), Astoria, Bellingham, Brookings, Coos Bay, Eureka, Fort Bragg, Newport, San Francisco, and Moss Landing should benefit from initial allocation of nonwhiting QS, regardless of the percentage of buyback quota allocated to harvesters. Princeton/Half Moon Bay may benefit, depending on the initial allocation rule. With nonwhiting quota allocation based entirely on catch history (Figure 4-52), Astoria, Coos Bay and Bellingham benefit the most, regardless of the percentage of buyback quota allocated to harvesters. Newport, Astoria, and Westport all stand to benefit from the initial allocation of shoreside whiting (Figure 4-53 and Figure 4-54).

4.14.5.4.1 Initial Allocation of Overfished Species

As discussed in Section 4.6.2.5 (page 313), the amount of overfished species quota will play a large role in determining access to target species. At a community level, the amount of overfished species quota in that community will determine the access that harvesters in that community will have to target species to some degree. This is also dependent on the abundance of overfished species in fishing grounds which local harvesters within a community depend upon. For instance, if overfished species abundance is relatively low in fishing grounds prosecuted by harvesters within a community, then harvesters in that community may need relatively less overfished species quota.

In an attempt at identifying the regional interaction of overfished species at a port level, we use an analysis created by the GMT to support the 2007-08 Groundfish Harvest Specifications EIS examining overfished species interaction by community and gear type. We then compare the initial allocation of overfished species to that fishery interaction analysis.

Table 4-67, below, shows ports, overfished species, and the interaction of each port’s LE fixed gear (FG) sablefish fishery and trawl fishery with those overfished species. These two sectors, or fisheries, are included because trawl vessels may engage in gear switching under the program and the most likely

species which trawlers will switch gears to focus on appears to be sablefish. As illustrated in Table 4-67, canary rockfish has perhaps the largest geographic distribution and largest interaction across sectors of all overfished species. Bocaccio is managed south of Cape Mendocino, so ports north of that area do not interact with that stock. The same is true for cowcod. Recently available data indicate that interactions with bocaccio and cowcod are highest around the Monterey Canyon area (generally extending from an area south of San Francisco to the southern end of Monterey Bay). Darkblotched is generally a trawl associated overfished species that is oriented to deep water strategies north of 38° N. latitude. Pacific ocean perch is similar, though it has a more northern orientation than darkblotched. Widow tends to impact midwater trawl strategies and is also a northern oriented species. In recent years, however (after the GMT analysis was created), widow rockfish have shown up in the bottom trawl fishery in greater numbers, and also south of Cape Mendocino. Yelloweye rockfish is generally a northern oriented species and is more susceptible to fixed gear than trawl gear. However, the amount of yelloweye likely to be available to the fishery is low, and, therefore, any interaction with yelloweye is likely to be important.

Table 4-67. Interactions between ports, fishery sectors, and overfished species.

Sub Region	Port	Super Sector	Sector	Overfished Species Interaction							
				Boc	Can	Cow	Drk	POP	Wid	Yel	
N 40 10	Astoria	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	
			LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	LOW	HIGH	LOW
	Bellingham Bay	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	LOW
	Blaine	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	LOW
	Brookings	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
LE B-Trawl Shelf			LOW	HIGH	LOW	LOW	LOW	LOW	LOW	LOW	
Coos Bay	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH	
	LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW		
		LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	LOW	
		LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	LOW	HIGH	LOW	
N 40 10	Crescent City	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	LOW
			LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	LOW	HIGH	LOW
N 40 10 cont.	Eureka	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	MED HIGH
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	

Sub Region	Port	Super Sector	Sector	Overfished Species Interaction							
				Boc	Can	Cow	Drk	POP	Wid	Yel	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	
			LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	HIGH	LOW	
	Ilwaco	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	MED HIGH	
		LE Trawl	LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	HIGH	LOW	
	Neah Bay	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	MED HIGH	
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
	LE B-Trawl Shelf		LOW	HIGH	LOW	LOW	LOW	LOW	LOW		
	Newport	LE Fixed Gear	LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	MED HIGH	
		LE Trawl	LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
			LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	LOW	
	Westport	LE Trawl	LE Mw-Trawl Whiting	LOW	MED HIGH	LOW	LOW	LOW	HIGH	LOW	
			LE FG-Sablefish	LOW	MED LOW	LOW	LOW	LOW	LOW	MED HIGH	
			LE B-Trawl Deep	LOW	MED LOW	LOW	HIGH	HIGH	LOW	LOW	
		Fort Bragg	LE Trawl	LE B-Trawl Shelf	LOW	HIGH	LOW	LOW	LOW	LOW	
				LE B-Trawl Deep	LOW	MED HIGH	LOW	LOW	LOW	HIGH	LOW
				LE FG-Sablefish	MED LOW	MED LOW	LOW	LOW	LOW	LOW	LOW
38 - 40 10			LE B-Trawl Deep	MED LOW	MED LOW	LOW	MED HIGH	LOW	LOW	LOW	
			LE B-Trawl Shelf	MED LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	
	Monterey	LE Fixed Gear	LE FG-Sablefish	MED LOW	MED LOW	MED LOW	LOW	LOW	LOW	LOW	
		LE Trawl	LE B-Trawl Deep	MED LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	
	LE B-Trawl Shelf		HIGH	MED HIGH	MED HIGH	LOW	LOW	LOW	LOW		
	Moss Landing	LE Fixed Gear	LE FG-Sablefish	MED LOW	MED LOW	MED LOW	LOW	LOW	LOW	LOW	
		LE Trawl	LE B-Trawl Deep	MED LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	
	LE B-Trawl Shelf		HIGH	MED HIGH	MED HIGH	LOW	LOW	LOW	LOW		
	Half Moon Bay	LE Fixed Gear	LE FG-Sablefish	MED LOW	MED LOW	MED LOW	LOW	LOW	LOW	LOW	
		LE Trawl	LE B-Trawl Deep	MED LOW	LOW	LOW	LOW	LOW	LOW	LOW	
	LE B-Trawl Shelf		HIGH	MED HIGH	MED HIGH	LOW	LOW	LOW	LOW		
	San Francisco	LE Fixed Gear	LE FG-Sablefish	MED LOW	MED LOW	MED LOW	LOW	LOW	LOW	LOW	
		LE Trawl	LE B-Trawl Deep	MED LOW	MED LOW	LOW	LOW	LOW	LOW	LOW	
	LE B-Trawl Shelf		HIGH	MED HIGH	MED HIGH	LOW	LOW	LOW	LOW		

Boc: bocaccio; Can: canary rockfish; Cow: cowcod; Drk: darkblotched rockfish; POP: Pacific ocean perch; Wid: widow rockfish; Yel: yelloweye rockfish

Viewing the initial allocation of overfished species to permits by the permits' principal port provides an indication of the geographic distribution of overfished species initial allocation (Table 4-68). This

information is useful when comparing it to the information above illustrating the interaction of various fishery sectors and overfished species by area. What is clear in Table 4-68 is that the initial allocation of overfished species to permits varies (sometimes widely) depending on the formula used for making that initial allocation.

In general terms, the initial allocation patterns (on a geographic basis) tend to follow the pattern shown above in Table 4-67 indicating the geographic-based interaction of overfished species by fishery sector. However, there are some noteworthy differences depending upon the formula chosen. These are itemized by species below:

- **Bocaccio:** Using any of the landings-based formulas distributes a noteworthy amount of quota to permits north of Cape Mendocino, where it is not needed.
- **Canary:** The alternatives that do not include the “equal sharing of buyback history” component results in several instances of zero, or nearly zero, amounts being allocated to permits along the coast. This can be problematic to those communities receiving these minimal amounts as canary is widely distributed and nearly every community needs some access to canary.¹¹¹
- **Cowcod:** Both of the landings-based allocations for cowcod allocate a relatively large amount of quota to areas north of Cape Mendocino, where it is not needed. Both of the bycatch rate-based formulas allocate a relatively larger amount of areas from San Francisco through the southern end of Monterey Bay area, where recently available data indicate it may be more needed.
- **Darkblotched:** Each of the allocation formulas results in a relatively similar average amount of QS to permits within each port, except for Fort Bragg where the pure landings-based formula results in noticeably more quota being allocated to permits there than other formulas. Also, ports south of Fort Bragg receive no darkblotched under the pure landings-based formula, though available information indicates that darkblotched are found in these areas.
- **Pacific ocean perch:** Follows the same general pattern as darkblotched where the initial allocations of Pacific ocean perch tend to be northern oriented and also tend to vary relatively little across the various initial allocation formulas.
- **Widow:** Aside from a handful of exceptions, each of the allocation formulas distributed widow rockfish to permits along the entire coast. The exceptions are for the pure landings-based allocation formula which allocates close to zero quota to permits in communities from Half Moon Bay south.
- **Yelloweye:** Under all allocation formulas, the amount of quota poundage of yelloweye is equivalent to a handful of individual fish even in the best-case scenario. The distribution of QSs is oriented toward the north and off southern Oregon where available information indicates that yelloweye is most abundant. Permits in other areas of the coast will receive very little, and this will be challenging to vessel operators and communities in which they reside.

Table 4-68. Average allocation of overfished species to permits by principal port, allocation formula, and overfished species.

Port	Formula	Boc	Can	Cow	Drk	POP	Wid	Yel
Bellingham	Bycatch rate (pro rata for whiting)						0.4	
	only	0.0%	2.1%	0.0%	0.4%	1.3%	%	2.6%
	Bycatch rate (pro rata for whiting)	0.1%	1.4%	0.3%	0.5%	0.9%	0.5	1.9%

¹¹¹ In November 2009, shortly before the release of the DEIS, the Council revised the final preferred alternative adopted in June 2009 to change the allocation scheme for canary rockfish to include an equal sharing element, similar to the formula used for nonoverfished species (although the bycatch rate formula is still applied to quota not derived from the equal sharing element).

Port	Formula	Boc	Can	Cow	Drk	POP	Wid	Yel
	plus equal sharing of BB History						%	
	Landings history only	1.3%	1.4%	0.0%	0.7%	1.7%	%	2.1%
	Landings history plus equal sharing of BB history	1.1%	1.1%	0.3%	0.6%	1.2%	1.0%	1.5%
Neah Bay	Bycatch rate (pro rata for whiting) only	0.0%	1.6%	0.0%	0.1%	0.2%	0.1%	2.3%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.1%	1.0%	0.3%	0.3%	0.3%	0.2%	1.7%
	Landings history only	0.0%	0.5%	0.0%	0.0%	0.2%	0.1%	0.1%
	Landings history plus equal sharing of BB history	0.1%	0.4%	0.3%	0.3%	0.3%	0.2%	0.3%
Westport	Bycatch rate (pro rata for whiting) only	0.0%	0.7%	0.0%	0.3%	0.4%	0.7%	0.5%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.1%	0.7%	0.3%	0.4%	0.5%	0.6%	0.5%
	Landings history only	0.0%	0.4%	0.0%	0.1%	0.2%	0.3%	0.1%
	Landings history plus equal sharing of BB history	0.1%	0.5%	0.3%	0.3%	0.4%	0.4%	0.2%
Astoria	Bycatch rate (pro rata for whiting) only	0.0%	0.6%	0.0%	0.6%	0.9%	0.8%	0.7%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.1%	0.6%	0.3%	0.6%	0.8%	0.7%	0.7%
	Landings history only	0.1%	0.6%	0.0%	0.5%	1.2%	0.5%	0.4%
	Landings history plus equal sharing of BB history	0.2%	0.6%	0.3%	0.5%	0.9%	0.5%	0.4%
Newport	Bycatch rate (pro rata for whiting) only	0.1%	0.6%	0.1%	0.7%	0.9%	1.1%	0.2%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.2%	0.7%	0.3%	0.6%	0.8%	0.9%	0.3%
	Landings history only	0.1%	1.0%	0.0%	0.7%	0.7%	1.0%	0.9%
	Landings history plus equal sharing of BB history	0.2%	0.9%	0.3%	0.6%	0.7%	0.9%	0.8%
Coos Bay	Bycatch rate (pro rata for whiting) only	0.1%	0.4%	0.0%	0.9%	0.6%	0.5%	0.3%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.1%	0.4%	0.3%	0.7%	0.6%	0.5%	0.4%
	Landings history only	0.5%	0.6%	0.0%	1.1%	0.3%	0.5%	1.3%
	Landings history plus equal sharing of BB history	0.5%	0.6%	0.3%	0.8%	0.4%	0.5%	1.1%

Port	Formula	Boc	Can	Cow	Drk	POP	Wid	Yel
Brookings	Bycatch rate (pro rata for whiting) only	0.0%	0.4%	0.0%	0.8%	0.2%	0.3%	0.2%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.1%	0.5%	0.3%	0.7%	0.4%	0.4%	0.3%
	Landings history only	0.1%	0.4%	0.0%	0.4%	0.1%	0.7%	0.2%
	Landings history plus equal sharing of BB history	0.2%	0.4%	0.3%	0.5%	0.3%	0.6%	0.3%
Crescent City	Bycatch rate (pro rata for whiting) only	0.2%	0.4%	0.1%	0.5%	0.2%	0.2%	0.3%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.2%	0.4%	0.3%	0.5%	0.3%	0.3%	0.4%
	Landings history only	0.5%	0.1%	0.0%	0.3%	0.0%	1.3%	0.2%
	Landings history plus equal sharing of BB history	0.5%	0.2%	0.3%	0.4%	0.2%	1.0%	0.3%
Eureka	Bycatch rate (pro rata for whiting) only	0.1%	0.4%	0.1%	0.6%	0.1%	0.1%	0.3%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.2%	0.4%	0.3%	0.6%	0.3%	0.2%	0.4%
	Landings history only	0.2%	0.2%	6.4%	0.5%	0.2%	0.3%	0.2%
	Landings history plus equal sharing of BB history	0.3%	0.3%	3.1%	0.5%	0.4%	0.3%	0.3%
Fort Bragg	Bycatch rate (pro rata for whiting) only	1.0%	0.0%	0.2%	0.4%	0.0%	0.2%	0.0%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.9%	0.2%	0.4%	0.5%	0.2%	0.3%	0.2%
	Landings history only	1.3%	0.2%	0.0%	1.4%	0.1%	0.2%	0.1%
	Landings history plus equal sharing of BB history	1.2%	0.3%	0.3%	1.0%	0.3%	0.3%	0.3%
San Francisco	Bycatch rate (pro rata for whiting) only	2.2%	0.2%	2.0%	0.4%	0.1%	0.4%	0.3%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	1.9%	0.4%	1.2%	0.5%	0.3%	0.4%	0.4%
	Landings history only	3.9%	0.4%	0.0%	0.5%	0.1%	0.6%	0.5%
	Landings history plus equal sharing of BB history	3.3%	0.4%	0.3%	0.5%	0.3%	0.6%	0.5%
Half Moon Bay	Bycatch rate (pro rata for whiting) only	4.9%	0.2%	6.5%	0.1%	0.1%	0.1%	0.9%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	4.1%	0.3%	3.2%	0.3%	0.3%	0.2%	0.8%
	Landings history only	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Landings history plus equal sharing of BB history	0.5%	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%

Port	Formula	Boc	Can	Cow	Drk	POP	Wid	Yel
Moss Landing	Bycatch rate (pro rata for whiting) only	2.0%	0.3%	1.9%	0.3%	0.1%	0.4%	0.4%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	1.7%	0.4%	1.1%	0.4%	0.3%	0.4%	0.4%
	Landings history only	2.0%	0.2%	0.0%	0.3%	0.2%	0.3%	0.3%
	Landings history plus equal sharing of BB history	1.8%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
Monterey	Bycatch rate (pro rata for whiting) only	3.0%	0.1%	3.7%	0.1%	0.0%	0.1%	0.5%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	2.6%	0.2%	1.9%	0.3%	0.2%	0.2%	0.5%
	Landings history only	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Landings history plus equal sharing of BB history	1.7%	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%
Morro Bay	Bycatch rate (pro rata for whiting) only	1.0%	0.1%	0.6%	0.3%	0.1%	0.2%	0.1%
	Bycatch rate (pro rata for whiting) plus equal sharing of BB History	0.9%	0.2%	0.6%	0.4%	0.3%	0.3%	0.3%
	Landings history only	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	Landings history plus equal sharing of BB history	0.6%	0.2%	0.3%	0.3%	0.2%	0.2%	0.3%

Boc: bocaccio; Can: canary rockfish; Cow: cowcod; Drk: darkblotched rockfish; POP: Pacific ocean perch; Wid: widow rockfish; Yel: yelloweye rockfish

4.14.5.5 Comparative Advantage

Based on these data, combined with the weight of nonwhiting groundfish landed by port and vessel efficiency category (Table C-4, Appendix C), we established the following summary of relative comparative advantage for nonwhiting trawl communities. In particular, the port of Neah Bay appears to be at a disadvantage in a rationalized fishery because of its lack of fleet efficiency, lack of shore-based infrastructure, and the high degree of dependence that vessels in this port have on areas defined as “high bycatch.” Conversely, the ports of Astoria and Coos Bay appear to be at a relative advantage compared to other ports. Astoria has the benefit of a relatively efficient fleet, a relatively large presence of shore-based infrastructure, and a low dependence on fishing grounds located in high bycatch areas. Coos Bay also appears to be at a relative advantage because of fleet efficiency and the relatively large amount of shore-based infrastructure. While catch landed in Coos Bay has historically been caught in high bycatch areas, this amount of catch does not constitute the majority. Therefore, it is likely that vessels originating in Coos Bay will adjust fishing practices to avoid bycatch, but the community is not likely to suffer as a result.

The comparative advantage of other communities is less certain. Bellingham and Half Moon Bay may see their vessels’ ability to fish highly constrained because of their reliance on fishing grounds in high bycatch areas. Vessels in Half Moon Bay are relatively less efficient, and, while Bellingham has a number of vessels that fall within the efficient range, vessels from that area have a much longer travel distance to and from fishing grounds relative to vessels from other ports. This increases costs for these vessels relative to vessels from other ports, suggesting that they may be more appropriately categorized as inefficient.

The effect on Fort Bragg and Crescent City is also somewhat uncertain. While there are several scores that appear to work in Fort Bragg's favor, this community does not score in the top bracket on any of the determinant variables and may have a fleet consisting of inefficient vessels, though several vessels are near the efficient range. Crescent City scores in the negative category on several variables and positively in others. The overall effect on Crescent City may depend on the relative importance of the variables. If bycatch dependency is the overall driving factor, then Crescent City may actually be at an advantage, even though it has a relatively inefficient fleet and a relatively small amount of quota initially allocated to it.

The table below summarizes the comparative advantage of nonwhiting communities. Ports that are at a disadvantage from consolidation and geographic shift have a relatively inefficient fleet (vessels with a relatively long travel time to fishing grounds and those with relatively unsuccessful operators, costly vessels, and inefficiently sized vessels contribute to the fleet efficiency score in the table below), insufficient infrastructure, and are adjacent to fishing grounds with high constraining overfished species abundance ("bycatch dependence" in the table below). The table also includes a positive or negative score for "initial allocation of groundfish," as determined by the initial allocation estimates. The implications of these scores for each community will be described further below.

Table 4-69. Comparative advantage of nonwhiting trawl communities under rationalization.

Port	Fleet Efficiency Score	Bycatch Dependent Area Score	Shore-based Infrastructure	Initial Allocation of Groundfish	Score
Bellingham	?	--	++	+	
Neah Bay	-	--	--	-	-
Westport	-	+	+	-	
Astoria	+	+	++	++	+
Newport	+	-	++	+	
Charleston (Coos Bay)	+	+	++	+	+
Brookings	+	+	-	+	
Crescent City	-	+	+	-	
Eureka	+	+	+	+	+
Fort Bragg	-	+	+	+	
San Francisco	-	-	++	+	
Moss Landing	-	--	+	+	
Princeton/Half Moon Bay	-	--	+	+	
Morro Bay	?	+	-	-	

While this information suggests that shifts in fishing effort may occur as a result of rationalization, with subsequent impacts to communities, these shifts can be mitigated or restricted to some degree by various aspects of the alternatives. The proposed rationalization program contains an option for area management that would create separate Qs for north and south of 40°10'. In general, northern areas have received a larger share of trawl-caught groundfish during recent years, and this appears to have been a pattern that could continue if the fishery is rationalized. Several large trawlers from the south have also relocated to the north, specifically Astoria. In addition, the geographic shift and regional comparative advantage analysis indicates northern communities have more factors working in their favor than southern communities. This may lead to a shift in fishing activity toward the north. Area management would presumably help retain catch in those southern communities. Adaptive management could be used to assist adversely impacted communities as well. Directing the adaptive

management quota to specific communities that have demonstrated harm, or a likely harm, could maintain fishing activity in a community that may otherwise stand to lose that activity.

Whiting communities are not as likely to see a shift in Pacific whiting fishing activity. This is because of resource access and access to infrastructure necessary to support a processing plant for Pacific whiting. Since the whiting fishery operates in northern California, Oregon, and Washington, community-based activity is not likely to deviate from communities in this area. In the shoreside whiting fishery, processors range from northern California to central Washington. The range is not expected to grow further since the fishery does not operate further south and, north of Westport, because of a lack of support infrastructure and fresh water, which is necessary to support a large Pacific whiting processor. Therefore, while some redistribution of whiting activity may occur across communities currently engaged in the whiting fishery, it does not appear likely that there would be a wholesale shift in the location of where this activity takes place. The at-sea fishery is an even more extreme example. Since entities involved in the whiting fishery also tend to participate in the Bering Sea pollock fishery, many of these entities are based in the Puget Sound region of Washington. This is because of the travel distance to and from the Bering Sea (basing further south would mean more travel distance) and because of the amount of infrastructure and business in the Seattle area that can handle the needs of the at-sea sector. Therefore, rationalization is not likely to displace the major centers for at-sea whiting activity from the Puget Sound area.

4.14.5.6 Resilience and Dependence

Knowing the resilience and dependence level of coastal communities helps to assess impacts from the trawl rationalization program. Impacts that may be minor to a very resilient community (like Seattle) could be substantial for a community with low resilience (like Neah Bay). Section 3.7.4 summarizes work done on dependence on the groundfish fishery and resilience in fishing communities for the 2007-08 groundfish harvest specifications (PFMC 2004a). The study uses as indicators the number of Federal and state groundfish permits in the community, number of commercial fishing vessels, revenue from fish landings, percentage of groundfish revenue as a percentage of total fisheries revenue, and number of processors and buyers to determine engagement and dependence on commercial fisheries. The study uses an industry diversity index, unemployment rate, percentage of population living below the poverty line, isolation of cities, and population density to determine resilience. The table below summarizes dependence and resilience of west coast trawl communities.

Most vulnerable communities (medium dependence on groundfish, least resilience)

Neah Bay	Moss Landing
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Relatively lower dependence, but low resilience

Ilwaco

Relatively higher dependence, medium resilience

Bellingham	Crescent City
Astoria	Eureka
Coos Bay	Fort Bragg

Relatively higher dependence, higher resilience

Newport	Morro Bay
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Medium dependence but higher resilience

Westport

Relatively lower dependence and relatively higher resilience

Warrenton

Higher dependence, but high resilience (not considered “vulnerable”)

Brookings	San Francisco
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Low dependence, high resilience (not considered “vulnerable”)

Anacortes	Hammond
Seattle	Half Moon Bay

As a reminder, the term “dependence” involves use of groundfish specifically, while “engagement,” when used, refers to engagement in west coast fisheries as a whole. In addition, the list above is slightly different than the list of trawl communities identified for this EIS. In our analysis, Astoria and Hammond are joined as one community. Coos Bay includes the port of Charleston.

The discussion below focuses on impacts from the options in the alternatives to individual communities. The larger-scale impacts of rationalization (discussed in detail in Section 4.14.2) also apply here. When it is possible to differentiate among communities, relevant concerns are included below. In addition, there are several options within the alternatives that do not vary by community. Each community would be affected equally (in proportion to its trawl activity) by tracking and monitoring provisions and carryover. Depending on how an adaptive management provision is administered, it could either benefit communities (by providing more quota) or adversely impact them by reducing the total available quota.

As discussed above, area management refers to the splitting of Qs between the north and south. This could benefit central and southern California communities by maintaining more quota in the south.

The grandfather clause could also affect communities differentially. However, there are currently insufficient data to determine how communities would be affected, and confidentiality issues would prevent a detailed discussion of individual community impacts.

4.14.5.7 Impacts on Individual Communities

The following section outlines the impacts of rationalization, when predictable, on individual trawl communities. For more background on these communities, please see Chapter 3. For cumulative impacts on individual trawl communities, please see

Table 4-71.

Bellingham, Washington

Bellingham is located on Bellingham Bay in north Puget Sound, in Whatcom County. The closest major U.S. city is Seattle, a 90-mile drive south, while Vancouver, British Columbia, is a 54-mile drive north. Bellingham is a nonwhiting port.

Bellingham is considered vulnerable because it is highly engaged in Pacific fisheries in general, highly dependent on groundfish, and has medium resilience.

Bellingham has two processors that process groundfish landed in Bellingham Bay and Neah Bay. Bellingham also has access to a large seafood cold storage facility and has a relatively well-developed level of port infrastructure. Bellingham is located on the I-5 corridor, which enhances access to distribution facilities in the Seattle area.

The Comparative Advantage Model shows that 69.9 percent of Bellingham's nonwhiting trawl catch occurs in an area identified as a high bycatch area. Yelloweye and canary rockfish are the main species of concern, and both are very constraining. Because of this, Bellingham vessels are relatively constrained compared to other ports. In addition, vessels from Bellingham have a much longer travel distance to and from fishing grounds compared to vessels from other ports. This increases cost for those vessels, suggesting that the four of eleven vessels that fall within the efficient range may be more appropriately categorized as inefficient. However, the efficiencies created by Bellingham's shore-based infrastructure help make up for the burden created by constraining bycatch species and lack of efficiency.

Effects of alternatives

- Since Bellingham is a nonwhiting port, it would not be significantly affected by decisions relating to co-ops.
- The three or four sector issue would not impact Bellingham differently than other nonwhiting communities, at least to a degree that can be identified at this time.
- Bellingham should benefit from initial allocation, particularly if 100 percent of the buyback history is equally allocated to harvesters.
- Bellingham has two processors that could benefit from initial allocation of IFQ to processors and processor linkages.
- Since Bellingham is close to a high bycatch area, it could be affected by the choice of which species to cover with IFQ, since harvesters would need a relatively large amount of quota for constraining species and would be at risk of a disaster tow.

Anacortes, Washington

Anacortes, in Skagit County, is 80 miles north of Seattle and 40 miles southwest of Bellingham. Anacortes is primarily a whiting port; the at-sea whiting fleet docks there, and one at-sea whiting companies have their corporate headquarters in Anacortes. Perhaps because of this, commercial fishing in Anacortes has employed few workers, but has paid some of the area's highest salaries. In 2000, the annual average wage for commercial fishermen in the county was \$57,810. That year, the finfish fishery (which includes whiting) employed 53 workers making \$83,016 annual average pay. In the same year, only 91 Skagit County residents identified themselves as commercial fishermen.

Anacortes is not considered vulnerable. It is engaged in Pacific fisheries in general, but it is not considered dependent on groundfish and it is highly resilient.

Anacortes currently has no groundfish processors. Many seafood processors operating in the area have closed. However, several seafood companies from Western Washington come to Cap Sante Boat Haven to purchase product (not groundfish) from local fishermen.

Effects of alternatives

- Anacortes' involvement in the trawl fishery is limited to the at-sea whiting fleet, specifically the catcher-processors sector.
- Unlike Bellingham, commercial groundfish vessels in Anacortes are not at a disadvantage due to their long travel time to fishing grounds or their proximity to the high bycatch area off northern Washington, because they are primarily at-sea whiting vessels that are not tied to a specific geographic area.
- Since the community has no trawl groundfish processors and no Federal nonwhiting trawlers, it will only be affected by the alternatives as they pertain to the whiting fishery. Variations in the way the catcher-processor sector is managed are not expected to impact Anacortes because the effect of those variations on catcher-processors does not differ substantially from the status quo.

Seattle, Washington

Seattle is on the east side of the Puget Sound between Elliot Bay and Lake Washington, in King County. According to the 2000 U.S. Census, Seattle's population was 563,374. The larger metropolitan area (comprising all or parts of Snohomish, King, Pierce, Thurston, and Kitsap Counties) was home to 3,554,760 in 2000.

Seattle is an important whiting port, with docks for the at-sea fleet and corporate headquarters. Most of the 24 Federal trawl permits owned in Seattle are used in the at-sea whiting fishery.

Although nonwhiting permit holders live in Seattle, none actively fish out of Seattle, so Seattle's proximity to a high bycatch area is irrelevant.

In 2000, west coast fisheries landings in Seattle were delivered by 909 unique vessels, including 253 commercial vessels, 498 tribal commercial vessels, and 158 personal use vessels. Nine vessels landed 109 mt of groundfish.

Seattle is not considered vulnerable. It is engaged in Pacific fisheries in general, but it is not considered dependent on groundfish and it is highly resilient. Seattle has a high level of fisheries infrastructure.

Effects of alternatives

- Seattle is primarily an at-sea whiting port.
- It is too early to say how initial allocation might affect Seattle, and vessel efficiency data are not available for the at-sea fishery.
- The three or four-sector alternative should not significantly affect Seattle since Seattle does not have vessels actively engaged in shoreside fisheries.
- Seattle would not be affected by area management, since it is a whiting port and whiting are found in the north.

- Seattle could be affected by decisions regarding management of the mothership sector because of its engagement in the at-sea whiting fishery. Mothership sector co-op linkages or an initial allocation of whiting IFQ to motherships may affect companies differently. Variations in management of the catcher-processor sector are not expected to affect Seattle because the alternatives do not vary substantially from status quo.
- Seattle has several motherships that could benefit from initial allocation of IFQ to processors and processor linkages.

Neah Bay, Washington

Neah Bay is at the northwestern-most point of the contiguous United States, across the Strait of Juan de Fuca from Vancouver Island, British Columbia. Situated in Clallam County, Neah Bay is the main settlement on the Makah Indian Reservation. The nearest major U.S. city is Seattle, a 165-mile drive and ferry ride southeast.

Neah Bay is considered quite vulnerable. It is not deeply engaged in Pacific fisheries in general, but it is dependent on groundfish and has very low resilience.

There are no known processing facilities of trawl groundfish in Neah Bay. Vessels deliver to buyers who subsequently deliver to processors in Seattle, Bellingham, Astoria, and elsewhere. Port and harbor facilities are limited, and the location is considered remote and removed from distribution and transportation networks. No Federal trawl permits are owned by community members. Vessels fishing out of Neah Bay are owned by nonresidents. As recently as 2005, there were eight vessels that made deliveries to Neah Bay, but anecdotal information indicates that many of these vessels have since left the business due to management restrictions. As of 2008, no trawlers are believed to be operating out of Neah Bay.

Effects of alternatives

- Neah Bay is a small, vulnerable nonwhiting port that is at risk of losing its trawl fleet due to rationalization. Four of seven vessels delivering to Neah Bay in recent years are of inefficient size, and these four vessels constitute the majority of recent trawl landings.
- Neah Bay would not be affected by decisions regarding co-ops since it has no processors and no whiting fishery.
- Neah Bay does not benefit substantially from initial allocation, receiving less than the average allocated to all ports. Of the three buyback allocation options, Neah Bay would fare best under the 100 percent to harvesters option.
- Because Neah Bay has no permanent processors of trawl groundfish. It may experience a reduction in landings if processors are allocated quota, because processors with quota will likely direct landings to ports that already have processing plants.
- Vessels fishing out of Neah Bay are at a disadvantage because of its proximity to a high bycatch area. Of Neah Bay's nonwhiting trawl catch, 95.5 percent occurs in an area identified as a high bycatch area, constrained by canary and yelloweye rockfish. Because of this, Neah Bay could be affected by the choice of which species to cover with IFQ, since harvesters would need a relatively large amount of (possibly expensive) quota for constraining species and would be at risk of a disaster tow.
- Neah Bay might benefit from having three, rather than four, trawl sectors. Since having three sectors increases the pool of available quota to nonwhiting harvesters (which includes all Neah Bay harvesters), three sectors would give them more ability to trade quota as necessary, while four sectors could inadvertently constrain them in some years if whiting bycatch is high.

- Of all communities, Neah Bay may benefit the most from an adaptive management provision to mitigate the impacts of rationalization.
- Although there has been a gradual shift in trawling to the north, trawl activity has not been moving to Neah Bay. However, area management could help because there would be less competition for the same fish and less risk of localized depletion.

Westport, Washington

Westport is on the southernmost peninsula in Washington, Point Chehalis, in Grays Harbor County. The nearest major U.S. city is Seattle, a 130-mile drive northeast. Westport is primarily a whiting port, though two small nonwhiting vessels also deliver there.

Westport is considered vulnerable. It is deeply engaged in Pacific fisheries in general, and it is fairly dependent on the groundfish fishery, but it is also fairly resilient.

Westport has a single processor that processes trawl groundfish landed in the community. This facility concentrates primarily on Pacific whiting and is one of the largest shoreside processors for this species. Facilities near the Port of Grays Harbor include vessel fabrication services and supply centers. Westport is somewhat removed from distribution centers. Fish landed in Westport are also processed in Astoria and Ilwaco.

Effects of alternatives

- Westport would be affected by options impacting whiting harvesters, nonwhiting harvesters, and processors. Processor ties in the shoreside whiting fishery could guarantee landings of whiting to Westport.
- Because of its involvement in Pacific whiting harvesting and processing activities, Westport would be affected by decisions relating to co-ops and processor ties, and initial allocation to harvesters and processors.
- Westport receives less nonwhiting quota under the initial allocation options than the average allocated to all ports. Among the three buyback allocation options, Westport would fare best if buyback were allocated 100 percent to harvesters.
- Westport has one processor that could benefit from initial allocation of Qs to processors and processor linkages.
- Since Westport is not close to a high bycatch area, it may not be substantially affected if constraining stocks are managed with IFQ.
- The nonwhiting harvesters delivering to Westport are categorized as inefficient, meaning fleet consolidation may remove nonwhiting activity from this port.
- Since Westport is engaged in both whiting and nonwhiting activity, the decision to have three or four sectors will impact this port. The three-sector option will provide more flexibility since it expands the pool of quota available to harvesters in both sectors, making it more likely that expected harvest volumes will be reached.

Ilwaco, Washington

Ilwaco is on the Long Beach Peninsula in southwest Washington. Situated in Pacific County, the community encompasses 2.06 square miles of land and 0.31 square miles of water. The closest major U.S. city is Portland, Oregon, a 110-mile drive southeast, while Seattle is a 170-mile drive northeast. Ilwaco is primarily a whiting port.

Ilwaco is considered vulnerable. It is deeply engaged in Pacific fisheries in general, but it is not very dependent on groundfish. Ilwaco is fairly lacking in resilience.

Ilwaco has a relatively small but sufficient amount of infrastructure, with one processor, a marina, a fish wholesaler, and sources for fishing and marine supplies.

Effects of alternatives

- Ilwaco is primarily a whiting port, and would be affected by options impacting the shoreside whiting fishery.
- Ilwaco receives less initial allocation of nonwhiting groundfish than the average allocated to all ports. In addition, initial allocation reduces the amount of fish available to Ilwaco harvesters compared to status quo.
- Ilwaco has one processor that could benefit from initial allocation of Qs to processors and processor linkages.
- Since Ilwaco's engagement in the groundfish trawl fishery is limited to shoreside whiting activity, establishing three or four sectors will impact the community. If four sectors are established, yet the shoreside whiting fishery is managed with co-ops and shares bycatch limits with the at-sea sectors, a four-sector option may not constrain harvest activity. However, if four sectors are established and the shoreside whiting fishery is managed as its own sector with a specific allocation, harvest activity may be constrained during years when nontarget catch is higher than anticipated. Managing the shoreside whiting fishery with three sectors is likely to provide more flexibility in prosecuting shoreside whiting activity since harvesters in both shoreside sectors can trade quota as necessary.

Astoria/Warrenton, Oregon

Astoria and Warrenton are adjacent to one another and are located in Clatsop County on the northwestern tip of Oregon, bordered by the Pacific Ocean on the west and the Columbia River on the north. Portland is the nearest major city, 91 miles to the east.

Astoria is considered vulnerable. It is deeply engaged in Pacific fisheries in general, and it is relatively dependent on groundfish. Astoria has medium resilience. Warrenton is not considered vulnerable. It is not very engaged in Pacific fisheries, and not very dependent on groundfish. Warrenton is also fairly resilient.

Astoria has the benefit of a relatively efficient fleet, a relatively large presence of shore-based infrastructure, and a low dependence on fishing grounds located in high bycatch areas. However, Astoria is fairly removed from distribution centers.

Effects of alternatives

- In general, Astoria is expected to benefit from rationalization, with a large initial allocation, and possibly increased harvesting and processing activity in the future as landed catch volumes in the nonwhiting sector increase. Astoria/Warrenton would benefit the most from initial allocation of nonwhiting quota relative to the average allocated to all ports, especially under the 100 percent buyback history to harvesters option.
- Both Astoria and Warrenton are whiting and nonwhiting ports and would be affected by options impacting whiting and nonwhiting harvesters.

- Combined, Astoria and Warrenton have four processors that process trawl groundfish from Astoria, Aberdeen, Garibaldi/Tillamook, Neah Bay, Port Angeles, and Westport. In addition, several support businesses exist in the area, and dock and harbor facilities are fairly well developed. Astoria/Warrenton could benefit from initial allocation of IFQ to processors and processor linkages.
- Since Astoria/Warrenton is not close to a high bycatch area, it would probably not be substantially affected by the choice to cover constraining stocks with IFQ.
- As with other communities that have both a whiting and nonwhiting sector, establishing three or four trawl sectors may impact Astoria/Warrenton. If four trawl sectors are established, either shoreside sector may face difficulties prosecuting fishing activity if a species becomes unexpectedly constraining. Such difficulties may be felt in communities via a second-order effect on harvesters.

Newport, Oregon

Newport is located in Lincoln County at the mouth of the Yaquina River. The northern portion of unincorporated South Beach is within the City of Newport's boundaries. The closest major metropolitan area is Portland, 136 miles to the northeast. Newport is both a whiting and nonwhiting port.

Newport prides itself in and protects its working waterfront, realizing that the seafood industry is at the core of Newport's history and culture. Tourism on the historic bayfront compliments its mixed use. While new revitalization plans have enhanced the local tourism economy, they have also increased tensions between the tourism and seafood industries.

Newport is considered vulnerable. It is deeply engaged in Pacific fisheries in general, is very dependent on groundfish, but is also fairly resilient.

In addition, several support businesses exist in the area and dock and harbor facilities are fairly well developed. Newport is fairly removed from distribution centers.

Effects of alternatives

- In general, Newport is expected to benefit from rationalization, with a large initial allocation, and possibly increased harvesting and processing activity in the future as landed catch volumes in the nonwhiting sector increases. Newport would receive more IFQ through initial allocation than the average allocated to all ports. Of the three buyback history distribution options, Newport benefits the most from the 87.5 percent to harvesters option.
- Newport is both a whiting and nonwhiting port and would be affected by options impacting whiting and nonwhiting harvesters.
- Newport has three processing facilities engaged in trawl groundfish. Newport could benefit from initial allocation of Qs to processors and processor linkages if doing so increases the likelihood that fishing activity will remain there.
- Newport is located near a high bycatch area (58.4 percent of its nonwhiting trawl catch occurs in an area identified as a moderately high bycatch area). The species of concern are Pacific ocean perch and darkblotched rockfish, which are less constraining than canary and yelloweye rockfish. Newport could, therefore, be affected by covering constraining species with IFQ. However, since the constraining species found off Newport are not as constraining as some, their presence may not have a substantial effect on Newport.
- As with other communities that have both a whiting and nonwhiting sector, establishing three or four trawl sectors may impact Newport. If four trawl sectors are established, either shoreside

sector may face difficulties prosecuting fishing activity if a species becomes unexpectedly constraining. Such difficulties may be felt in communities via a second-order effect on harvesters.

Coos Bay/Charleston, Oregon

Coos Bay and its port, Charleston, are located at the mouth of Coos Bay in Coos County, Oregon. Coos Bay is both a whiting and a nonwhiting port. Charleston, where most of the port activity takes place, is unincorporated. Coos Bay is located 226 miles south of Portland, on Highway 101, and 539 miles north of San Francisco.

Coos Bay is considered vulnerable. It is deeply engaged in Pacific fisheries in general, very dependent on groundfish, and has medium resilience. Charleston is not considered vulnerable. It is not as engaged in Pacific fisheries or as dependent on commercial groundfish fisheries as Coos Bay (it scored higher on recreational measures, however), and it is considered resilient.

There are several support businesses in the area, and dock and harbor facilities are fairly well developed. However, Coos Bay is fairly removed from distribution centers.

Coos Bay appears to be at a relative advantage because of fleet efficiency and the relatively large amount of shore-based infrastructure.

Effects of alternatives

- In general, Coos Bay and Charleston are expected to benefit from rationalization, with a large initial allocation, and possibly increased harvesting and processing activity in the future as landed catch volumes in the nonwhiting sector increase. Coos Bay/Charleston would receive more IFQ than the average allocated to all ports. Of the three buyback history distribution options, Coos Bay/Charleston benefits the most from the 100 percent to harvesters option.
- Coos Bay/Charleston is both a whiting and nonwhiting port and would be affected by options impacting whiting and nonwhiting harvesters.
- Coos Bay has five groundfish processors that process fish from Brookings and Newport, as well as Coos Bay. Fish landed in the community are processed in the community, as well as in Newport and Santa Rosa. Coos Bay/Charleston could benefit from initial allocation of IFQ to processors and processor linkages if it increases the likelihood that processing activity will remain in those ports.
- While catch landed in Coos Bay historically has been caught in high bycatch areas, this amount of catch does not constitute the majority. Therefore, it is likely that vessels originating in Coos Bay will adjust fishing practices to avoid bycatch, but the community is not likely to suffer as a result.
- As with other communities that have both a whiting and nonwhiting sector, establishing three or four trawl sectors may impact Coos Bay. If four trawl sectors are established, either shoreside sector may face difficulties prosecuting fishing activity if a species becomes unexpectedly constraining. Such difficulties may be felt in communities via a second-order effect on harvesters.

Brookings, Oregon

Brookings, located in Curry County, is the southernmost coastal city of Oregon. It is situated at the mouth of the Chetco River, approximately 345 miles south-southeast of Portland. According to the Port

of Brookings-Harbor, it is the busiest recreational port on the Oregon coast with more than 95,000 anglers taking more than 31,000 trips.

Brookings is not considered vulnerable. It is quite engaged in Pacific fisheries in general, and it is very dependent on groundfish, but it is also considered very resilient. Brookings depends heavily on the recreational salmon fishery, which was closed in 2008; therefore, it may be somewhat less resilient now than it was in the past.

Brookings is fairly removed from distribution networks. The fleet is characterized as relatively efficient because five vessels fall within the efficient category.

Effects of alternatives

- Brookings is a nonwhiting port, and would be affected by options affecting nonwhiting harvesters, but not by options impacting whiting harvesters.
- Brookings would benefit slightly from initial allocation. Of the three buyback history distribution options, Brookings benefits the most from the 87.5 percent to harvesters option.
- Brookings has no known processing facilities of trawl groundfish. Groundfish landed in Brookings are processed in Eureka, Santa Rosa, and Charleston. Brookings may not see any benefit from initial allocation of Qs to processors and processor linkages. In fact, such processing linkages and initial allocation may draw trawl activity away from Brookings if processors elect to put that activity into ports where processing plants are located.
- Brookings is not adjacent to areas with high bycatch and would, therefore, not be substantially affected by covering constraining species with IFQ.
- The establishment of four sectors may make it difficult for nonwhiting trawlers out of Brookings to acquire quota necessary to cover catch of some species if the catch of those species is higher than expected. Three trawl sectors would allow Brookings-based trawlers to trade quota with shoreside whiting trawlers, potentially alleviating these constraints.

Crescent City, California

Crescent City is in Del Norte County in northern California, approximately 330 miles south of Portland, Oregon, and 356 miles north of San Francisco. The Crescent City Harbor supports recreational and commercial fisheries, along with tourism. The harbor includes an ice plant, hoist, fuel supplier, boatyard, tackle shops, dry storage, marine supply store, vessel repair and maintenance, and other amenities.

The Groundfish Vessel Buyback Program and sales of other local vessels have removed many of the larger rent-paying vessels from the port. The absence of this revenue stream has reportedly caused an increase in rent. A new port master plan aims to attract shops and other business.

Crescent City is considered vulnerable. It is very engaged in Pacific fisheries in general, and it is quite dependent on groundfish, with medium resilience. In addition, Crescent City has been affected by the recent closure of the commercial and recreational salmon fishery.

Effects of alternatives

- Crescent City is a whiting and nonwhiting port and would be affected by options impacting both whiting and nonwhiting harvesters.

- Crescent City would receive an initial allocation that is less than average. Of the three buyback history distribution options, Crescent City benefits the most from the 75 percent to harvesters option.
- Crescent City has one processing facility that has engaged in minor quantities of trawl groundfish. Fish landed in Crescent City are also processed in Eureka, Fort Bragg, and San Francisco. Crescent City is fairly removed from distribution centers, but has several support businesses and infrastructure components.
- Crescent City scores in the negative category on several variables, but scores positively in bycatch dependency. The overall effect on Crescent City may depend on the relative importance of these variables. If bycatch dependency is the overall driving factor, then Crescent City may actually be at an advantage, even though it has a relatively inefficient fleet and relatively small amount of quota initially allocated to it.
- The establishment of three or four trawl sectors would affect Crescent City similarly to other ports engaged in both nonwhiting and whiting trawl fisheries. The establishment of four trawl sectors may make it difficult, in some instances, for harvesters to work around a species that has become unexpectedly constraining, while the establishment of three trawl sectors would allow harvesters in both shoreside trawl activities to trade quota, potentially alleviating this constraint.

Eureka, California

Eureka is the county seat of Humboldt County in northern California on Humboldt Bay south of Redwood National Park. San Francisco is 272.3 miles south. The economic base of Eureka was founded on fishing and timber. Commercial fishing has downsized in recent years, and now the major industries are tourism and timber. Eureka is located on Humboldt Bay, the only deep-water port between Coos Bay and San Francisco.

Eureka has one large processing facility engaged in trawl groundfish. This processor also processes fish landed in Bodega Bay, Brookings, Fort Bragg, San Francisco, and Crescent City. Fish landed in Eureka are also processed in Fort Bragg and Watsonville. Eureka's harbor facilities include berthing, dry storage, cold storage, a hoist, a boatyard, fuel facilities, ice, vessel repair and maintenance, electrical services, marine supplies, and other amenities.

Eureka is relatively removed from transportation networks and seafood distribution facilities.

Eureka is considered vulnerable. It is very engaged in Pacific fisheries in general, and it is very dependent on groundfish, with medium resilience. Like Crescent City, Eureka has been affected by the recent closure of the commercial and recreational salmon fishery.

Effects of alternatives

- Eureka is both a whiting and nonwhiting port, and would be affected by options impacting both whiting and nonwhiting harvesters.
- Eureka would receive more IFQs under the initial allocation options than the average allocated to all ports. Of the three buyback history distribution options, Eureka benefits the most from the 87.5 percent to harvesters option.
- Harvesters based in Eureka do not regularly trawl areas defined as high bycatch. Therefore, covering constraining overfished species with IFQ is not likely to have a substantial impact on Eureka.
- The establishment of three or four trawl sectors would affect Eureka similarly to other ports engaged in both nonwhiting and whiting trawl fisheries. The establishment of four trawl sectors

may make it difficult, in some instances, for harvesters to work around a species that has become unexpectedly constraining, while the establishment of three trawl sectors would allow harvesters in both shoreside trawl activities to trade quota, potentially alleviating this constraint.

Fort Bragg, California

Fort Bragg is in Mendocino County on northern California's Pacific Coast. The community is bordered on the north by Pudding Creek, which flows into the Pacific Ocean through a narrow inlet. Noyo Harbor is at the southern edge of the city. Noyo Bay provides a natural harbor and access to ocean fisheries.

Fishing has historically been, and remains, an important part of Fort Bragg's economy and community identity. Many boat owners offer private charter services for tourists and sport fishermen. In addition to salmon, commercial and recreational fishermen take rockfish, abalone, crabs, and mussels. Several festivals point to the city's dependence on fishing and logging. The city has two fish processors, a liquid fish fertilizer processing plant, and numerous businesses associated with fishing and coastal tourism. Harbor facilities include berthing, two hoists, dry storage, fuel, ice, marine supplies, vessel repair and maintenance, and other amenities.

Fort Bragg is considered vulnerable. It is very engaged in Pacific fisheries in general, and it is very dependent on groundfish, with medium resilience. As with other California and Oregon communities, Fort Bragg has been affected by the recent closure of the commercial and recreational salmon fishery.

Effects of alternatives

- Fort Bragg is a nonwhiting port, and would be affected by options impacting nonwhiting harvesters, but not by options impacting whiting harvesters.
- While there are several scores that appear to work in Fort Bragg's favor, this community does not score in the top bracket on any of the variables used for indicating how this community may fare under rationalization. In addition, Fort Bragg has a fleet comprised of inefficient vessels, though several vessels are near the efficient range.
- Fort Bragg would receive more IFQs under the initial allocation options than the average allocated to all ports. Of the three buyback history distribution options, Fort Bragg benefits the most from the 87.5 percent to harvesters option.
- Fort Bragg has one known processing facility engaged in trawl groundfish. This processor also processes fish from Eureka and San Francisco, while fish from Fort Bragg are also processed in Eureka and Santa Rosa. Fort Bragg is relatively close to the distribution centers in San Francisco.
- Fort Bragg's vessels do not appear to rely on fishing grounds with a relatively high bycatch of constraining overfished stocks. Therefore, covering constraining overfished species with IFQs is not expected to substantially affect Fort Bragg.
- The three or four sector issue would not impact Fort Bragg differently than other nonwhiting communities, at least to a degree that can be identified at this time.

San Francisco, California

San Francisco is located on the San Francisco Peninsula. A large and diverse city, San Francisco still has active commercial and recreational fisheries. San Francisco-area fisheries, like many west coast fisheries, fluctuate depending on fisheries management decisions, ocean and weather cycles, and economic factors. Fishermen's Wharf is the traditional home of the fishing fleet and still serves commercial fishermen, although to a lesser extent than in the past; it is now primarily a tourist

attraction. The Port of San Francisco provides berthing for commercial fishing boats at Fisherman's Wharf. The port offers full service ship repair, two dry docks, fuel, ice and other supplies, and numerous portside facilities. Additionally, the wharf's Pier 45 houses the west coast's largest concentration of commercial fish processors and distributors. It is port policy that commercial fishing vessels have top priority for berths at the harbor. Many of the fishermen in the wharf community are not San Francisco residents due to San Francisco's high cost of living. Fishermen live in the nearby communities of East Bay, South Bay, Sonoma, Peninsula, and others.

San Francisco is not considered vulnerable. It is very engaged in Pacific fisheries in general, and its fisheries are quite dependent on groundfish, but it has very high resilience.

Effects of alternatives

- San Francisco is a nonwhiting port and would be affected by options impacting nonwhiting harvesters, but not by options affecting whiting harvesters.
- San Francisco would receive more IFQ through the initial allocation than the average allocated to all ports. Of the three buyback history distribution options, San Francisco benefits the most from the 100 percent to harvesters option.
- San Francisco has at least six processors engaged in trawl groundfish. These processors process fish from several ports in California. San Francisco has a relatively developed port and harbor infrastructure. San Francisco is one of the primary distribution centers on the west coast, meaning fishing-based activity may remain in this port under rationalized conditions.
- Vessels based in San Francisco are defined as inefficient, meaning fleet consolidation may remove trawl fishing activity from this port.
- Vessels based in San Francisco have historically fished in areas with a relatively high rate of overfished species bycatch. Therefore, covering overfished species with IFQs may negatively impact San Francisco-based trawlers.
- The three or four sector issue would not impact San Francisco differently than other nonwhiting communities, at least to a degree that can be identified at this time.

Moss Landing, California

Moss Landing is in Monterey County on the eastern shore of Monterey Bay at the mouth of Elkhorn Slough. The community is 25.4 miles south of Santa Cruz and 95.8 miles south of San Francisco.

Fisheries in Moss Landing traditionally targeted sardines and other CPS species. After the sardine population collapsed, fishermen and buyers shifted their focus to anchovies, mackerel, and squid. Over time, fisheries for groundfish, halibut, spot prawn, crab, salmon, albacore, and other species developed at Moss Landing. Today Moss Landing Harbor is one of the largest commercial fishing ports in California. In 2001, it ranked third in pounds landed behind the Los Angeles and Ventura/Port Hueneme/Oxnard Harbor complexes and fourth in ex-vessel revenues behind the San Francisco Bay area. Moss Landing Harbor, Woodward's Marine (a small supply/tackle store and fuel dock), a boatyard with travelift, a marine electrician, a marine diesel mechanic, a marine covers/upholstery shop, and a metal fabricator/welder provide fishing-related goods and services. Fish landed in Moss Landing are processed in San Francisco, Santa Rosa, Watsonville, and Hawaiian Gardens.

Moss Landing's economy is now based on commercial fishing, research, and recreation and tourism.

Moss Landing is considered vulnerable. It is quite engaged in Pacific fisheries in general, and it is somewhat dependent on groundfish. It has very low resilience.

Effects of alternatives

- Moss Landing is a nonwhiting port and would be affected by options impacting nonwhiting harvesters, but not by options impacting whiting harvesters.
- Moss Landing would receive more IFQ during initial allocation than the average allocated to all ports. Of the three buyback history distribution options, Moss Landing benefits the most from the 100 percent to harvesters option.
- Because Moss Landing has no permanent processors of trawl groundfish, it may experience a reduction in landings if processors are allocated quota. This is because it is likely that processors with quota will adjust operations so that ports where processing plants already exist have more landings.
- The fleet based at Moss Landing is considered inefficient, meaning fleet consolidation may remove trawl fishing activity from this port.
- Vessels from Moss Landing have historically fished in areas defined as relatively high bycatch. Therefore, managing overfished species with IFQ may negatively impact Moss Landing.
- The three or four sector issue would not impact Moss Landing differently than other nonwhiting communities, at least to a degree that can be identified at this time.
- Moss Landing might benefit from area management, since the gradual shift of trawl activity from south to north would be halted.

Princeton/Half Moon Bay, California

Princeton, also known as Princeton-by-the-Sea, is one of several unincorporated coastal communities south of San Francisco. It is 25 miles south of San Francisco and 44 miles northwest of San Jose. Half Moon Bay is located nearby. Princeton generally serves as the port for Half Moon Bay.

Neither Princeton nor Half Moon Bay is considered vulnerable. As their relatively high median household income shows, both are quite well off, though Princeton also has a high percentage of residents whose income is below poverty level. Both communities' dependence on the groundfish fishery is low, and both are highly resilient.

Originally envisioned as an ocean resort, Princeton is now known principally for its harbor, Pillar Point. The land adjacent to Pillar Point is primarily industrial for boatbuilding and other marine-related industries. Pillar Point is a working fishing harbor with 369 berths. The harbor was constructed in 1961, and the inner breakwater was added in 1982. Pillar Point offers a modern fish dock, six-lane boat launch ramp, ice-making facility, and serves as a fish-buying hub for local commercial vessels.

Effects of alternatives

- Princeton/Half Moon Bay is a nonwhiting port and would be affected by options affecting nonwhiting harvesters, but not by options impacting whiting harvesters.
- The amount of IFQ allocated to entities active in the Princeton/Half Moon Bay area may be higher or lower than average, depending on the initial allocation formula. Of the three buyback history distribution options, Princeton/Half Moon Bay benefits the most from the 87.5 percent to harvesters option.
- Princeton and Half Moon Bay are located near a high bycatch area (94.7 percent of nonwhiting trawl catch occurs in an area identified as a high bycatch area; the species of concern are cowcod and bocaccio). Therefore, management of overfished stocks with IFQ may negatively impact Princeton/Half Moon Bay.

- Vessels in Half Moon Bay are relatively inefficient, and therefore fleet consolidation may remove vessels from this port. However, the presence of shore-based infrastructure may make up for the burden created by constraining bycatch species and vessel inefficiency.
- Together, Princeton and Half Moon Bay have three processing facilities engaged in trawl groundfish, so these communities could benefit from processor allocations. These processors also process groundfish from Santa Cruz and Vallejo. Groundfish landed in Princeton/Half Moon Bay are also processed in Hawaiian Gardens, Santa Rosa, and El Granada.
- The three or four sector issue would not impact Princeton/Half Moon Bay differently than other nonwhiting communities, at least to a degree that can be identified at this time.
- Princeton/Half Moon Bay might benefit from area management, since the gradual shift of trawl activity from south to north would be halted.

Morro Bay, California

Morro Bay is considered vulnerable. It is quite engaged in Pacific fisheries in general, and it is very dependent on groundfish, but it also is very resilient.

In 2006, The Nature Conservancy purchased six Federal trawling permits and four trawling vessels from commercial fishermen in Morro Bay. In addition to the six permits, the Conservancy purchased four trawling vessels and is exploring alternative uses for them. One vessel associated with the acquired trawling permits remains with its current owner, who holds permits for other types of fishing, but is not trawling at this time. The vessel is legally constrained from bottom trawling for groundfish in the future. Any fisherman who sells his or her permit to the Conservancy cannot reenter the trawl groundfish fishery.

There are currently no trawlers operating out of Morro Bay. For now, all but one of The Nature Conservancy permits are inactive. In the future, however, it may lease back permits to central coast fishermen who would use more selective gear; Morro Bay fishermen will be given preference for using these permits. Therefore, it is impossible to predict how efficient Morro Bay's future fleet may be, though The Nature Conservancy materials suggest it is unlikely that much trawling will take place there.

Groundfish landed in Morro Bay are processed in Atascadero (15 miles away), San Francisco, Watsonville, and Port San Luis/Avila. The town is relatively removed from distribution facilities, but infrastructure exists in the harbor area to support commercial fishing operations.

Effects of alternatives

- Morro Bay is a nonwhiting port and would be affected by options affecting nonwhiting harvesters, but not by options impacting whiting harvesters.
- Morro Bay would receive less during initial allocation of IFQs than the average allocated to all ports. Of the three buyback history distribution options, Morro Bay benefits the most from the 75 percent to harvesters option.
- Since Morro Bay is a nonwhiting port, it would not be significantly affected by decisions relating to co-ops.
- The three or four sector issue would not impact Morro Bay differently than other nonwhiting communities, at least to a degree that can be identified at this time.
- Morro Bay might benefit from area management, since the gradual shift of trawl activity from south to north would be halted.

4.14.6 Cumulative Effects on Communities

Cumulative impacts are a combination of baseline conditions, RFFAs, ongoing trends, and the proposed action. Due to the complexity of the alternatives and the number of communities impacted, it is impossible to predict cumulative impacts from every potential event and trend, for every community, under every alternative. The potential impacts of rationalization were discussed in detail above and are summarized, along with a brief summary of cumulative impacts for each community, in

Table 4-71 (below). This discussion presents a general narrative of how past and present management actions have affected communities, and how RFFAs and trends are expected to affect communities along the west coast. In accord with Table 4-66, we focus on economic changes (changes in the amount of trawl vessel activity, in crew wages and number of crew jobs, in the relationships between crew and captains, in the level of processing activity, in the number of processing jobs and in the seasonality of processing jobs), social/cultural changes, and physical changes (changes in municipal revenues and community stability; infrastructure impacts).

Every management action affecting the viability of fish harvesters and processors also affects communities. To simplify this analysis and reduce repetitiveness, the reader is asked to refer to previous sections on cumulative impacts related to trawl harvesters, crewmembers, and processors.

Chapter 3 lists past, present, and RFFAs. Many of these have become part of the status quo, which will effectively be replaced by trawl rationalization, should it be implemented. Of the RFFAs listed in Chapter 3, those that have affected communities in the past and that are most likely to affect communities in the future include the following:

- Implementation of rebuilding plans
- Bycatch reduction and monitoring (observers, VMS)
- Trawl vessel buyback program
- Limited entry
- EFH designation and implementation
- MPA implementation
- Development and implementation of CFAs

Chapter 3 also lists past, present, and reasonably foreseeable future trends. The trends that seem most likely to impact communities include the following:

- Changes in the use of ocean areas
- Changes in coastal economies and land use
- Profitability of fishing and processing enterprises (including increased demand for protein, changes in production costs, and increased consumer awareness affecting purchasing decisions)
- Rebuilding of overfished species
- Cyclical and continuing climate change

4.14.6.1 Discussion of RFFAs and Trends

Overall, the trawl industry is becoming more controlled, monitored, clean, streamlined, and small. Figures 4-5 through 4-9 show the decline in the number of trawl vessels home-ported in west coast communities between 1994 and 2007, including those in communities that are no longer the site of trawl activity. Managers have recently implemented, or are proposing, a number of actions—including trawl rationalization—that will continue this trend. From a community perspective, this means that fewer communities will benefit from trawl activity, while those that do benefit should see a long-term improvement in the viability of their smaller, but more profitable, trawl fleet.

Due to the need to rebuild overfished stocks and meet the mandates of the SFA, the trawl fishery has been subject to increasingly stringent restrictions since the 1980s, beginning with LE in 1992. Prior to

LE, there were between 337 and 469 trawl vessels making landings on the west coast.¹¹² The LE program resulted in the creation of approximately 260 trawl permits.

In December 2003, a buyback program permanently retired 91 of the remaining permits, roughly 35 percent of the total. The buyback generally increased revenue per vessel, although these effects varied by region. Some ports lost a disproportionate share of their trawl fleet, while others lost relatively few vessels. Figure 4-55 through Figure 4-59 demonstrate the effect of the buyback on the number of vessels home-ported in each community. The buyback had the greatest impact on California ports; the number of trawl vessels landing in the major trawl ports of Eureka, Crescent City, and Avila declined by 50 percent or more.

As of 2008, there were 178 LE trawl permits remaining on the west coast (PFMC 2008c). The long-term decline in the number of trawl vessels, and later permits, led to complete cessation of trawl activity in many communities (such as Aberdeen and Chinook, Washington; Garibaldi, Oregon; and Bodega Bay, California) and a sharp decline in trawl activity in others. Some communities, particularly Astoria, Newport, and Coos Bay, retained active trawling and processing industries and now stand to benefit from trawl rationalization. The following figures show the declining number of LE trawl vessels that were principally ported in Washington, Oregon, and California communities between 1994 and 2007. Communities with currently active trawl fleets, and those whose trawl fleet has disappeared, are included.

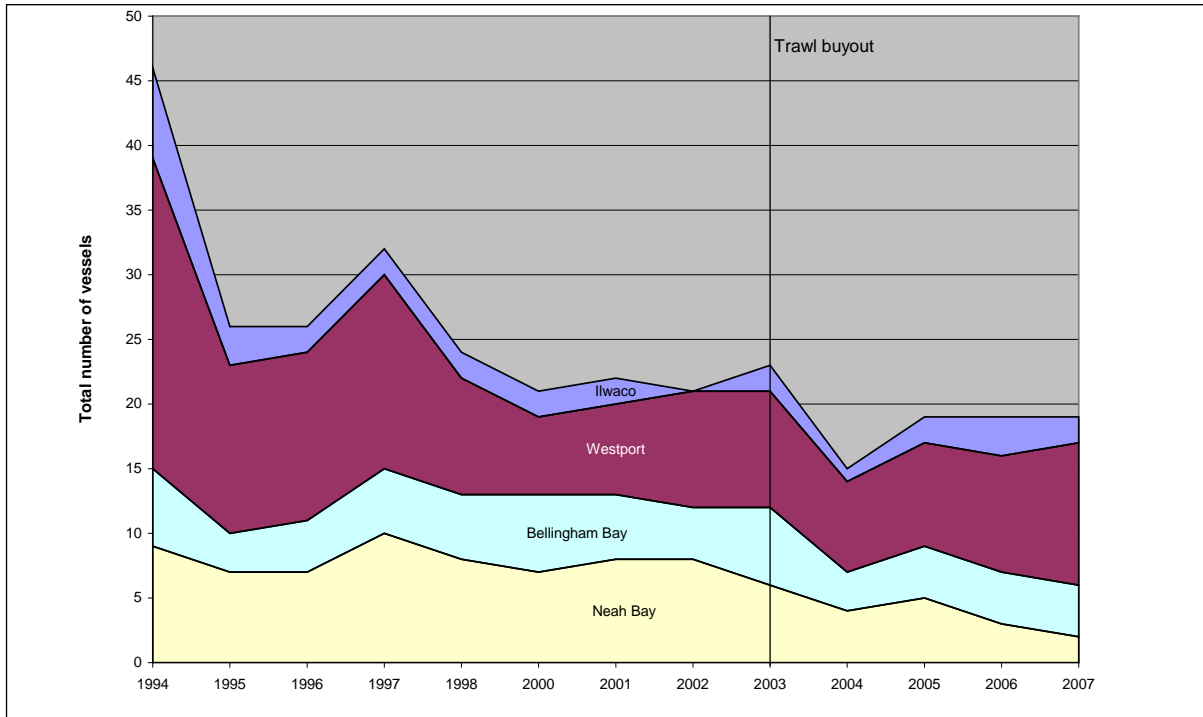


Figure 4-55. Limited entry trawl vessels principally ported in currently active Washington trawl communities, 1994—2007 (1999 data missing). (Figures 4-5 through 4-9 based on PacFIN data).

¹¹² That is, 337 vessels making at least one landing in 1987, and 469 making at least one landing between a window from 1984 to 1988 (PFMC 1992).

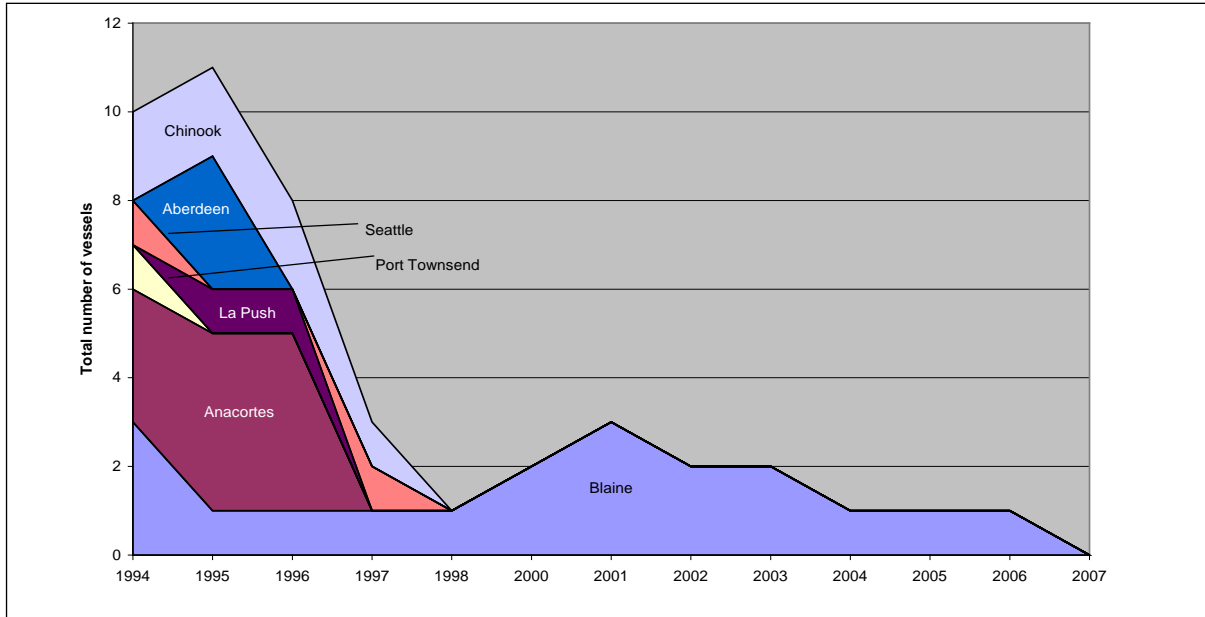


Figure 4-56. Limited entry trawl vessels principally ported in currently inactive Washington trawl communities, 1994—2007 (1999 data missing).

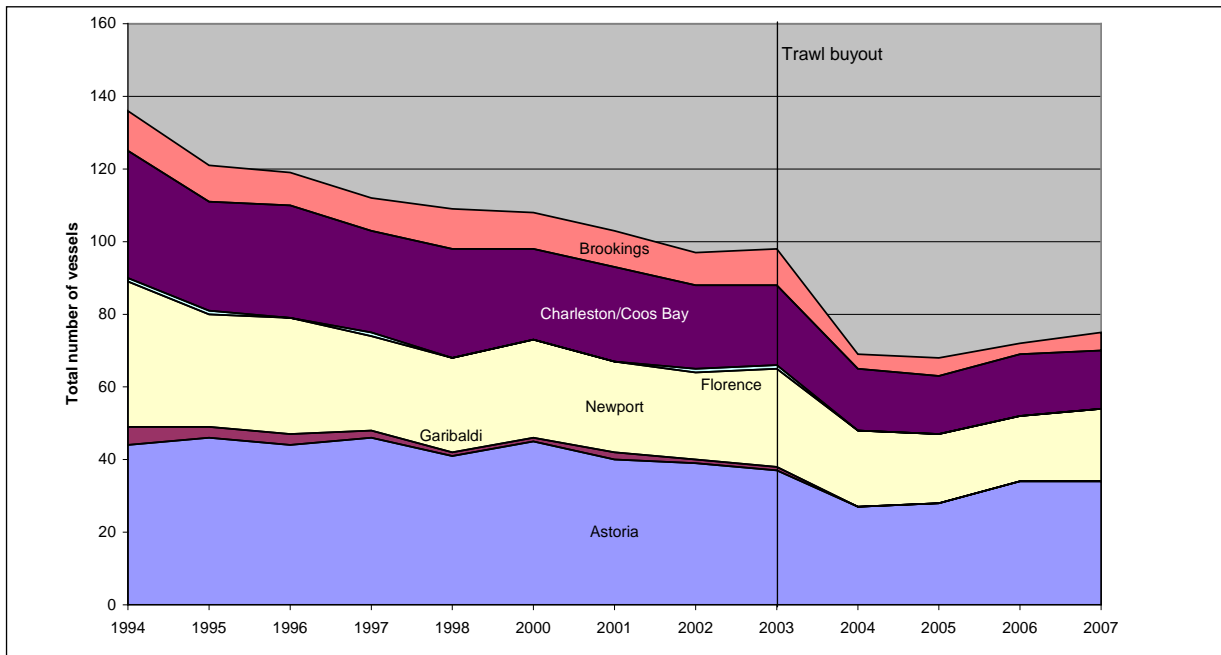


Figure 4-57. Limited entry trawl vessels principally ported in Oregon trawl communities (currently active and inactive), 1994—2007 (1999 data missing).

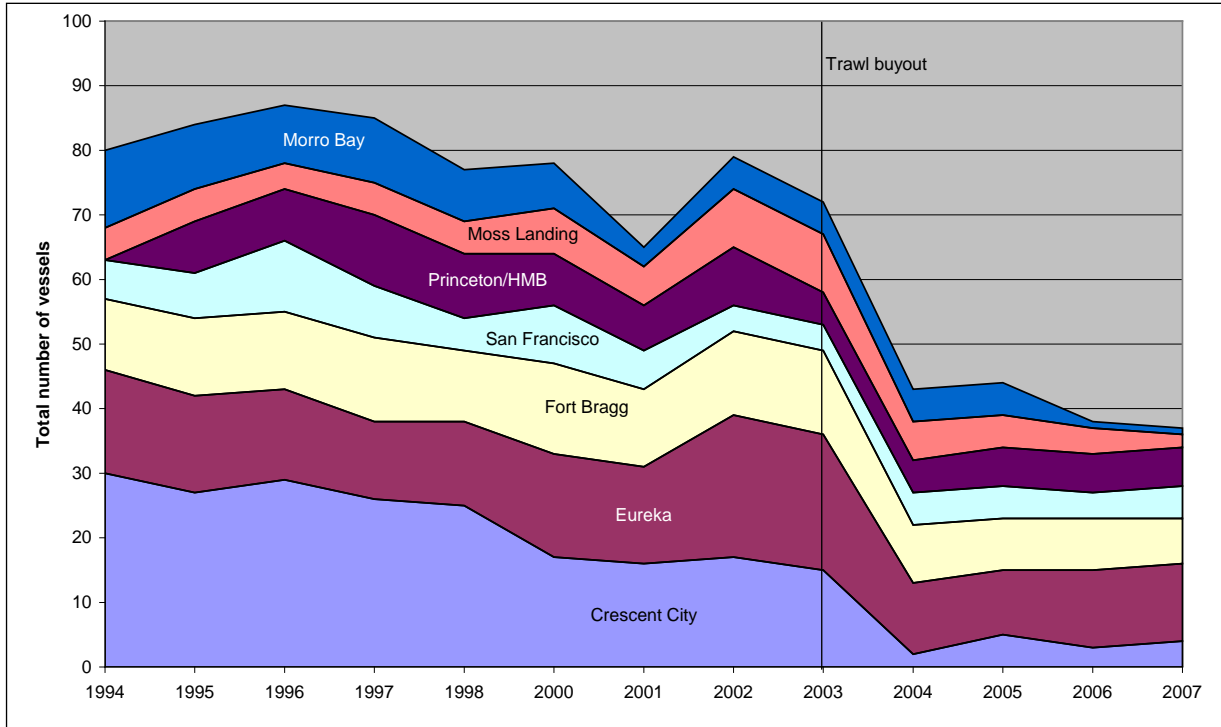


Figure 4-58. Limited entry trawl vessels principally ported in currently active California trawl communities, 1994—2007 (1999 data missing).

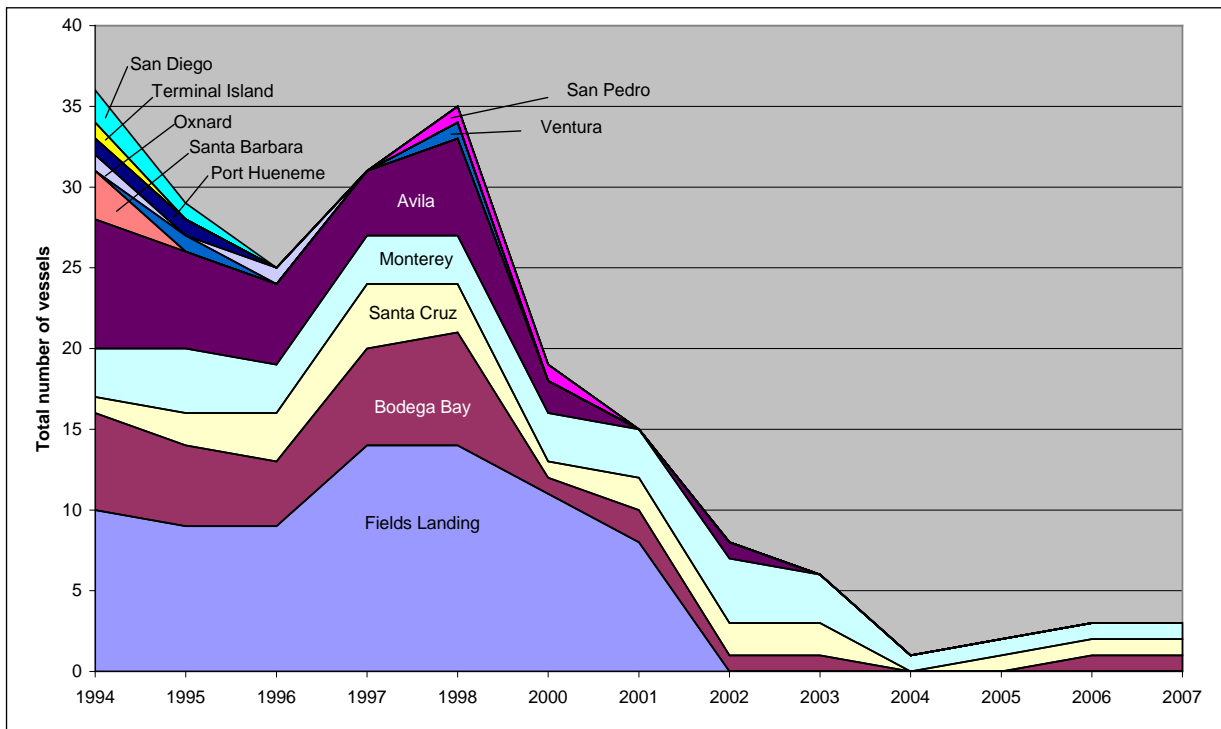


Figure 4-59. Limited entry trawl vessels principally ported in currently inactive California trawl communities, 1994—2007 (1999 data missing).

Since 2000, the management of west coast groundfish fisheries has been heavily centered on the need to rebuild overfished groundfish species. Rebuilding plans have been implemented for nine overfished groundfish species (two of which have subsequently rebuilt), resulting in depth-based closures, gear restrictions, and other regulations that limited the profitability of fishing operations. Communities in the north, where more trawlers were located and, coincidentally, where the closed areas were larger, were especially hard hit. The negative assessment of fishing community stability described in Section 4.1.4.1 derives in large part from restrictions created by rebuilding plans, combined with other long-term fishery restrictions. When overfished stocks are rebuilt, some of these restrictions will be lifted, allowing the fishery to become more profitable. However, rebuilding is a long-term process and may be complicated by factors such as climate change. In the short term, both widow rockfish and Pacific ocean perch are likely to be rebuilt by 2017, benefiting the whiting fishery and deepwater trawlers in Washington and Oregon. Later, bocaccio, canary rockfish and darkblotched rockfish are expected to be rebuilt by 2028. The rebuilding of bocaccio will benefit Fort Bragg and points south; canary rockfish will benefit communities in Washington and Oregon, and to a lesser extent communities south of Fort Bragg (apart from Morro Bay); and the rebuilding of darkblotched rockfish will primarily benefit deepwater trawlers in Washington and Oregon. Much later, cowcod and yelloweye are expected to be rebuilt by 2084 (or 2098 at the latest, given current knowledge). The rebuilding of cowcod will benefit trawlers in Monterey, Moss Landing, Princeton/Half Moon Bay, San Francisco, and Morro Bay. Yelloweye are generally not caught by the trawl fishery, but rebuilding of yelloweye will benefit fixed-gear fishing communities (including all of the communities identified as trawl communities) in Washington, Oregon, and northern California.

In addition to the depth-based closures to protect overfished stocks, both state and Federal MPAs have been put in place during recent years, particular in California. Although not all MPAs are no-take zones, trawlers in communities near some MPAs may have to shift their effort to other locations. The California MLPA process has created a cluster of MPAs near Santa Cruz, Monterey, and Morro Bay in central California, most of which allow no commercial take. The MLPA process is now focusing on proposed MPAs in north central California, from Pigeon Point to Point Arena. In 2008 and 2009, the MLPA process moves on to the south coast (Point Conception to the California/Mexico border) and then to San Francisco Bay. In addition to the MLPA areas, MPAs have also been designated, or are being considered, in National Marine Sanctuaries along the west coast. Finally, the designation of EFH areas in 2006 closed more areas to trawling, including 34 bottom trawl closed areas in Washington, Oregon and California and a bottom trawl footprint closure that closes areas in the EEZ between 1,280 meters (700 fathoms) and 3,500 meters (1,094 fathoms). A five-year-review of EFH will occur in 2011 and may create new closures or, alternatively, open up areas that were previously closed.

In conjunction with these area closures, trawlers have been required to purchase new VMSs, reducing their profitability. In addition to VMS, trawl rationalization will likely require harvesters to carry and pay for additional observation systems, such as human observers or cameras, leading to increased operational costs. Although bycatch reduction and monitoring will have a long-term positive impact by allowing the fishery to be more sustainable, the financial burden of meeting these requirements may be a hardship for financially stressed trawlers.

Overall, revenues in the nonwhiting fishery have declined through time, leading to the depressed status of many trawl harvesters remaining in the fishery. A severe recession in 2008 and 2009 is affecting all sectors of the economy. Changes in production costs have made it more expensive to harvest and process fish, and are likely to continue doing so. Fuel and steel are expected to become more expensive. Such high costs may cause harvesters to target more valuable fish to recoup their investment. It may also put pressure on owners to reduce wages further for captains and crew. In the late 1990s and early 2000s, many nonwhiting trawl harvesters found it difficult to generate enough revenue to pay crew; vessel owners crewed for other vessel owners, and vice-versa. At the same time, the whiting fishery

experienced a temporary decline when whiting was listed as overfished, and processing methods underwent a change. From a community perspective, the recent closure of the salmon fishery has posed a hardship to both commercial and recreational fishing businesses, particularly those in northern California and Oregon (Astoria, Newport, Coos Bay, Brookings, Crescent City, Eureka, and Fort Bragg). In many communities where fishing was once a primary activity, it is now overshadowed, from an economic standpoint, by other activities.

Above, we discussed long-term management actions that will affect trawl communities. Even apart from changes in the fishing industry, west coast fishing communities are undergoing considerable economic and social change. North of San Francisco, this change has been driven by a decline in the natural resource-based economy (including fisheries, timber, and agriculture). Many communities in Washington, Oregon, and northern California are still recovering from timber cutbacks in the 1980s and 1990s. According to the Oregon Historical Society, the following occurred:

In October 1979, the bottom fell out of the wood-products market, and over the next three years lumber prices dropped more than 48 percent. The recession of the early 1980s was a nationwide phenomenon that hit resource-dependent communities — which covers just about every community along the coast — particularly hard. A wave of mill closures left many workers jobless, and in some coastal towns the unemployment rate topped 25 percent. The effects of the shutdowns rippled through communities, bringing hard times to retailers and other businesses, slashing local tax revenues, and starving community-service organizations. ... (Wells 2008)

Against the background of this fundamental economic and social change, communities are also experiencing demographic change. Trawl communities in Oregon and Washington are experiencing population growth, while some trawl communities in California are losing population. In Washington, Westport grew 18 percent between 2000 and 2007 (U.S. Census data). In the same period, Anacortes and Bellingham each grew 14 percent, while Ilwaco and Seattle grew by 5 percent. Data were not available for Neah Bay. In Oregon, Brookings grew by 13 percent, Warrenton grew by 9 percent, Newport grew by 4 percent, Coos Bay grew by 3 percent, and Astoria grew by 1 percent. Several California communities actually lost population. Crescent City grew the most at 5 percent, and Half Moon Bay by 4 percent (no data were available for Princeton); meanwhile, Eureka and Fort Bragg both shrank by 3 percent; San Francisco by 2 percent, and Morro Bay by 1 percent. No data were available for Moss Landing. Table 4-65 shows population changes since between 2000 and 2007 in coastal counties. Although the coastal population in some California communities has lessened, coastal density in California's coastal areas grew from 270 people per square mile in 1980 to 419 people per square mile in 2008 (NOAA). Many of these areas are highly urbanized.

The following table shows changes in population in coastal counties since 2000 (from Census Bureau data):

Table 4-70. Population change in coastal counties, 2000-07.

County	Trawl Communities	Population Change Since 2000
Whatcom (WA)	Bellingham	15.7
Anacortes (WA)	Anacortes (at-sea only)	13
King (WA)	Seattle (at-sea only)	7
Clallam (WA)	Neah Bay	9.8
Grays Harbor (WA)	Westport	6.2
Pacific (WA)	Ilwaco	2.4
Clatsop (OR)	Astoria, Warrenton	4.9
Lincoln (OR)	Newport	3.1
Coos (OR)	Coos Bay, Charleston	1.1
Curry (OR)	Brookings	3
Del Norte (CA)	Crescent City	5.5
Humboldt (CA)	Eureka	1.9
Mendocino (CA)	Fort Bragg	No change
San Francisco (CA)	San Francisco	-1.5
Monterey (CA)	Moss Landing	1.5
San Mateo (CA)	Princeton/Half Moon Bay	No change
San Luis Obispo (CA)	Morro Bay	6.4

Census data also shows that the coastal population is aging. Some of this aging is driven by outmigration of young adults; some by immigration of older adults, including retirees; and some by the natural aging of the American population, which can be seen in Figure 4-60 through Figure 4-62. In Oregon and Washington, residents of coastal counties tend to be older than the state at large. In Washington, Pacific and Clallam Counties (locations of Ilwaco and Neah Bay, respectively) have older residents than the state average. In contrast, Whatcom County has a slightly younger population, probably due to Western Washington University, which has more than 13,000 students located there.

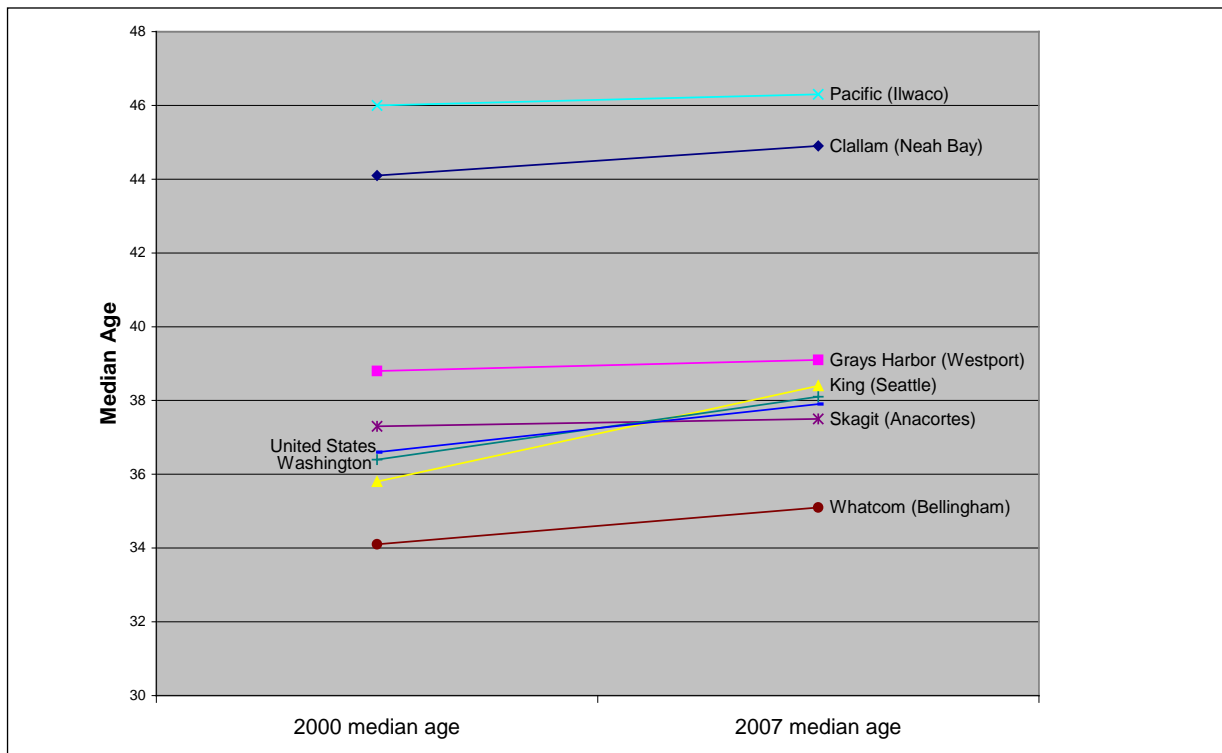


Figure 4-60. Growth in median age in Washington coastal counties.

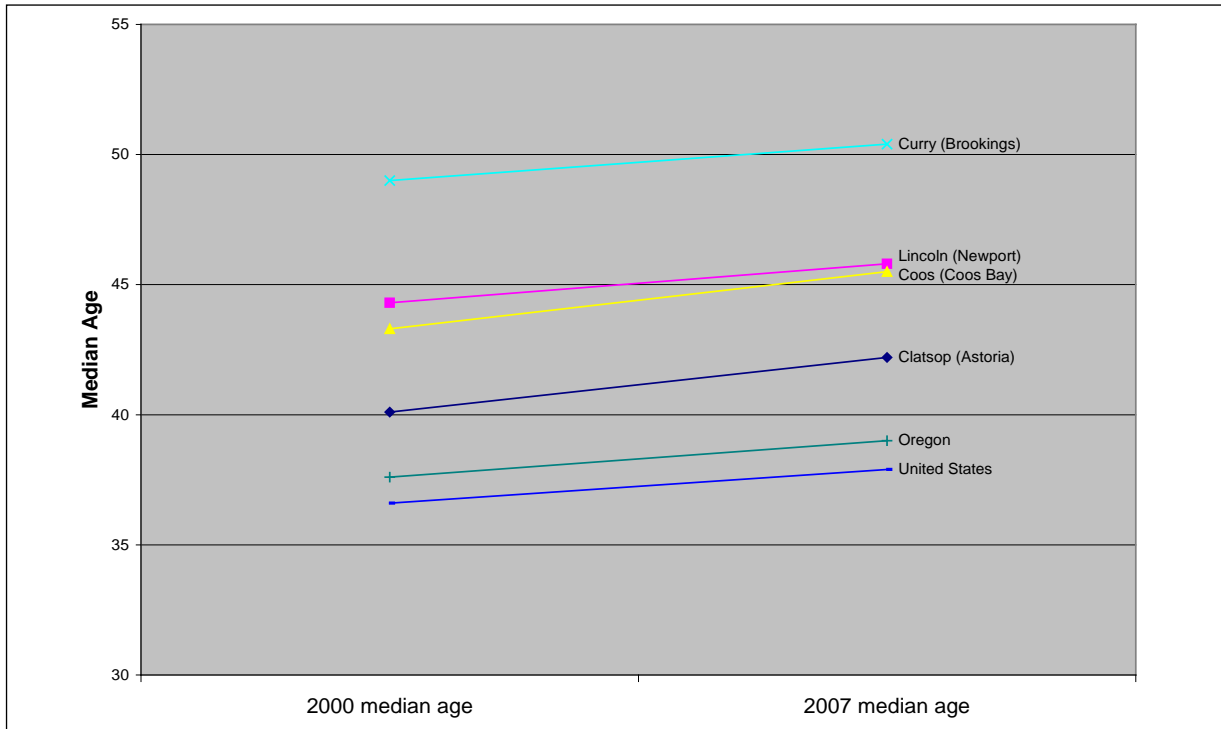


Figure 4-61. Growth in median age in Oregon coastal counties.

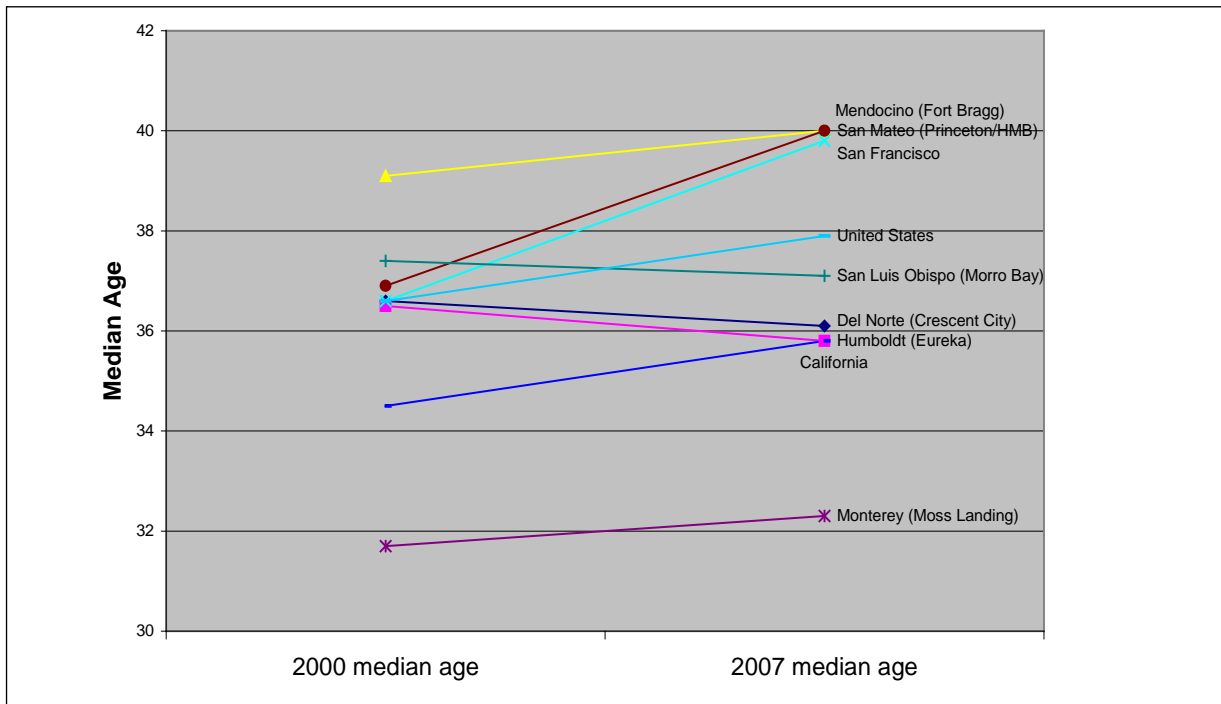


Figure 4-62. Change in median age in coastal California counties.

In Oregon, one-third of coastal residents are over the age of 55 (U.S. Census Bureau). Curry County (location of Brookings) has the oldest population among the coastal trawl communities, averaging more than 50 years old. Brookings, which is known as the “banana belt” of Oregon, has attracted large

numbers of retirees; as noted above, its population grew 13 percent between 2000 and 2007. Other Oregon coastal counties also show aging populations.

The aging of the coastal population may represent an increased burden on coastal communities. As the retired population increases relative to the working population, the social system is put under economic and political pressure (Gavrilov and Heuveline 2003). A study of the implications of aging populations on rural communities (Rogers 2000) notes that “the number of persons at risk of disability and chronic conditions increases, creating a greater need for medical, rehabilitative, and social services. Low-density, sparsely populated non metro communities are limited in their ability” to provide these services (2000). In addition, “poverty rates of older non metro residents are higher than those of metro residents, a disparity that is even more pronounced among the oldest old (age 85 and older)” (2000:2). Since older citizens pay less state and local tax as a percentage of their income (Childress 2001), the increased cost of caring for the elderly also comes with a decrease in community revenues, particularly if there is outmigration of younger, tax-paying workers.

In California, the population picture is more complex. The average population in California is younger than that for the United States as a whole (whereas Oregon is older, and Washington is almost the same). The population in Monterey County (Moss Landing) is still younger—around 32 years old. Average ages in San Luis Obispo County (Morro Bay), Del Norte County (Crescent City), and Humboldt County (Eureka) are actually declining, while populations in Mendocino County (Fort Bragg) and San Francisco County (San Francisco) are aging at a faster rate than the rest of the state. California’s demographics are complicated by the large immigrant population (with faster or slower growth rates for different ethnic groups); an increasingly high cost of living in certain areas (which may explain the older populations in San Francisco and Princeton/Half Moon Bay); increasing numbers of retirees as baby boomers age; and increasing out-migration caused in part by the high cost of living (Myers, *et al.* 2005).

In California, and to a lesser extent in Oregon and Washington, fishing communities are experiencing gentrification, or the displacement of traditional fishing infrastructure with nonfishing-related businesses and activities. Hall-Arber *et al.* (2001, pp. 112-113) writes the following:

“Gentrification... of a fishing community implies a shift in power from the working men and women of the fishing industry to ‘those from away,’ those in white-collar jobs, or tourist (service) industries, and/or those who do not value the reality of a working waterfront. When intense external capital flow comes into a community, it necessarily increases the vulnerability of existing total capital networks. Traditions—existing ways of working, socializing, sharing, learning, and extracting economic capital—are lost or weakened as new, often mono-cultural, patterns come to dominate. Boat owners stop sharing fish at the dock, and banks stop giving loans to the fishing industry. More frequently, land use patterns change, shoreline property prices inflate and the fishing industry is displaced, with less access to the waterfront... Such external influences can engulf and transform unique fishing cultures and communities following the natural resource way of life.”

Although gentrification can contribute to the loss of fishing activity, it can also encourage residents to safeguard and celebrate their fishing heritage. National studies show that there is a growing demand for heritage-based tourism among travelers in the United States (Claesson, *et al.* 2005). Festivals such as the Blessing of the Fleet or local seafood festivals attract tourists to waterfront areas. In some cases, such activities may eventually supplant actual fishing activities. On the east coast, researchers found that “Seacoast fishermen surveyed ... revealed that historical/cultural preservation was more important to

them than restoration of wild fish stocks, indicating a stronger concern for preservation of a traditional way of life than for preservation of a food source” (Claesson, *et al.* 2005).

Many of the trawl communities analyzed here rely heavily on tourism. However, as the Oregon Historical Society notes (Oregon Historical Society 2008) the following:

Although it opens entrepreneurial opportunities, tourism generates mostly low-wage, part-time, unskilled jobs. It depends on an economy of surplus somewhere else, in which people have leisure time, money, and gasoline to spend, and so it is as vulnerable to boom-and-bust cycles as timber ever was. On a less tangible level, tourism forces year-round residents of the coast to be touts and hawkers of their own homeland, panderers to strangers.

Coastal economies will continue to change. As the population ages, retiring baby boomers will likely contribute to increased housing demand in coastal communities. Tourism may also increase (or decrease) as rising fuel prices change peoples’ destination plans and encourage them to vacation closer to home.

Rising fuel prices are linked to increased public concern about energy dependence. In the last three years, interest has grown in alternative energy (wave energy, tidal energy, and wind power) off the west coast. The number of proposals varies, but generally exceeds 20 for the three coastal states. Because of the nature of currents and wave activity off the Pacific Northwest, the Washington and Oregon coastlines are thought to have the best wave energy development potential in the United States (Renewable Northwest Project 2007). Such projects could lead to additional closed areas and will likely have other, currently unknowable, effects on fisheries and habitats. At the same time, they could bring new employment and new industries to coastal areas, possibly revitalizing coastal communities that are undergoing the long-term transition from a timber and fishing economy. Recent proposals to renew offshore oil drilling activities could also affect fishing activity off the west coast in the long term.

Other nonfishing activities, such as the laying of underwater fiber-optic cables, could further disrupt fishing activity, either temporarily or permanently. In Section 4.6.4, we note that harvesters will be more able to respond to these impacts under rationalization than they would under status quo management. Under a rationalized system, harvesters will be more able to move or transfer harvest privileges to another harvester, adapting to new conditions fairly readily, while maintaining fishing activity. Although harvesters could move and adapt under the status quo, the individual accountability aspects of rationalization will allow them to adapt in more creative ways that are more favorable to their operations.

Other external trends could influence groundfish trawlers and trawl communities. One such trend is an increasing consumer awareness of the ecological impacts of fish consumption. The Monterey Bay Aquarium, Environmental Defense and other nonprofits have developed seafood guides that describe the eco-friendliness of various seafoods. Some grocery stores and restaurants are already using these guides to encourage customers to make sustainable choices. This may affect the marketability of trawl-caught seafood, which is often described as unsustainable or deserving of caution due to the environmental impacts of trawling (Duchene 2004). When combined with rationalization, this may lead to increasing numbers of trawlers switching to nontrawl gear. The effect of this switch on revenues is unclear, since the amount of fish landed would be expected to decline, while the price of such fish would be expected to increase. Likewise, the demand for fish protein is expected to increase (Tidwell and Allan 2001). However, if gear switching occurs, it may impact the number of crewmembers per vessel, the need for crew to learn new skills, and the need to fish in new places; this could subsequently affect communities in both positive and negative ways.

Two further, unpredictable, factors should be noted. First is the possibility of a stock being declared as overfished, or stock unexpectedly rebuilding before scheduled. If a stock becomes overfished and a lower OY is implemented, harvesters are likely to see lower revenues, while the inverse is true if a stock is declared rebuilt. Second, cyclical and continuing climate change will affect stock productivity in the northeast Pacific. Cyclical events include ENSO and the PDO. Both events have been linked to changes in the relative productivity of different marine organisms, affecting ecosystem components on the regional scale (California Current ecosystem). These changes, in turn, affect the abundance of fishery resources. Global climate change, with its associated ecosystem impacts (including ocean acidification, increased dead zones and severe weather events) could potentially lead to permanent changes in stock structure and productivity. If groundfish migration patterns change substantially, harvesters could find it difficult to make informed decisions about fishing location, increasing cost and effort for harvesters and compromising stocks in those locations. This could, in turn, have severe impacts on communities if stocks move substantially, or if productivity of coastal ecosystems changes in such a way that a local fishery is not possible. At this time, not enough is known about climate change to be able to predict these impacts in an informed way.

Although the AMP is described as part of the proposed action, trailing actions will occur to further define the program and implement it. For that reason, it may also be considered an RFFA. One of the goals of the AMP is to assist communities that may be adversely affected by rationalization. Even though the specifics of the AMP have not been developed, some guiding principles, goals, and objectives have been developed that can be used to inform the likely effects of the AMP on communities. The fact that the AMP will allocate QPs in a formulaic fashion means that it is likely that some entities may receive those QPs based on criteria that can be measured, such as past catch history (in the case of a vessel), or past purchasing history (in the case of a processor). One example for how the AMP may work is to allocate those AMP pounds to catcher vessels or processors in a community, conditional on the basis that they agree to use those pounds in a manner that benefits that community. While this does not guarantee the continued presence of fishing activity in a particular port, it provides an incentive for fishery participants to continue activity in communities or ports that the Council deems have been adversely affected by rationalization.

Community fishing associations, or CFAs, could help communities that may be adversely affected by rationalization. CFAs are currently being tested under an EFP in the Morro Bay area. A CFA can generally be described as a community-based entity with special privileges and responsibilities designed to operate for the benefit of communities. CFAs, if explicitly allowed, would have higher accumulation limits than other quota-owning entities, but would also have unique standards placed upon them in order to be allowed to hold QPs at those higher limits. A CFA could acquire QPs through divestiture, QPs through the AMP, or direct transfer from another entity.

Some of the potential benefits of CFAs include ensuring access to the fishery resource in a particular area or community to benefit the local fishing economy, enabling the formation of risk pools and sharing monitoring and other costs, ensuring that fish delivered to a local area will benefit local processors and businesses, providing a local source of QPs for new entrants and others wanting to increase their participation in the fishery, increasing local accountability and responsibility for the resource, and benefiting other providers and users of local fishery infrastructure (The Nature Conservancy comments on Agenda Item F.4.a, Attachment 2, April 2009). The development of CFAs could have a positive impact on the culture of fishing communities. Although little research has been done on the effect of CFAs on culture, it seems likely that CFAs could strengthen a community's cultural associations with fishing by contributing to a unique sense of identity, increasing accountability for both natural and cultural resources, and building and strengthening connections among community members.

To summarize, rationalization is scheduled to take place after a long period of economic change and economic decline in west coast fishing communities. Changing demographics, changing public values regarding fisheries and fishery management, the increased number of areas closed to fishing, community gentrification, and the unknown factor of global climate change all pose challenges to coastal communities. New alternative energy technologies may have a positive benefit on coastal economies if they move forward, but such benefits could come at a cost to fishing fleets.

Since one of the goals of trawl rationalization is to make the trawl fleet more flexible, rationalization could help trawlers and trawl communities adapt to these changes more easily. Without mitigating provisions, however, some communities could lose trawl activity. The AMP and CFAs—if implemented and well managed—are two mitigating factors that may work in harmony to help preserve community stability.

Table 4-71 summarizes some of the major impacts of rationalization, as well as cumulative impacts, for west coast trawl communities.

Table 4-71. Summary of the impacts of rationalization on communities.

Community	General Impacts	Vulnerability	Cumulative Impact Notes
Bellingham	Benefits from initial allocation, allocation of IFQ to processors; but close to high bycatch area.	Vulnerable. Medium dependence and medium resilience.	Long-term decline in natural resources employment, but diversified economy. Population has grown 14% since 2000. Increasing gentrification. Young population.
Anacortes	Not strongly affected by rationalization due to nature of fishery (at-sea catcher-processors)	Not vulnerable.	Long-term decline in natural resources employment. Increasing tourism and retiree destination. Population has grown 14% since 2000. Should benefit from whiting amendments (10 and 15).
Seattle	Not strongly affected by rationalization due to nature of fishery (at-sea whiting), diversity and size of community	Not vulnerable.	Diversified economy with strong fishing infrastructure. Population has grown 5% since 2000. Should benefit from whiting amendments (10 and 15). Increasing gentrification.
Neah Bay	At risk of losing trawl fleet. Receives less than average in initial allocation. May experience reduction in landings if processors are allocated quota.	Extremely vulnerable.	Relatively heavy reliance on natural resource jobs. Impacted by 2008 salmon closures. Near marine sanctuary and wave energy site. Older-than-average population.
Westport	Would receive less than average initial allocation. Processor could benefit from processor QS. Consolidation could remove nonwhiting activity from port.	Vulnerable. Fairly dependent on groundfish fishery, but fairly resilient.	Tourism and natural resources both historically important to economy. Impacted by salmon closure. Luxury boatbuilding, important to economy, could be affected by economic downturn.
Ilwaco	Primarily a whiting port. Receives less than average initial allocation of nonwhiting. Processor could benefit from QS.	Vulnerable. Low dependence on groundfish, but low resilience.	Increasing population (5%). Older-than-average population. Impacted by 2008 salmon closure. Should benefit from whiting amendments (10 and 15).
Astoria/Warrenton	Expected to benefit from rationalization, with large initial allocation and possibly increased harvesting and processing activity.	Astoria is vulnerable; Warrenton is not. Medium to high resilience.	General long-term decline in natural resources employment. Astoria population stable; Warrenton population increasing. Slightly older-than-average population. Impacted by 2008 salmon closures. Should benefit from whiting amendments (10 and 15). Increasing tourism (with accompanying low-paying jobs) and increasing gentrification, especially in Astoria. Some population leaving to find higher-paying jobs.

Community	General Impacts	Vulnerability	Cumulative Impact Notes
Newport	Expected to benefit from rationalization, with large initial allocation and possibly increased harvesting and processing activity.	Vulnerable. Very dependent on groundfish fisheries, but also fairly resilient.	General long-term decline in natural resources employment. Active tourist industry and increasing gentrification. Older-than-average population. Slightly increasing population. Impacted by salmon closure. Should benefit from whiting amendments (10 and 15). Wave energy projects have been proposed for nearby waters.
Coos Bay/ Charleston	Expected to benefit from rationalization, with large initial allocation and possibly increased harvesting and processing activity.	Somewhat vulnerable. Dependent on groundfish with medium resilience.	Heavily dependent on natural resource economy. Impacted by salmon closure. Should benefit from whiting amendments (10 and 15). Slight population increase since 2000. Older-than-average population. Large wave energy project proposed for nearby waters.
Brookings	Would benefit slightly from initial allocation. Currently no processors of trawl groundfish; processing could be less likely to move to Brookings under rationalization.	Not vulnerable. Dependent on groundfish, but high resilience.	General long-term decline in natural resources employment. Greatly increasing population (23.8% between 1990-2000, 15.9% between 2000-2007), many retirees. Much older-than-average population. Heavily reliant on recreational fishing. Impacted by 2008 salmon closures.
Crescent City	Would receive lower-than-average initial allocation. Relatively inefficient fleet; however, scores well on bycatch dependency, which could mitigate other factors.	Vulnerable; relatively dependent on groundfish, with medium resilience.	General long-term decline in natural resources employment. Many large rent-paying vessels removed by 2003 trawl buyback. Reliant on tourism. Slightly increasing population. Impacted by salmon closure.
Eureka	Would receive higher-than-average initial allocation. Located in low-bycatch area.	Vulnerable; relatively dependent on groundfish, with medium resilience.	General long-term decline in natural resources employment; reliant on tourism, timber, and fishing. Sixteen groundfish vessels retired through trawl buyback. Decreasing population (3%). Impacted by salmon closure. Four wave energy projects are proposed for nearby state and Federal waters.
Fort Bragg	Would receive higher-than-average initial allocation. Located in low-bycatch area. However, a relatively inefficient fleet.	Vulnerable; relatively dependent on groundfish, with medium resilience.	General long-term decline in natural resources employment (large mill closed in 2002). Decreasing population (3%). Older-than-average population. Impacted by 2008 salmon closure. Increasing gentrification. Three wave energy projects are proposed for nearby state and Federal waters. Several MPAs located in nearby waters.

Community	General Impacts	Vulnerability	Cumulative Impact Notes
San Francisco	Would receive higher-than-average initial allocation. Strong infrastructure. However, located in a high-bycatch area. May lose some of its relatively inefficient fleet.	Not vulnerable.	Decreasing population (2%). Ongoing gentrification of fishing facilities. Wave energy projects proposed for nearby waters (mainly bay). Impacted by 2008 salmon closure.
Princeton/ Half Moon Bay	Initial allocation may be higher or lower than average, depending on allocation formula. Located near high bycatch area. Relatively inefficient fleet (some vessels may be lost), but strong infrastructure may mitigate these factors.	Not vulnerable.	Historically dependent on tourism; active tourist industry. Slightly increasing population; older-than-average population. Increasing gentrification. Near Monterey Bay Sanctuary and newly designated California MPAs.
Moss Landing	Would receive higher-than-average initial allocation. May experience reduction in landings if processors are allocated quota. Inefficient fleet near high bycatch area.	Vulnerable; somewhat dependent on groundfish, with low resilience.	Historically reliant on sardine and other fisheries. Near Monterey Bay Sanctuary and newly designated MPAs. Affected by 2008 salmon closure.
Morro Bay	Currently no trawlers are trawling out of Morro Bay. Permits bought out by The Nature Conservancy. Impossible to predict how efficient fleet may be in future. Would receive less than average initial allocation of QS.	Vulnerable. Medium dependence on groundfish, but highly resilient.	Active tourist industry. Slightly decreasing population. Increasing gentrification. Impacted by salmon closure. Five groundfish vessels participated in buyout. New MPAs located in nearby waters. One wave energy project currently proposed for nearby waters.

4.14.7 Summary of the Impacts by Alternative

The cumulative effects of the alternatives on communities consider the effect of past, present, and RFFAs and conditions and combine those with the direct and indirect effects of the alternatives. As indicated above, west coast fishing communities have gone through substantial change over the past 20 years in response to salmon fishery restrictions, restrictions on forestry practices, reduction in groundfish fishing activity, and the development of the Pacific whiting fishery, among others. Without a change in fishery management practices, the trends invoked by these circumstances are expected to continue. These trends are likely to come in the form of a gradual decline in nonwhiting trawl activity, a continued presence of Pacific whiting (but with little additional growth), and continued attempts at economic diversification among west coast communities.

In addition to these factors and trends, the demographics of west coast fishing communities have tended to change in terms of population size, population age, average income, and sources of employment. Some communities have adapted relatively better than others to changing conditions. Some communities appear to have diversified into industries such as tourism, while others have struggled with the decline in their resource-base industries. Still, other communities have capitalized on the development of the Pacific whiting fishery and have seen reinvestment in the fishing industry coming in the form of fishing vessels and shoreside processing.

Rationalization has the potential to impact fishing communities in a variety of ways, with some communities potentially becoming better off, while others become worse off. Communities appear to

be largely affected through a handful of key mechanisms, including fleet consolidation; changes in timing and volume of deliveries; changes in harvester, captain, and crew income; impacts on shoreside processors; changes in the amount of shoreside labor and other forms of necessary labor; initial allocation of Qs; whether an adaptive management provision is part of a rationalization program; and whether that provision is used to help communities in some fashion.

4.14.7.1 Alternative 1 (No Action)

Much of the cumulative effect of Alternative 1 is captured in the above discussion. Without a change to existing fishery management systems, the current trend in west coast fishing communities is expected to continue. This includes a gradual decline in nonwhiting fisheries and associated shoreside businesses, a continued presence of the shoreside whiting fishery, and continued economic and demographic adjustments in west coast communities, among others.

4.14.7.2 Alternative 2a through 4b

The cumulative effects of the action alternatives on communities can be broken down into variations in a handful of elements of the alternatives.

Initial Allocation

The initial allocation of Qs will tend to place communities in different relative starting places at the outset of rationalization. Those alternatives that allocate Qs based on catch history will tend to benefit relatively larger ports with relatively larger fishing vessels, while those alternatives that allocate based on catch history plus an equal sharing of buyback history will tend to benefit relatively smaller communities with smaller operations. Finally, those alternatives that make an initial allocation to processors will tend to advantage those communities where processing facilities are present and disadvantage those communities where harvesters are present but processors are not.

Fleet Consolidation

Each of the alternatives is expected to result in the same level of fleet consolidation. This consolidation may mean a relatively large reduction in the number of nonwhiting trawl vessels and a reduction in the number of shoreside whiting vessels. Such consolidation is not likely to be homogeneous across communities, meaning that some communities will lose more vessels than others for a variety of reasons. Many of these disadvantaged communities can be assisted through an adaptive management provision, which is explained below.

Volume and timing of deliveries and effects on shoreside processing and labor

As articulated previously, the volume of deliveries of nonwhiting species is expected to rise, leading to an increase in the demand for shoreside processing and associated labor. The timing of whiting deliveries is expected to change, leading to a decline in peak harvest volumes, hence a decline in necessary whiting processing and labor. However, the duration of jobs involved in whiting processing and other shoreside business would be expected to increase.

The increase in nonwhiting delivery volume is expected to stem the tide of shoreside nonwhiting processor consolidation that has been occurring in recent years. This would tend to halt some of the declining trend that has been occurring and impacting communities where nonwhiting processing is present. However, the decline in the amount of processing capital necessary for the whiting fishery may mean that some communities lose processing facilities, while others experience a longer period of

Pacific whiting processing activity and may tend to see that longer period as beneficial due to longer duration of employment and incoming revenue.

Harvester, Captain, and Crew Income

Due in large part to a reduction in the number of vessels, remaining harvester, captain, and crew income is expected to increase while the number of those employed is expected to decrease. Communities that experience relatively less consolidation may see the increase in these incomes as beneficial due to improvements in the income received from fishing activity and the impact that has on communities where harvesters, captain, and crew reside. However, those communities that experience relatively greater amounts of fleet consolidation may not be made better off even if those remaining in the fishery in those communities receive higher incomes.

Adaptive Management

The adaptive management provision has the potential to assist communities that may stand to be adversely impacted from rationalization. This measure can direct quota in a manner that directly influences how communities adapt to changes brought about as a result of rationalization.

Combined Effect

When combined with the past, present, and future conditions/actions, the alternatives will tend to beneficially impact some communities, while adversely impacting others. This compares with Alternative 1 (No Action) where most communities will continue to suffer. The utilization of adaptive management will tend to assist those communities that may be adversely impacted, and, when combined with the possibility that CFAs will be implemented, these measures may work in concert to help disadvantaged communities under a rationalized fishery structure. Other communities that are not recipients of adaptive management quota will tend to be beneficially impacted by rationalization through higher wages for harvesters and their captain and crew, more processing activity and demand for related shoreside business, and other matters. Furthermore, the fishery structure created by the rationalization program grants fishery participants with tools which allow them to better adapt to varying future conditions, providing a beneficial second-order effect to communities.

4.14.8 Regional Economic Impacts

Table 4-72 compares estimated income impacts from commercial fishing and processing for different cross-sections of the west coast commercial fishery under the three bycatch avoidance scenarios against income impacts in 2007. The table shows that change is projected to occur only in the nonwhiting trawl sector. For example, under the low bycatch avoidance scenario, income impacts are estimated to increase by \$15.2 million compared with 2007. The increase is \$25.5 million and \$27.1 million under the moderate and high bycatch avoidance scenarios, respectively. Compared with 2007, these dollar changes under the three scenarios represent increases of 35.3 percent, 59.3 percent and 63 percent, respectively, in income impacts attributable to the nonwhiting trawl sector.

Table 4-72. Estimated income impacts from harvesting and processing of Council managed species for different cross-sections of the west coast commercial fishery under three bycatch avoidance scenarios compared with 2007.

Cross-section of the West Coast Commercial Fishery	2007	Low	Moderate	High
Income Impacts (million \$)				
Total West Coast Landings (including at-sea and tribal)	662.4	677.5	687.9	689.5
Nontribal Groundfish Landings (including at-sea)	145.3	160.4	170.8	172.4
Total LE Trawl Groundfish Landings (including at-sea)	123.4	138.5	148.9	150.5
Shoreside LE Trawl Groundfish Landings Including Whiting	80.7	95.8	106.2	107.8
Shoreside LE Trawl Groundfish Landings Excluding Whiting	43.0	58.2	68.6	70.1
LE Trawl Whiting Landings (shoreside and at-sea)	80.3	80.3	80.3	80.3
LE Fixed Gear Groundfish Landings	14.5	14.5	14.5	14.5
Open Access Groundfish Landings*	7.3	7.3	7.3	7.3
Tribal Groundfish Shoreside Landings (including whiting)	11.8	11.8	11.8	11.8
Tribal Groundfish At-Sea Landings (whiting)	1.8	1.8	1.8	1.8
Change compared to 2007 (million \$)				
Total West Coast Landings (including at-sea and tribal)		+15.2	+25.5	+27.1
Nontribal Groundfish Landings (including at-sea)		+15.2	+25.5	+27.1
Total LE Trawl Groundfish Landings (including at-sea)		+15.2	+25.5	+27.1
Shoreside LE Trawl Groundfish Landings Including Whiting		+15.2	+25.5	+27.1
Shoreside LE Trawl Groundfish Landings Excluding Whiting		+15.2	+25.5	+27.1
LE Trawl Whiting Landings (shoreside and at-sea)		-	-	-
LE Fixed Gear Groundfish Landings		-	-	-
Open Access Groundfish Landings*		-	-	-
Tribal Groundfish Shoreside Landings (including whiting)		-	-	-
Tribal Groundfish At-Sea Landings (whiting)		-	-	-
Change compared to 2007 (percent)				
Total West Coast Landings (including at-sea and tribal)		+2.3%	+3.9%	+4.1%
Nontribal Groundfish Landings (including at-sea)		+10.4%	+17.6%	+18.7%
Total LE Trawl Groundfish Landings (including at-sea)		+12.3%	+20.7%	+22.0%
Shoreside LE Trawl Groundfish Landings Including Whiting		+18.8%	+31.6%	+33.6%
Shoreside LE Trawl Groundfish Landings Excluding Whiting		+35.3%	+59.3%	+63.0%
LE Trawl Whiting Landings (shoreside and at-sea)		-	-	-
LE Fixed Gear Groundfish Landings		-	-	-
Open Access Groundfish Landings*		-	-	-
Tribal Groundfish Shoreside Landings (including whiting)		-	-	-
Tribal Groundfish At-Sea Landings (whiting)		-	-	-

Table 4-73 displays estimated income impacts from commercial fishing and processing activities under the three bycatch avoidance scenarios and in 2007 split north and south of 40°10' N. latitude for west coast fishery sectors. The table shows, for example, that in 2007, the nonwhiting LE trawl sector contributed \$61 million of a total \$335 million income impacts accruing north of 40°10' N. latitude, and \$13.4 million of a total \$282 million south of 40°10' N. latitude. Under the three bycatch avoidance scenarios, the contribution of the nonwhiting trawl sector north of 40°10' N. latitude is projected to increase to \$71.4 million, \$76 million, and \$77.5 million, respectively and to \$18.2 million, \$23.9 million, and \$24 million, respectively, south of 40°10' N. latitude. Finer geographic regions are not shown due to the inability to predict changes in landed catch activity at a finer scale.

Table 4-73. Estimated income impacts (\$ million) by commercial fishing sector north and south of 40°10' N. latitude resulting from harvesting and processing of Council managed species in 2007 and under the trawl rationalization bycatch avoidance scenarios.

Fishery Sector / Region	2007	Low	Moderate	High
North of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl	61.06	71.37	76.05	77.54
Shoreside Whiting	6.25	6.25	6.25	6.25
LE Fixed Gear	10.10	10.10	10.10	10.10
OA Exempted Trawl	0.05	0.05	0.05	0.05
OA Nontrawl	2.88	2.88	2.88	2.88
Non Groundfish	230.14	230.14	230.14	230.14
Treaty Nonwhiting Groundfish	4.53	4.53	4.53	4.53
Treaty Shoreside Whiting	7.31	7.31	7.31	7.31
Treaty Nongroundfish	13.11	13.11	13.11	13.11
North Total	335.44	345.75	350.43	351.92
South of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl	13.36	18.22	23.90	24.00
LE Fixed Gear	4.44	4.44	4.44	4.44
OA Exempted Trawl	0.05	0.05	0.05	0.05
OA Nontrawl	4.37	4.37	4.37	4.37
Non Groundfish	260.17	260.17	260.17	260.17
South Total	282.40	287.26	292.94	293.04
At-Sea Whiting				
Whiting Catcher-Processors	25.83	25.83	25.83	25.83
Mothership Whiting	16.87	16.87	16.87	16.87
Treaty Mothership Whiting	1.82	1.82	1.82	1.82
At-Sea Whiting Total	44.51	44.51	44.51	44.51
Coastwide Total	662.35	677.52	687.88	689.47

Table 4-74 highlights the dollar changes in income impacts shown in the prior table. Compared with 2007, income impacts for the nonwhiting trawl sector north of 40°10' N. latitude are estimated to increase by \$10 million, \$15 million, and \$16.5 million, respectively, under the three bycatch avoidance scenarios. South of 40°10' N. latitude, increases in income impacts are estimated to be \$4.9 million, \$10.5 million, and \$10.6 million, respectively, under the three bycatch avoidance scenarios.

Table 4-74. Estimated change (from 2007) in income impacts by commercial fishing sector north and south of 40°10' N. latitude resulting from harvesting and processing of Council managed species under the trawl rationalization bycatch avoidance scenarios (\$ million).

	Change in Income Impacts (\$ millions)			
	2007	Low	Moderate	High
North of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl		+10.3	+15.0	+16.5
Shoreside Whiting		-	-	-
LE Fixed Gear		-	-	-
OA Exempted Trawl		-	-	-
OA Nontrawl		-	-	-
Non Groundfish		-	-	-
Treaty Nonwhiting Groundfish		-	-	-
Treaty Shoreside Whiting		-	-	-
Treaty Nongroundfish		-	-	-
North Total		+10.3	+15.0	+16.5
South of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl		+4.9	+10.5	+10.6
LE Fixed Gear		-	-	-
OA Exempted Trawl		-	-	-
OA Nontrawl		-	-	-
Non Groundfish		-	-	-
South Total		+4.9	+10.5	+10.6
At-Sea Whiting				
Whiting Catcher-Processors		-	-	-
Mothership Whiting		-	-	-
Treaty Mothership Whiting		-	-	-
At-Sea Whiting Total		-	-	-
Coastwide Total		+15.2	+25.5	+27.1

Table 4-75 translates the dollar changes in the previous table into percentage changes. The table shows that compared with 2007 income impacts under the low, moderate and high bycatch avoidance scenarios for the nonwhiting trawl sector increase by 16.9 percent, 24.6 percent, and 27 percent, respectively, north of 40°10' N. latitude. South of 40°10' N. latitude income impacts in nonwhiting trawl sector under the three scenarios increase by 36.4 percent, 78.8 percent, and 79.6 percent, respectively.

Table 4-75. Estimated percent change (from 2007) in income impacts by commercial fishing sector north and south of 40°10' N. latitude resulting from harvesting and processing of Council managed species under the trawl rationalization bycatch avoidance scenarios.

	Change in Income Impacts (%)			
	2007	Low	Moderate	High
North of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl		+16.9%	+24.6%	+27.0%
Shoreside Whiting		-	-	-
LE Fixed Gear		-	-	-
OA Exempted Trawl		-	-	-
OA Nontrawl		-	-	-
Non Groundfish		-	-	-
Treaty Nonwhiting Groundfish		-	-	-
Treaty Shoreside Whiting		-	-	-
Treaty Nongroundfish		-	-	-
North Total		+3.1%	+4.5%	+4.9%
South of 40° 10' N. Latitude				
Nonwhiting Groundfish LE Trawl		+36.4%	+78.8%	+79.6%
LE Fixed Gear		-	-	-
OA Exempted Trawl		-	-	-
OA Nontrawl		-	-	-
Non Groundfish		-	-	-
South Total		+1.7%	+3.7%	+3.8%
At-Sea Whiting				
Whiting Catcher-Processors		-	-	-
Mothership Whiting		-	-	-
Treaty Mothership Whiting		-	-	-
At-Sea Whiting Total		-	-	-
Coastwide Total		+2.3%	+3.9%	+4.1%

4.15 Treaty Tribe Harvesters

This section evaluates impacts to fisheries prosecuted by the Northwest treaty tribes. Native Americans may also participate in other groundfish and nongroundfish fisheries, but impacts to Native Americans not exercising treaty rights would be generally equivalent to those described in other sections of this EIS, such as impacts to nontrawl harvesters, captain and crew, and communities.

4.15.1 Methods for Assessing Impacts

Tribal fisheries are not subject to the proposed action and all effects are indirect. In general, these impacts are similar to those described in Section 4.8, for nontrawl harvesters. The discussion below compares the general effects of trawl rationalization with status quo. Section 4.15.4 summarizes the effects of the alternatives. Of the impact mechanisms described for nontrawl commercial harvesters, the following spillover effects would also apply to tribal fisheries:

- Fleet consolidation could make more fishing vessels available, potentially decreasing the capital costs for tribes to increase fleet size. On the other hand, if these vessels enter other fisheries in

which tribes participate (e.g., Pacific halibut and Dungeness crab), market and resource competition in these fisheries could increase.

- As discussed in Section 4.14, fleet consolidation could result in loss of port infrastructure if trawl vessels are a major source of revenue. Neah Bay, the principal port for Makah tribal fisheries, was identified as particularly vulnerable.
- An increase in the bycatch of nontarget species by the trawl fishery, especially Pacific halibut, which is targeted in tribal fisheries, could affect catch opportunity.
- Increased flexibility due to rationalization increases market competition.

Some of the impact mechanisms described for nontrawl commercial harvesters are less likely to affect tribal fisheries to the degree that implementation of treaty obligations shields tribal harvesters from some forms of direct competition. Fishing grounds competition is likely to be less intense since tribal fisheries occur in designated U&A areas. Resource competition was also identified for nontrawl harvesters. However, as noted in Section 4.8, this type of competition would only become an issue if target species allocations to the trawl sector were increased in response to gear switching or for other reasons. Tribal fisheries may be further insulated to the degree that treaty obligations place a higher legal bar for protecting tribal fishing opportunity.

Table 4-76. Overview of impacts, mechanisms, and metrics used to compare the general effects of the no action alternative and the action alternatives on tribal harvesters.

Potential Impacts	Reasons or Mechanisms for Impacts	Metrics or Indicators for Informing Impact Mechanisms	Data, Models, and Methods used for Assessing Impacts
Changes in profits and participation of tribal harvesters	Fleet consolidation increases supply of vessels for use in nontrawl fisheries	Increased participation in nontrawl fisheries leading to decreased resource availability, change in supply and prices	Expert opinion, comments made by tribal fishing representatives at Council meetings, and other pertinent information
	Access to processors and markets	Reliance of tribal harvesters on the port infrastructure supported by trawl harvesters	
	Spillover from increased catch of nontarget species, principally Pacific halibut	Changes in trawl vessel effort and catch	
	Potential impacts on ex-vessel prices due to greater flexibility, especially from increased fixed-gear catch as a result of gear switching	Price changes of select groundfish as a result of increased quantities of fixed-gear harvest	

4.15.2 Direct and Indirect Effects of the Alternatives on Tribal Harvesters

4.15.2.1 Vessel Participation in Tribal Fisheries due to Consolidation

As discussed in Section 4.8, rationalization could have several, countervailing mechanisms affecting tribal fisheries. First, greater control over future fishing opportunity in a rationalized trawl fishery could lead to greater specialization and less interest by groundfish trawl vessels to participate in other fisheries, principally pink shrimp and Dungeness crab fisheries. On the other hand, fleet consolidation

could make more vessels available for sale. Increased supply would lead to lower prices for vessels, lowering the barrier for entry into tribal fisheries, depending on other entry costs (such as the purchase of any required LE permits). These lower capital costs could have a beneficial impact on tribal harvesters, in that the tribes could increase their fleets at less cost. For the same reason, nontribal harvesters would also benefit from the lower cost to entry represented by the availability of surplus trawl vessels. This could increase market and resource competition in those fisheries.

4.15.2.2 Loss of Port Infrastructure Affecting Market Access

Section 4.14 discusses impacts to communities, including processors, infrastructure, and suppliers. The impacts analysis shows that Neah Bay is likely to be adversely affected by trawl rationalization. It is also the principal port for the Washington treaty tribes, particularly the Makah, whose reservation lands are located around the port. Although some LE trawl vessels operated out of this port in the recent past, they have already relocated. There is also no local groundfish processing in Neah Bay; landings are trucked to Westport and Astoria. Consolidation in both the harvesting and processing sectors is likely to raise the barriers to any increase in nontribal trawl harvesters operating out of this port. This could result in withdrawal of services and less financial support for business infrastructure. For example, if lower volumes are landed, groundfish buyers may be less inclined to make purchases or may offer less favorable prices.

4.15.2.3 Change in Catch of Pacific Halibut in the Trawl Fishery

Section 4.8.2.2 references bycatch of Pacific halibut, which is an important target species in tribal fisheries. Rationalization is predicted to result in increased target species catches in the groundfish trawl fishery. With increases in effort and catch, unless the bycatch rate decreases, more halibut bycatch could occur in the trawl fishery. Area-specific TAC levels are decided by the IPHC. An estimate of bycatch in nontarget fisheries is deducted from an estimate of allowable biological catch to determine the Pacific halibut TAC for the west coast, referred to as Area 2A. The bycatch deduction for the trawl fishery is based on estimates prepared by the NMFS NWFSC derived from observations in a recent year. For example, estimates of bycatch in the 2007 groundfish trawl fishery are given to the IPHC to use in establishing the TAC for 2009 halibut fisheries. To date, an estimate of bycatch in the groundfish fixed-gear fishery has not been applied in determining the TAC. Recent observer data suggest that there may be a comparable level of bycatch mortality in this fishery. Determining the TAC thus depends on stock assessment results combined with bycatch estimates. While Pacific halibut stock status appears robust over the long term, a deduction for fixed-gear bycatch could lead the IPHC to reduce the TAC. Potential changes in the groundfish trawl sector bycatch under the alternatives are discussed in the next paragraph.

As discussed in Section 4.8.2.2, Pacific halibut bycatch could increase as trawlers find more efficient ways to avoid overfished stocks and access target species, especially flatfish species that co-occur with halibut. However, a Pacific halibut IBQ is a feature of Alternative 2a-c and Alternative 4b (the preferred alternative); under these alternatives, the IBQ would cap the amount of Pacific halibut caught in the nonwhiting trawl fishery. This would work similarly to IFQs except that retention would be prohibited. Like the IFQ system, IBQ would impose individual accountability and allow for more precise monitoring of halibut bycatch. The accountability feature could motivate harvesters to reduce their halibut bycatch rates. Under these alternatives, IBQ would cover legal and sublegal size Pacific halibut bycatch mortality in the area north of 40°10 N. latitude, and bycatch mortality would be estimated on an individual vessel basis. The actual amount allocated or credited to the groundfish trawl fishery to account for Pacific halibut bycatch was determined under the Amendment 21 intersector allocation process. This is further discussed under cumulative effects since it is an exogenous action. In

general, a reduction in Pacific halibut bycatch in the trawl fishery is expected. This could benefit the tribal fishery. As noted in Section 4.8.2.2, implementation of an IFQ program in the B.C. groundfish trawl fishery that included vessel limits on Pacific halibut bycatch was followed by a reduction in bycatch.¹¹³

4.15.2.4 Spillover due to Increased Flexibility in a Rationalized Trawl Fishery

Section 4.8.2.2 identifies nontrawl sablefish harvesters as potentially indirectly affected by gear switching by trawl harvesters in a rationalized fishery. This is likely to be the main potential impact to tribal harvesters since they participate in the sablefish fishery. Because of treaty rights, including tribal U&As, it is less likely that the other effects identified in that section—resource and fishing grounds competition—would affect tribal harvesters. The analysis in Section 4.8.2.2 indicates that sablefish caught on the west coast is sold into a global market, with Japan being a major importer. Moreover, higher quality fixed-gear-caught fish likely sells into a different market from trawl-caught sablefish. Given that level of market specialization, gear switching could depress the price of fixed-gear-caught sablefish slightly if IFQ holders are more efficient producers.

4.15.3 Cumulative Effects on Tribal Harvesters

Exogenous factors affecting tribal harvesters are as follows:

- Increased consumer awareness of the impact of fishing in relation to retail products
- High and increasing demand for protein
- High and increasing production costs
- Overfished species rebuilding

This is a subset of the factors listed for nontrawl harvesters in Section 4.8. Two other exogenous factors are potential changes in accounting for fixed-gear Pacific halibut bycatch being considered by the IPHC in setting the Area 2A TAC and the allocation formula under Amendment 21 for Pacific halibut IBQ. If, as preliminary data suggest, the bycatch mortality in the fixed gear fishery is large, it could result in substantial reductions in the TAC for directed fisheries.

Under Amendment 21, the allocation formula would be set at 15 percent of the Area 2a constant exploitation yield for legal size halibut, not to exceed 130,000 pounds for the first four years of the trawl rationalization program and not to exceed 100,000 pounds starting in the fifth year. The bycatch allocation could be adjusted up or down from this formula through the groundfish biennial harvest specifications process. This bycatch allocation applies to the whole groundfish trawl fishery, and set-asides would be established for sectors and areas not managed with IBQ (at-sea whiting fishery, groundfish trawl fishing south of 40°10' N. latitude). Because IBQ accounts for both legal and sub-legal sized fish and covers bycatch mortality, the actual deduction from the allocations to other fisheries (including the directed tribal fishery), which are computed in terms of legal size fish, would be less than the amounts indicated in the formula above. In general, the bycatch allocation formula would represent a substantial reduction in trawl bycatch compared to status quo.

The other factors, bulleted above, are pervasive, affecting fishery sectors across the board. Consumer awareness, tied to a presumption that trawling has greater adverse environmental effects in comparison

¹¹³ According to testimony by Mr. Gregg Williams of the IPHC at the June 2009 Council meeting, halibut bycatch in the B.C. groundfish trawl fishery has been reduced by approximately two-thirds compared to levels prior to program implementation.

to other gear types could affect the price of fish caught with trawl gear. This would depend, first, on the level of consumer knowledge and whether purchasers can distinguish retail products according to fishing method (as opposed to other factors such as the stock status of the species involved) and, second, on the degree to which such information affects purchasing decisions. If this trend also results in a price premium for other gear types, tribal harvesters would see both beneficial and adverse impacts.

Increased demand not matched by supply increases results in price inflation. For harvesters, this has both beneficial and adverse impacts since the price of inputs (fuel being a prime example) increases costs while price increases for fish would benefit revenues. The net effect depends on the difference in commodity-specific price inflation. If fish consumers are less willing to substitute other products in comparison to harvesters' ability to substitute inputs or increase efficiency, then harvesters could benefit.

As discussed elsewhere, overfished species rebuilding is likely to have a beneficial impact over the long term. Tribal harvesters are subject to set-asides of overfished species yield agreed upon during the biennial harvest specifications process. As stocks recover, and OYs (ACLs) can be increased, these set-asides can be increased. In the short term, the rebuilding paradox confronts all groundfish harvesters. This phenomenon is due to increases in bycatch as stocks rebuild that cannot be easily compensated for by the OY increases set by the rebuilding policy. The effect depends on the relationship between gear selectivity and the rebuilding trajectory. For 2009-10, tribal set-asides have been established for canary, widow, and yelloweye rockfish, and Pacific ocean perch; the set-asides are larger for the nonwhiting portion of the tribal fishery. Yelloweye would be the most constraining stock for tribal fixed-gear fisheries and canary for tribal trawl fisheries.

4.15.4 Summary of the Impact of the Alternatives on Tribal Harvesters

Impact mechanisms discussed above are related to increased fleet consolidation (potential for price competition) and changes in Pacific halibut resulting from increased target species catch in the groundfish trawl fishery and the application of IBQ. Gear switching by vessels with groundfish trawl permits could also increase competition compared to the no action alternative (Alternative 1). Gear switching under the IFQ program is an element in all of the action alternatives. Exogenous factors would have the same effect across all the action alternatives, changing the intensity of impacts, but not the relative magnitude among the alternatives. Exogenous factors have both beneficial effects (increased demand, overfished species rebuilding) and adverse effects (increased costs). Increased consumer awareness could have either beneficial or adverse impacts.

Compared to Alternative 1 (no action) the action alternatives are likely to lead to greater price competition and either higher or lower Pacific halibut bycatch by the groundfish trawl fishery, depending on the application of IBQ.

Alternative 2 would likely lead to greater consolidation compared to the other alternatives (due to higher accumulation limits, grandfather clause, three-sector management). This alternative includes Pacific halibut IBQ.

Alternative 3 would likely lead to the least consolidation compared to the other alternatives (lower accumulation limits, no grandfather clause, and four sectors). This alternative does not include a halibut IBQ.

Alternative 4 would be intermediate compared to Alternatives 2 and 3 in terms of consolidation. Alternative 4a does not include IBQ; Alternative 4b (the preferred alternative) does.

4.16 Management Agencies

4.16.1 Methods for Assessing Impacts

Table 4-77 provides an overview of the analytical approach used to compare baseline and future conditions of the management and enforcement needs under the alternatives. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the impacts, 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis.

The same tracking and monitoring program would be implemented under all the action alternatives. Additional costs associated with tracking and monitoring is the principal effect to Federal and state agencies in terms of staffing levels and data collection and sharing. However, the MSA allows cost recovery for management, data collection, and enforcement under a LAPP up to 3 percent of the ex-vessel value of fish harvested (§304 (d)(2)(B)).

Table 4-77. Overview of analytical approach used to compare baseline and future conditions of the management agencies under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes in Level of Staffing	Changes in number of staff or reprogramming of current staff	Number of new hires, change in percentage of time dedicated by current staff to LE trawl management/enforcement	Qualitative and quantitative assessment
Changes in Inseason Management	Change in time dedicated to in-season adjustments	Time spent by the GMT, GAP, Council and management agencies to deal with issues that arise during the fishing season	Qualitative assessment
Changes in Data Collection and Data Sharing	Changes in the amount and type of data collected at sea and dockside, and Changes in uniformity of data collection	Percentage or hours spent on observing, enforcement, and shoreside monitoring. Time, effort, and funds utilized for data conformity and sharing mechanisms.	Qualitative assessment

4.16.2 Direct and Indirect Effects of the Alternatives on Management Agencies

Because the action alternatives do not differ in terms of the features affecting management agencies, the action alternatives are collectively compared to status quo in terms of impacts shown in Table 4-77.

4.16.2.1 Changes in Level of Staffing

In comparison to status quo management, rationalization will require increases in NMFS Northwest Region, NOAA General Counsel, NWFSC, and the Northwest/Southwest Offices of Law Enforcement staff. State fisheries management and enforcement staff will also have to be increased. Additional equipment, training, and information technology resources (hardware and software) will also be needed by both state and federal agencies. The Council will incur additional costs in the early years of the program.

Listed below are examples of anticipated additions to state and federal staff levels due to rationalization.

- Staff for cost recovery, permitting and, quota tracking, and appeals processes
- Staff and contracting for performance monitoring including mandatory economic data collection
- Observers, debriefers, and, port samplers
- Law enforcement officers, technicians, equipment and training
- Lawyers, policy analysts, and regulation writers to adopt Federal and state regulations in support of the Program and address enforcement issues
- Information technology (IT) resources (FTEs, hardware, and software) to support electronic reporting (logbooks, fish tickets, observers, compliance monitoring, etc.).
- State and Federal outreach

Based on the preferred alternative, NMFS has developed the following preliminary estimates of potential costs.

- Implementation Costs (one-time costs to develop the tracking and monitoring programs)
 - State management and enforcement \$300,000 to \$500,000 per state
 - NMFS management and enforcement \$2.1 million
 - NMFS (NWFSC) Observer Program and Economics Data Collection Programs \$3.150 million
 - **Total (approximate): \$6.5 million**
- Annual Costs (State and Federal costs associated with running the Program when fully implemented.)
 - State management and enforcement \$750,000 to \$1.5 million per state
 - NMFS management and enforcement \$1.7 million
 - NMFS (NWFSC) Observer Program and Economics Data Collection Programs \$3.15 million
 - **Total (approximate): \$8 million**

Council costs are expected to accrue based on various activities, including meetings associated with reviewing draft regulations (e.g., a February 2010 GMT meeting scheduled to review draft regulations), development of a trailing amendment on CFAs (commencing prior to program implementation), development of criteria and recommendations for the AMP (to be implemented by the third year of the program), and review of program performance (preparation for the review in the fourth year and participating in the review in years 5 and 6). These costs are expected to be \$150,000 per year, including implementation years, and may potentially rise to \$300,000 in years where the Council is undertaking review of program performance.

4.16.2.2 Changes in Inseason Management

Rationalization is expected to decrease the high level of inseason management done under status quo; however, savings in this area would likely go towards other groundfish management tasks, such as inseason QS/QP transfers, dealing with the nuances of the carryover and AMP provisions, and continued monitoring of in-season performance by other groundfish sectors.

4.16.2.3 Changes in Data Collection and Data Sharing

Rationalization would change the type and increase the amount of data collected by observers, because observer coverage would greatly increase in the shoreside nonwhiting fishery, expanding the amount of fishery dependent data collected. The annual cost of dealing with a higher volume of observer data, training, and management is estimated at \$3 million and would be incurred primarily by the NWFSC. Rationalization would also require a uniform mode of electronic recording and reporting of catch/landings information, as well as sharing that information across state and federal jurisdictions in the form of an electronic fish ticket system. The electronic fish tickets are being developed under status quo, so that cost is not directly attributable to trawl rationalization and is not part of this cost comparison.

4.16.2.4 Income Tax Revenue

One effect that may impact government tax revenue is the amount of income tax received by the government as a result of rationalization. To the degree these revenues make their way to the budgets of management agencies, these taxes may impact those agencies. As indicated in the analysis by Lian et al (2008), the potential amount of income potentially generated by nonwhiting harvesters could be approximately \$300,000 if harvesters base their decisions about fleet consolidation and cost cutting measures purely on economic efficiency (though this number will vary to some degree with variations in certain design elements of the program). This amount of income is compared to existing conditions where the average nonwhiting harvester generates zero economic profit. The term “zero economic profit” means that the average harvester would be equally well off engaging in a similar form of labor, such as construction. The bureau of labor statistics indicates that the mean annual wage of those in construction and extraction occupations is \$48,735 per year, placing those occupations at a 25 percent tax rate. Under status quo conditions, there are approximately 100 nonwhiting trawlers in any given year, meaning that income taxes received by the government from these operations is approximately \$1,218,375 per year. Under a rationalized nonwhiting fishery, the fleet could consolidate to 40 vessels if harvest volumes do not change. If these vessels generate income levels predicted by Lian et al (placing them in an income tax bracket of 33 percent), the income taxes received by the government could be approximately \$3,960,000. If harvest volumes increase in the fishery as expected, the number of vessels in the nonwhiting fishery could be somewhere on the order of 60, meaning tax revenues to the government could be approximately \$5,940,000. However, these estimates will tend to decline over time. As second-generation quota owners enter the fishery and take out loans for QSSs, the revenues those second-generation quota owners generate will be lower due to costs they must bear to pay back those loans. This would tend to decrease the amount of income tax revenue that the government receives.

Table 4-78. Estimated income taxes paid to the U.S. government from nonwhiting trawl activity

Estimated Income Tax under Status Quo	Estimated Income Tax under IFQ Program with No Increase in Harvest Volume	Estimated Income Tax under IFQ with Increase in Harvest Volume
\$1,218,375	\$3,960,000	\$5,940,000

4.16.3 Cumulative Effects on Management Agencies

Exogenous actions and trends affecting management agencies include costs related to other management responsibilities and the level of agency budgets. The responsibilities of management agencies has been increasing over time due to responsibilities added through the revised MSA, increasingly complex

fishery management regulations designed to protect weak stocks while still allowing fisheries to be prosecuted, and other matters. In some respects, the increasing responsibilities that have been constructed under the existing management system will be replaced with responsibilities to meet the needs of operating a rationalization program, shifting the workload within the various agencies. It is not clear whether a rationalization program will increase or decrease workload overall. However, when combined with past, present, and future actions/conditions, the workload and resources demanded of various agencies will—at best—remain the same, but may very well continue to increase due to other demands to which agencies will have to respond.

4.16.4 Summary of the Impact of the Alternatives on Management Agencies

Management under the action alternatives would produce more data than under a fishery operating under Alternative 1 (no action). The associated cost increases of the action alternatives compared to no action would also fall primarily on Federal management agencies and offices. However, some of these cost increases may be compensated through the cost recovery program as specified in the MSA. When comparing the total estimated incremental costs for management, data collection, and enforcement with the total estimated ex-vessel value of the LE trawl fishery, the costs are approximately 4 or 5 percent of the total value. This is close to the allowable 3 percent that can be recovered. Because both the costs and the future ex-vessel value are estimates, it is possible that the actual management costs would fall entirely within that 3 percent recoverable range. If there is full cost recovery, the action alternatives could have a beneficial effect on Federal agency costs compared to no action. Federal and state staff time spent on inseason management of the trawl fishery may also be reduced compared to no action (Alternative 1) since most nonwhiting species would no longer be subject to cumulative trip limits, which are frequently adjusted under status quo management (Alternative 1).

4.17 Fish Resources

Limited entry groundfish trawl harvesters, whose behavior would be affected by the proposed action, catch management unit species in the groundfish FMP and other species (usually in small amounts). Catch may be characterized in various ways. Although overall, the groundfish fishery is considered multi-species, some distinction can be made between targeted stocks and those caught incidentally. If they have market value, incidentally caught species may be retained for sale. As defined by the MSA, bycatch applies to fish that are discarded, typically at sea, although the term is colloquially applied to all incidental catch. Groundfish fishery management unit (FMU) species are categorized by stock status according to the management framework: healthy stocks, precautionary zone stocks, and overfished species. Under the status quo catch control tool, cumulative trip limits, retention of certain overfished species may be prohibited or trip limits set at low levels. Although some retention may be allowed, overfished species are often referred to as bycatch in the sense that targeting is discouraged, and the fact that trip limits (which apply to landings, not total catch) result in discarding once the limit is reached, assuming that target species cumulative trip limits have not been reached.

4.17.1 Methods for Assessing Impacts

Table 4-79 provides an overview of the analytical approach used to compare baseline and future conditions of the groundfish stocks and halibut under the alternatives. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the impacts, 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis.

Table 4-79. Overview of analytical approach used to compare baseline and future conditions of the groundfish resource under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes individual species stock abundance	<ul style="list-style-type: none"> • Increase in target species catch • Reduction in bycatch rates for overfished species • Increase/decrease in Pacific halibut bycatch • Improved monitoring leading to better specification of harvest levels 	<ul style="list-style-type: none"> • Biomass trajectory • Bycatch rates • Accuracy of catch estimates 	Stock assessments Empirical models Qualitative assessment
Changes in regional abundance of individual species stocks	Shifts in location of catch	Fishing concentration and likelihood of localized depletion Avoidance of certain bycatch species by harvesters	Qualitative assessment

The impact mechanisms identified in Table 4-79 are discussed below.

Change in the amount of target species catch: Trawl rationalization under the action alternatives is expected to result in an increased amount of target species catch. Existing management measures constrain the harvest of many types of target species to protect weak stocks under rebuilding plans. This greater utilization of healthy species could have impacts on individual stocks of groundfish as their mortality rates are increased. This potential impact was evaluated by applying several possible catch amounts to species stock assessment models. Each target species that could experience an increased catch amount was examined for the predicted biological responses in spawning stock biomass and the management thresholds governing the status of groundfish stock health.

Reduction in bycatch rates for overfished species: The existing framework of top-down management (which provides little incentive for harvesters to actively and voluntarily avoid rebuilding stocks) would be replaced by IFQs/co-ops under the action alternatives, which provide large incentives to avoid overfished stocks. One incentive to reduce the catch rate of overfished stocks is that harvesters can access some of the underutilized target stocks that are not being harvested to their potential. The catch control tools also would reduce bycatch in the form of regulatory discards, because catch is controlled directly through quotas. Since overfished species are marketable, they could be retained, reducing bycatch.

Improved monitoring: Under all the action alternatives, all the groundfish trawl sectors would be subject to 100 percent at-sea observer coverage or electronic monitoring (shore-based whiting catcher vessels and mothership catcher vessels are subject to full retention requirements, which may be monitored by video rather than direct human observation). For the nonwhiting sector, this represents an increase from current levels. Improved monitoring allows more accurate estimation of total catch, which can improve stock assessments, leading to better specification of harvest levels. It also makes it less likely that harvest limits will be exceeded because of inaccurate catch estimates and/or a lag between actual catch and post-hoc estimation of total catch.

Regional shifts in catch: Trawl rationalization is expected to result in geographic changes in harvest patterns, and consequently, the potential for localized depletion of some groundfish stocks. These changes could have an effect on stocks that are limited in range, do not range extensively to breed, or have little larval dispersion. To examine this impact, the model described in Section 4.2.1.3 and Appendix C illustrates the predicted geographic shifts in fishing patterns. This is combined with a qualitative discussion addressing possible impacts of geographic shifts in fishing activity and the implications of the area management provision.

The change in the condition of the groundfish, halibut, or other fish resource is not expected to differ substantially among the action alternatives, but is expected to differ comparing the action alternatives to status quo (Alternative 1). Therefore, the change in condition of the fish resource will be evaluated through a comparison of the condition under status quo management versus the condition under the action alternatives.

4.17.2 Direct and Indirect Effects of the Alternatives on Fish Stocks

4.17.2.1 Increase in the Amount of Target Species Catch

Groundfish stocks are expected to be primarily, but not substantially, affected by changes in the amount of target species that are harvested under the action alternatives. Currently, harvest of many target species is lower than the allowable harvest amount because the harvest limit of associated bycatch species constrains access to those target species. For example, many more tons of Dover sole could be caught in the current bottom trawl fishery, if the harvest of associated canary and darkblotched rockfish could be reduced or avoided. Under the action alternatives, catch of overfished species can be more directly limited through IFQs or allocations to co-ops for overfished species. These catch control tools are expected impose fewer indirect constraints on harvesting the potential yield of target species. Thus, trawl rationalization is expected to allow fishermen the time and incentive to avoid the take of constraining stocks such as canary and darkblotched rockfish, thereby allowing more time and opportunity to harvest larger amounts of target species.

It is difficult to predict the increased amount of target catch that could be realized under IFQ/co-op management, because it depends on the collective behavior of a sector. Therefore, in order to analyze the effects of action alternatives versus the status quo fishery (Alternative 1), three different levels of catch were examined against the status quo catch amounts.¹¹⁴ Under status quo (Alternative 1) target species catch is constrained by management measures (cumulative trip limits, RCAs) intended to limit the catch of overfished groundfish species. The catch scenarios representing impacts under the action alternatives are based on different assumptions about how effective harvesters will be in avoiding bycatch and, therefore, accessing higher levels of target species catch. Table 4-80 shows the total mortality under each of these catch scenarios. Information from current stock assessments was then used to estimate long-run biomass trajectories expressed as current spawning stock biomass (SB) as a fraction of unfished spawning stock biomass. For groundfish, 40 percent SB/Sunfishes is used as a proxy target reference point for management.

¹¹⁴ As described under Section 4.2 and Appendix C (Section C.2) and used in Section 4.6.2, describing possible changes in harvester profitability (which is partly determined by catch levels), empirical information is available from the Washington Arrowtooth EFP fishery that indicates the potential reduction in bycatch of constraining overfished species when harvesters are given incentives similar to those expected under the action alternatives.

Table 4-80. Predicted mortality scenarios expected in a rationalized fishery.

	Status Quo (Alternative 1)	Catch scenario 1 (low)		Catch scenario 2 (medium)		Catch scenario 3 (high)	
	Total mortality (mt)	Total mortality (mt)	Relative change	Total mortality (mt)	Relative change	Total mortality (mt)	Relative change
Sablefish	5,933.8	5,933.8	0.00%	5,933.8	0.00%	5,933.8	0.00%
Chilipepper	127.5	127.5	0.00%	2,000.0	1468.63%	2,000.0	1468.63%
Longspine	838.0	2,250.5	168.56%	2,250.5	168.56%	2,250.5	168.56%
Shortspine	904.0	1,841.3	103.69%	1,841.3	103.69%	1,841.3	103.69%
Dover sole	6,500.0	12,032.47	85.11%	12,032.5	85.11%	16,500.0	153.85%
Arrowtooth	2,913.3	4,942.9	69.67%	4,942.9	69.67%	4,942.9	69.67%
Petrале	2,440.0	2,440.0	0.00%	2,440.0	0.00%	2,440.0	0.00%
Other flatfish	1,562.0	3,170.0	102.94%	4,970.0	218.18%	4,970.0	218.18%
Yellowtail	618.0	618.0	0.00%	618.0	0.00%	1,000.0	61.81%
Slope rockfish	382.0	731.2	91.41%	1,200.0	214.14%	1,200.0	214.14%
Dogfish shark	450.0	450.0	0.00%	450.0	0.00%	450.0	0.00%
Pacific cod	400.0	723.4	80.85%	1,200.0	200.00%	1,200.0	200.00%
Lingcod	671.0	671.0	0.00%	815.0	21.46%	1,000.0	49.03%
Pacific whiting	242,950.0	242,950.0	0.00%	242,950.0	0.00%	242,950.0	0.00%

Catch of several stocks are not anticipated to change substantially from status quo levels, including sablefish, Petrale sole, dogfish shark, and Pacific whiting, were, therefore, not analyzed further. Some stocks with anticipated increased catch (other flatfish, slope rockfish, and Pacific cod) did not have a prior stock assessment; therefore, the catch predictions and the effect on stock biomass could not be analyzed. Lingcod and yellowtail rockfish stock assessment models could not effectively incorporate the mortality predictions, as provided, and could not be analyzed for the effects of the three catch scenarios. However, the OYs (ACLs) for lingcod and yellowtail rockfish were not exceeded in any of the catch scenarios. Four species managed under rebuilding plans—Pacific ocean perch, darkblotched rockfish, widow rockfish, and bocaccio—had anticipated catch increases under the catch scenarios, but no catch levels would exceed the mortality allowed in the respective rebuilding plans.

Under the action alternatives, the levels of mortality of several stocks—chilipepper rockfish, arrowtooth flounder, Dover sole, longspine thornyhead, shortspine thornyhead, yellowtail rockfish, and lingcod—are expected to increase. Therefore, the biomass of those stocks is anticipated to change. For those species, the three catch scenarios were applied to the stock assessment models to show how increased mortality levels may impact those spawning stock biomasses. None of the catch scenarios, when applied to the stock assessment model, resulted in a fishing mortality rate that reduces the spawning stock biomass below the proxy target reference point of 40 percent SB/SB_{unfished}.

For methodological reasons, the analysis simulates the various catch scenarios within the assessments as if the proposed action were implemented in 2008, although the expected implementation date is 2011. Nonetheless, the dates covered in the simulations are still representative of what would occur with changes in the mortality of the various species.

Figure 4-63 through Figure 4-67 show long-run biomass trajectories for the modeled stocks. Outputs are summarized below.

- Chilipepper rockfish: At the highest catch scenario, the stock biomass remains above the target of $SB_{40\%}$. None of the catch scenarios allows the fishing mortality rate to increase much beyond $F_{60\%}$, which is above the management threshold of $F_{40\%}$.¹¹⁵
- Longspine thornyhead: Even at the highest catch scenario, $SB/SB_{unfished}$ remains above 60 percent throughout the analysis period. As with chilipepper, the fishing mortality rate would not increase much above $F_{60\%}$, which is below the management threshold of $F_{40\%}$.
- Shortspine thornyhead: Under the catch scenarios, $SB/SB_{unfished}$ declines substantially compared to status quo (Alternative 1) to about 54 percent in 2030. However, the decrease is gradual over 20 years, and the fishing mortality rate remains below $F_{50\%}$. The trajectory does not differ among the three catch scenarios.
- Dover sole: Under the highest catch scenario, SB increases during the first five years of the simulation and then declines slowly to a ratio of about 60 percent at the end of the period, lower than under status quo. The fishing mortality rate remains below $F_{50\%}$.
- Arrowtooth flounder: Under the highest catch scenario, the ratio declines to about 50 percent over the analysis period, versus about 70 percent under status quo. Under all three catch scenarios, the fishing mortality rate is below $F_{50\%}$.

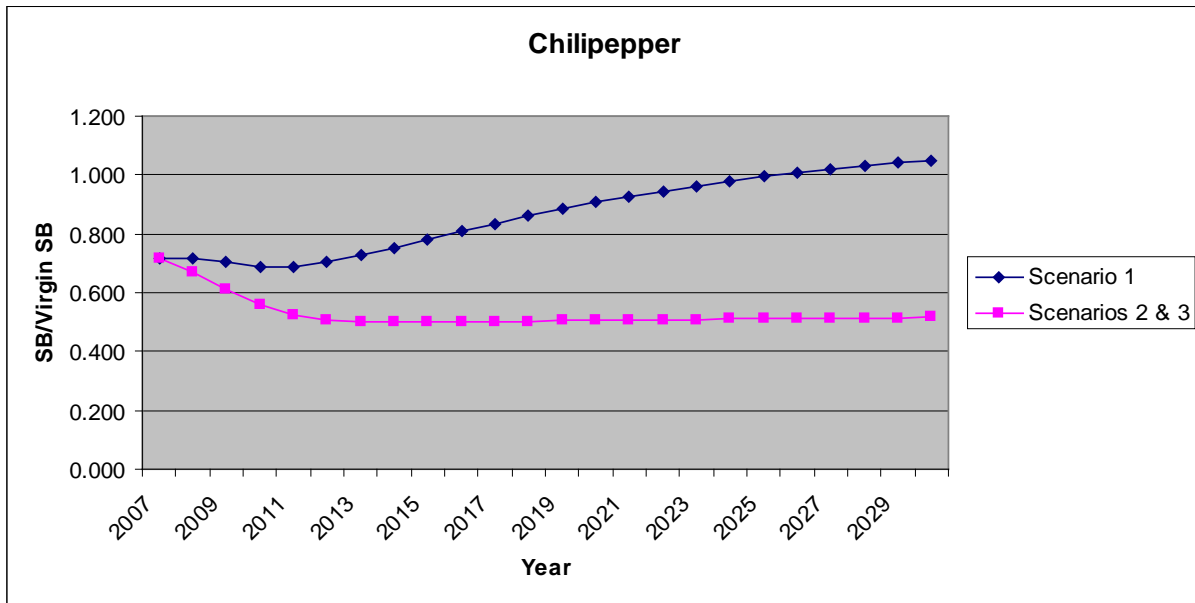


Figure 4-63. Percent of unfished spawning biomass predicted—chilipepper.

¹¹⁵ $F_{xx\%}$ expresses the fishing mortality rate expected to produce spawning biomass at xx percent of unfished biomass. Thus, $F_{40\%}$ is a higher rate than $F_{60\%}$.

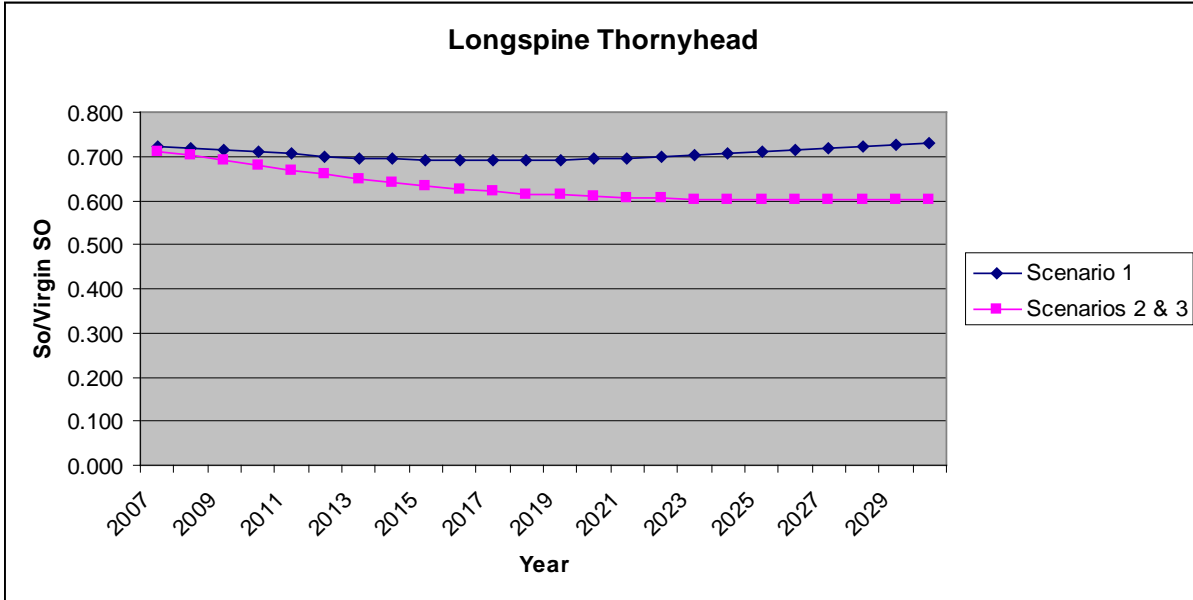


Figure 4-64. Percent of unfished spawning biomass predicted—longspine thornyhead.

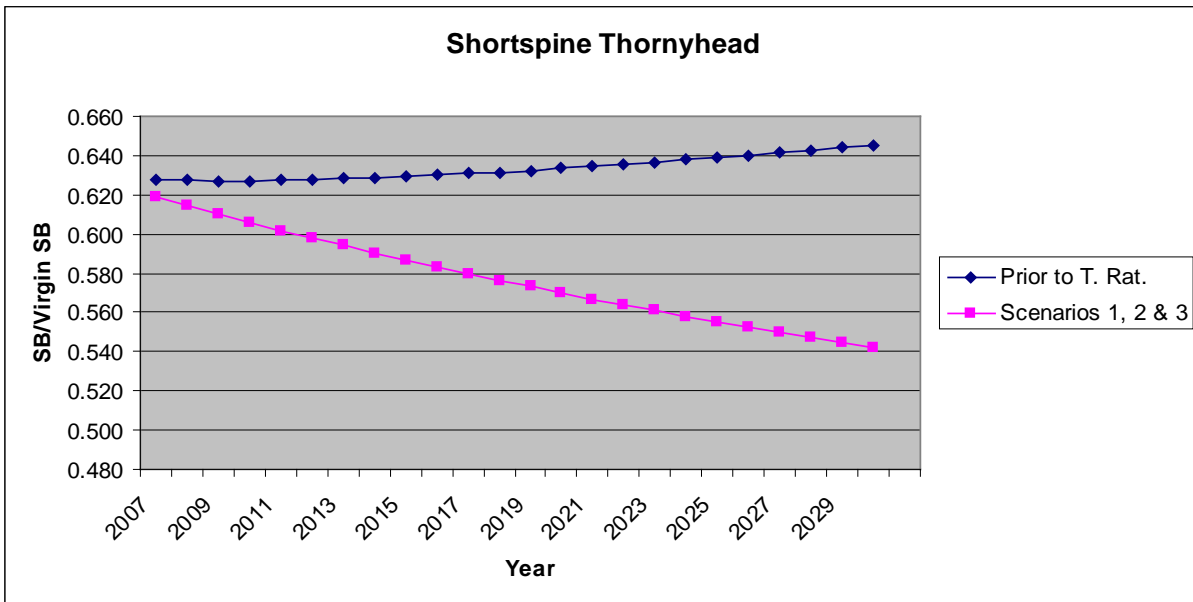


Figure 4-65. Percent of unfished spawning biomass predicted—shortspine thornyhead.

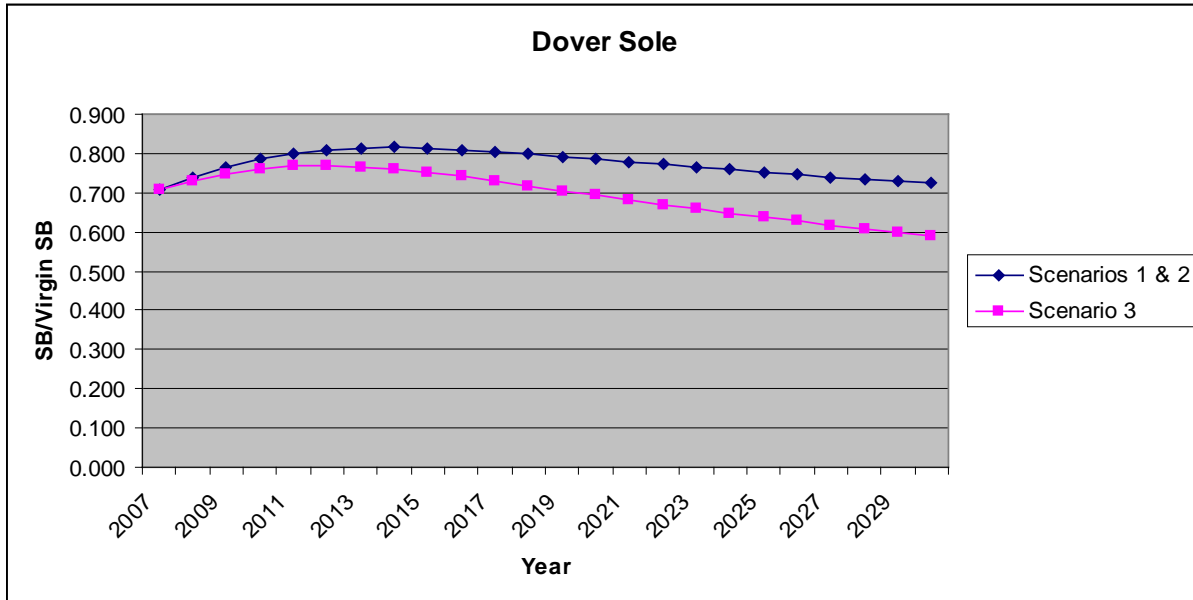


Figure 4-66. Percent of unfished spawning biomass predicted—Dover sole.

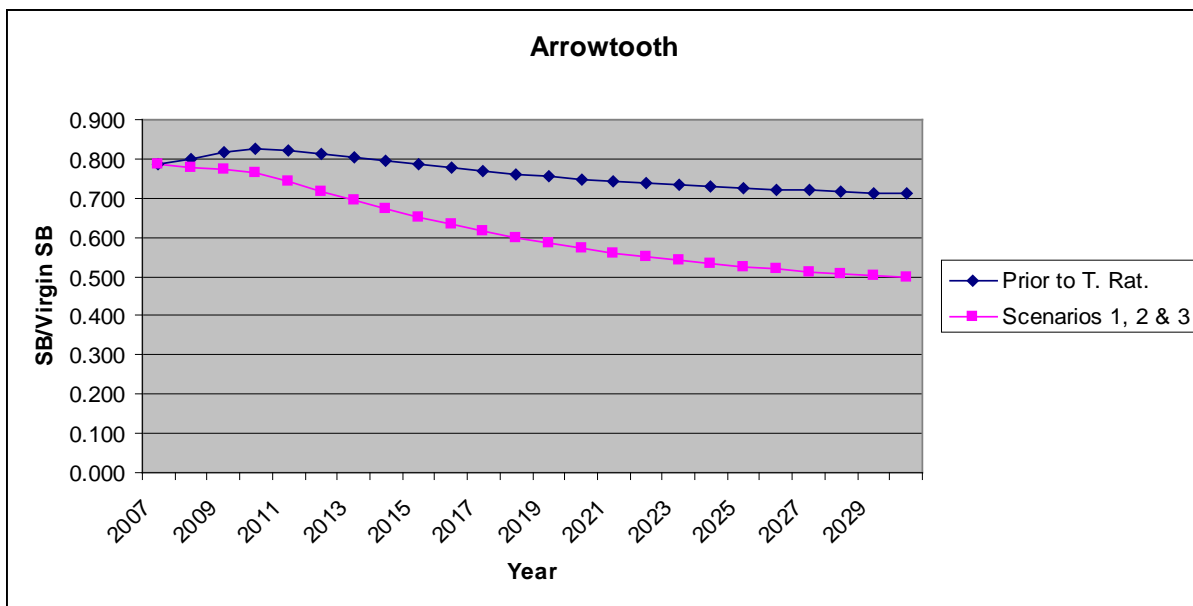


Figure 4-67. Percent of unfished spawning biomass predicted—Arrowtooth flounder.

4.17.2.2 Decrease in the Bycatch of Overfished Species

Under status quo (Alternative 1), catch of overfished species in the nonwhiting portion of the trawl fishery is indirectly managed, for example, by prohibiting retention or setting low trip limits for overfished species (to prevent targeting) and reducing cumulative trip limits for target species that co-occur with overfished species. Trip limits apply to landing amounts, not total catch. As a result, regulatory discarding of overfished species occurs as harvesters seek to achieve target species trip limits. Under this system, there is no individual incentive to reduce overfished species catch rates. Harvesters do not incur direct penalties for discarding overfished species, nor are they rewarded for

avoiding overfished species. Using the MSA definition, this management approach also increases bycatch because fish must be discarded for regulatory reasons (since they have market value they might otherwise be retained).

Under status quo, the observer coverage level in the nonwhiting fishery (about 20 percent) is intended to produce statistically accurate estimates of bycatch, although there is a time lag between data acquisition and its availability for management. Therefore, the fishery sector as a whole is indirectly accountable through any feedback from the management system (for example, inseason action to reduce trip limits or expand RCA boundaries), and that feedback may occur long after catch events have occurred due to the time lag between catch events and data availability to management.

Management of overfished species in the whiting fisheries is dealt with differently. Management in these fisheries imposes hard caps on the take of overfished species that are feasible due to the high level of monitoring in the fishery and the speed at which catch data are made available to management. However, the whiting fisheries are structured in a manner that encourages race for fish conditions, providing little opportunity for harvesters to adjust harvest timing in ways that may decrease bycatch. The exception is the catcher-processor fishery where a voluntary cooperative was formed, and participants operate as if they are in a rationalized fishery.

Under all the action alternatives, 100 percent observer coverage would be used in all sectors of the fishery (this coverage may come in the form of electronic video monitoring). Furthermore, the speed at which catch data would be available to management would be enhanced for the nonwhiting portion of the fishery. Such enhanced monitoring, the implementation of individual accountability, and incentives that eliminate race-for-fish conditions can be expected to reduce the bycatch rate (as is expected in the nonwhiting trawl fishery) and lead to reductions in the total amount of bycatch (as is the expectation in the whiting fisheries).

The reduction in the bycatch rate in the nonwhiting fishery is a direct result of imposing a form of reward through access to under-utilized target species, if harvesters can successfully avoid overfished stocks. It also comes in the form of a potential cost for encountering such species and needing to pay the cost of QPs to cover that catch event. The cost of this quota is likely to be expensive since these species restrict access to other, target species. The reduction in the amount of bycatch in the whiting fishery is a result of several motivations. One motivation is cost incentives that may come in the form of having to purchase quota (or catch history as may be the case in cooperative programs) if harvesters encounter these species, leading harvesters to change harvest activity in a way that reduces the potential for encountering overfished species, and thereby reducing the potential for incurring such costs. Expected reductions in overfished species bycatch amounts in the whiting fisheries also come from incentives to slow the pace of harvesting and/or a decrease in the need to fish as intensively over short periods. The incentives to slow the pace of harvesting come from research demonstrating that whiting become more valuable later in the year (Larkin and Sylvia, 1999), and also due to the incentives to reduce fishing capital to save costs, which means the fishery would have to occur over a longer period out of necessity. As demonstrated by a time-series analysis of bycatch in the whiting fishery, bycatch events and bycatch rates tend to decrease later in the year. Since more of the whiting fishery would occur later in the year, it is reasonable to expect that the amount of bycatch of overfished species would decline.

4.17.2.3 Changes in Nongroundfish Mortality

A variety of nongroundfish species are caught incidentally by the groundfish LE trawl fleet. The 2008 Groundfish SAFE document (PFMC 2008c) describes the various nongroundfish species caught by trawl gear and Section 3.17 summarizes observer data on catch by species. Arguably, the most

important incidentally caught species—because of the amount caught and its commercial importance—is Pacific halibut.

Pacific Halibut

As discussed in Section 4.8.2.2, Pacific halibut bycatch could increase as trawlers find more efficient ways to avoid overfished stocks and access target species, especially flatfish species that co-occur with halibut. However, a Pacific halibut IBQ is a feature of Alternatives 2a, 2b, 2c, and Alternative 4b (the preferred alternative); under these alternatives, this would cap the amount of Pacific halibut caught in the nonwhiting trawl fishery. This would work similarly to IFQ except that retention would be prohibited. Like the IFQ system, IBQ would impose individual accountability and allow for more precise monitoring of halibut bycatch. The accountability feature could motivate harvesters to reduce their halibut bycatch rates. Under these alternatives, IBQ would cover legal and sublegal size Pacific halibut bycatch mortality in the area north of 40°10' N. latitude and bycatch mortality would be estimated on an individual vessel basis. The actual amount allocated or credited to the groundfish trawl fishery to account for Pacific halibut bycatch was determined under the Amendment 21 intersector allocation process. This is further discussed under cumulative effects since it is an exogenous action. In general, a reduction in Pacific halibut bycatch in the trawl fishery is expected under Alternatives 2 and 4b, which include IBQ. As noted in Section 4.8.2.2, implementation of an IFQ program in the B.C. groundfish trawl fishery that included vessel limits on Pacific halibut bycatch was followed by a reduction in bycatch.

Other Fish

Previous environmental impact evaluations of groundfish biennial harvest specifications (PFMC 2004a) have indicated that the groundfish LE trawl fishery has a negligible impact on nongroundfish species because catches are small and are accounted for in the assessment of those stocks and the management of relevant nongroundfish target fisheries.

4.17.2.4 Improved Catch Monitoring

It is expected that there will be improvement in the fishery-dependent data used in many species stock assessments due to the increase in observer coverage, from status quo (20 to 30 percent observer coverage on bottom trawl vessels) to rationalized management (100 percent observer coverage or as close to 100 percent as is reasonable). More data would decrease one source of uncertainty in stock assessment models that arises from not fully accounted for catches. By decreasing uncertainty, decisionmakers can put greater confidence in stock assessment modeling, make more informed risk assessments, and formulate better management decisions. The mere presence of complete observer coverage may also influence vessel and crew behavior by discouraging high grading or unreported/unestimated discard, discouraging fishing in restricted areas, and encouraging avoidance of sensitive species and habitats.

Under Alternative 4b (the preferred alternative), several species infrequently encountered by trawl vessels will not be covered with IFQ/co-op shares, but total catch would still be accounted for through monitoring. The shoreside trawl sector encounters the nearshore stocks not managed with IFQ (longspine thornyhead south of 34°27' N. latitude, nearshore rockfish and others) relatively infrequently because they are restricted from fishing in state waters off California and Washington, and landings of nearshore species are subject to state regulations off Oregon and California. Furthermore, the ocean bottom structure south of 34°27' N. latitude is not conducive to trawling, limiting the catch of longspine thornyhead in that area. Shortbelly rockfish and spiny dogfish are frequently caught by trawl vessels; however, when the trawl mortality is viewed as a portion of the OY, that sector's catch is considered

relatively small. Catch of both shortbelly and spiny dogfish are limited in the trawl sector largely because of market conditions. Similarly, the whiting fishery catches a variety of other species, but in comparatively low amounts. Under Alternative 2, all fishery sectors would be managed with IFQ, and an initial allocation based on catch history would cover incidentally caught species. Whiting sectors would be managed with co-ops under Alternative 3 (all whiting sectors) and Alternative 4 (at-sea sectors) with co-op shares for whiting only (with bycatch limits for overfished widow, darkblotched, and canary rockfish). Other incidentally caught species, such as spiny dogfish, yellowtail rockfish, and slope rockfish, would be managed under status quo (alternative 1) with trip limits.¹¹⁶ As noted above, current full retention requirements (shoreside fishery, mothership catcher vessels) and full observer coverage (mothership vessels, catcher-processors) would continue under the action alternatives. Therefore, all catch would be fully monitored no matter what catch control tool is used.

4.17.2.5 Regional Shifts in Fishing Effort and Catch

The groundfish and halibut resource may be regionally affected by the action alternatives due to shifts in harvest location compared to status quo. Such shifts may be due to changes in the vessel homeport and processor delivery locations. Potential geographic shifts were explored through the comparative advantage analysis described in Appendix C (Section C.1) and used to evaluate impacts to communities (Section 4.14). That analysis concluded that the following areas would likely be less intensively trawled under the action alternatives compared to status quo (Alternative 1):

- Northern Washington shoreward of the RCA
- Northern and North/Central Oregon seaward of the RCA
- Central Oregon shoreward of the RCA
- Central California shoreward of the RCA

Broadly speaking, ports off northern California and Oregon appear to have the greatest advantage in a rationalized fishery, meaning that fishing effort will tend to become more concentrated in those areas. Harvesters may also alter their fishing strategy and gear in areas with higher abundance of overfished species. This implies that the mortality of stocks may be higher off these ocean/coastal areas compared to other areas. Quantitative prediction of the effects of differences in fishing mortality at a regional level is not possible since stock assessments are not spatially explicit at that fine a scale, and modeling of geographic shifts does not include estimates of the changes in fishing mortality at a regional scale.

The spatial concentration of fishing effort in certain locations has the potential for causing localized depletion. Localized depletion is usually assumed to have little impact on the health of a coastwide stock, depending on life history characteristics. Because stock assessments and management are on a large spatial scale (typically defined by stock distribution), localized depletion is neither accounted for, nor necessarily seen as a concern with respect to stock status (however, it may be a socioeconomic issue in terms of impacts to communities). The influence localized depletion has on stock health depends on stock structure, life history, and distribution. Additionally, at a coastwide scale, spatial differences in fishing mortality can lead to altered perceptions of stock status depending on the spatial scale at which a given stock is assessed. For example, sensitivity analysis of different stock boundaries for the shortspine thornyhead stock assessment in 2006 demonstrated that overall depletion and status was much less of a concern with a coastwide assessment relative to an assessment that only included the four INPFC areas north of Cape Mendocino.

¹¹⁶ A portion of the trawl sector allocation would have to be set aside for this expected catch in order to determine the amount of QPs available to the IFQ managed fishery.

In 2006 the Pacific Marine Conservation Council convened a “Cape to Cape Meeting,” composed of scientists, fishermen, and fisheries-policy experts, to explore the issue of spatial (area-based) management of west coast groundfish (Huhtala 2007). In a consensus statement, participants concluded that management of west coast fisheries would benefit by matching the spatial scales of interest for coastal communities with those scales naturally found within marine ecosystems. The evidence reviewed in that statement suggests that while nearshore ecosystems exhibit marked regional differences in their species composition, dynamics and productivity, and specialization of associated fisheries, offshore ecosystems (particularly the slope ecosystem and slope species) tend to have more population connectivity and more homogenous distribution and life history characteristics. Yet even at a coastwide scale, spatial differences in fishing mortality can lead to altered perceptions of stock status depending on the spatial scale at which a given stock is assessed. As noted above as an example, the 2006 shortspine thornyhead stock assessment demonstrated that a coastwide view resulted in a more optimistic outlook compared to a more localized view.

Alternative 3 contains an area management provision where QSs/QPs would be denominated north and south of 40°10' N. latitude, and catch in those areas would have to be covered by correspondingly denominated QPs. Although this provision is intended to limit geographic fleet consolidation (given the comparative advantage of northern ports), this measure could have implications in terms of localized depletion. Since QP represents a fraction of the catch rather than a quantity, the distribution of shares among permit holders would have no direct or indirect effect on harvest levels (put another way, the QSs denominated for a given area would add up to 100 percent). The potential for localized depletion would depend on the allocation of yield between the two areas. Since this is externally determined (through an allocation process and/or harvest specifications), this will be discussed further under cumulative effects.

Like most target species, the Pacific halibut TAC is set for the coastwide area 2A region by the IPHC, and the potential for localized depletion at smaller scales is not considered a stock status issue. As discussed above, Alternatives 2 and 4b include the use of halibut IBQ for nonwhiting fisheries north of 40°10' N. latitude (halibut bycatch is very minor in whiting fisheries). The region south of 40°10' N. latitude represents the southern extent of the stock's distribution, and Pacific halibut is not abundant in the area. For that reason, trawl bycatch mortality in this area is accounted for through deduction from the TAC for target fisheries as under status quo. Under Alternatives 2 and 4b, IBQ bycatch would be capped substantially lower than current levels, suggesting a reduced potential for localized depletion.

4.17.3 Cumulative Effects on Fish Resources

Past, present and RFFAs that apply to the fish resource are as follows:

- Current overfished status of seven groundfish species and resulting rebuilding plans
- Bycatch reduction and monitoring efforts
- Biennial specification of harvest levels for groundfish stocks, including target and overfished species and related management measures such as RCAs
- Allocation of harvest opportunity to the trawl sector under Amendment 21
- New retention and monitoring requirements for the shoreside vessels targeting whiting fishery (potentially as part of a single shoreside sector) will be implemented through Amendment 15
- Catch monitoring and harvest specifications for nongroundfish stocks, particularly Pacific halibut;
- Designation of EFH and related closed areas to mitigate the impacts of fishing
- Other marine protected areas

Trends that apply to the fish resource now and into the future include changes in the use of ocean areas, increased demand for protein, increased consumer awareness, continued rebuilding of overfished species, cyclical and continuing climate change, and ocean acidification.

For target species, the principal exogenous action is the biennial specification of harvest levels (OYs/ACLs). Major target stocks are regularly assessed. Most incidentally caught species remain unassessed, but management policies are precautionary; for example, the OY is set as a reduction from historical catch levels. The groundfish harvest policy framework is currently being revised to address changes to National Standard 1 guidelines, and new mechanisms to account for scientific uncertainty and adjust harvest limits accordingly may be adopted. Biennial harvest specifications would continue with implementation of the proposed action. Under status quo (Alternative 1), harvest limits for target species have been reduced because potential catch was constrained by management measures to limit overfished species bycatch. The catch control tools under the action alternatives allow catch at the species/stock/management unit level to be directly limited. As a result, harvest limits (QPs) could be set at levels potentially resulting in higher catches of healthy and currently underutilized species relative to status quo. In any case, however, the harvest policy framework has the primary objective of preventing overfishing and, as necessary, returning stock biomass to target levels. Under all the action alternatives, this objective would continue.

Overfished species are managed under rebuilding plans that provide a framework for returning stock biomass to the target level according to the constraints identified in §304(e) of the MSA, which may be paraphrased as rebuilding in a period that is as short as possible, taking into account the needs of fishing communities and the interaction of the overfished stock with the marine ecosystem. The policy framework and current rebuilding strategies—rebuilding in a timeframe consistent with §304(e)—would continue to drive harvest specifications. These rebuilding strategies, combined with periodic stock assessments and related rebuilding analyses, are used to set harvest limits (OYs/ACLs) in the biennial process. Catch control tools under the action alternatives are expected to provide incentives for avoiding overfished species catch (individual accountability, QS/QP cost). Because there is likely some minimum technically feasible bycatch rate, however, it is expected that harvest limits (sector allocations) will, for the most part, be fully utilized for these species. However, rebuilding strategies are predicated on the assumption that fishing mortality always corresponds to catch at the OY/ACL level. Improved monitoring will provide greater assurance that these harvest limits are not exceeded.

The trawl fishery under rationalized management will also continue to be constrained by rebuilding species, but, depending on individual behavior of harvesters, constraints on the fishery could be alleviated, resulting in greater access to underutilized stocks and a reduction in the encounter rate of rebuilding stocks. This behavior comes from incentives created through rationalization that would place pressure on harvesters to be accountable for and to minimize bycatch, as well as fully capturing the OYs of target species. When combined with the expected increase in public awareness and scrutiny of the fishing industry, the incentive to reduce bycatch may be even greater.

Changing ocean uses, such as adding alternative energy arrays, may tend to create de facto MPAs where fish harvesting is restricted or banned. Changing uses, combined with the present protected/conservation areas, will create more localized protection for the fish resources in that particular area, but may do little to alter the catch of groundfish species in the aggregate. However, to the extent that there are sub-populations, or populations of groundfish species that tend to reside outside the closed areas, such reduced fishing grounds will tend to put greater pressure on populations that lie outside of no-trawl areas.

The effect of climate change may be to alter where fish tend to occur, and it would logically follow that harvesters will move to where those fish relocate. When combined with the modifications expected to

occur from changes in the uses of ocean areas, changes in where trawling occurs may result. It is not clear what impacts this will have other than those noted previously.

Overall, the groundfish resource under rationalized fishery management is anticipated to be harvested closer to the OY/ACL for many of the species than it would be under status quo. That effect is expected to reduce the biomass levels of several groundfish species, though, according to available stock assessment models, not to levels that are below SB_{40%} (the proxy reflecting target biomass levels for groundfish). When these increased harvest levels are combined with climate change, anticipated regional shifts in catch, and closed areas, the resulting effect of rationalization on these resources in general is mixed. However, as indicated in the section below (California Current Ecosystem) the effect of climate change combined with the potentially increased harvest levels of some groundfish species may mean adverse impacts to some groundfish species. This is a twofold impact where climate change may reduce the availability of key prey species for some groundfish, while the trawl fishery subsequently increases the catch of those groundfish species that have experienced a reduction in prey availability. The result appears to be a decline in stock status for some species that is more dramatic than predicted from single species stock assessment models. To the extent that future harvest specifications setting considers this potential dynamic, the decline in stock status for these species may be avoided.

Finally, the increased catch accounting and bycatch accountability associated with the rationalization program would tend to reduce uncertainty in catch estimates, thereby improving information within stock assessments. This has a twofold impact in that the relative certainty management has in regard to meeting management targets is improved, and information in stock assessments is also improved, leading to more accurate estimates of stock status. Presumably, better information would allow for more accurate management of the groundfish resource and more accurate measurement of the resource status, making the resource better off in general.

4.17.4 Summary of the Impacts of the Alternatives on Fish Resources

The action alternatives are expected to affect fish resources differently compared to the no action alternative (Alternative 1), but the action alternatives are expected to be generally similar in terms of the types and intensity of impacts. Features of the alternatives expected to affect fish resources are measures that result in fleet consolidation, and any resulting secondary effect on the spatial distribution of effort, the inclusion of IBQ, which could result in reduced Pacific halibut bycatch, improved catch monitoring, and potential reduction in overfished species bycatch.

Catch of target species under the action alternatives is expected increase in comparison to Alternative 1 (no action). Modeled biomass trajectories indicate that spawning biomass and fishing mortality reference points would not be exceeded, so in this respect stock status would be unaffected. Harvest limits (OYs/ACLs) are set externally through the biennial harvest specifications process and ultimately determine total removals and effect on stock status. Improved catch monitoring under the action alternatives could, however, result in more accurate stock assessments.

The action alternatives are expected to result in a reduction of overfished species bycatch because of individual accountability. Improved monitoring is likely to contribute to this bycatch reduction. To the degree that actual total fishing mortality is reduced in comparison to the no action alternative (Alternative 1), these measures could lead to faster rebuilding of stocks. Any actual reduction in fishing mortality, beyond the amounts represented by the OY/ACL would be occur if there is some amount of unaccounted for bycatch under status quo or if total catch of these species was reduced. Such a reduction could result from lowering the OY/ACL compared to what it would be if set under status quo,

because harvesters demonstrate successful bycatch avoidance. Such a reduction would be an external policy decision (setting the ACL under the harvest specifications process) rather than a direct effect of the proposed action.

Spatial concentration of fishing effort could result in localized depletion. Generally, this is not an issue in terms of stock status, but may have socioeconomic effects at the community level. Alternative 3 creates separate Qs/QPs north and south of 40°10' N. latitude; although proposed to mitigate socioeconomic impacts of consolidation, it could also affect localized depletion.

Alternatives 2 and 4b (the preferred alternative) include IBQ for Pacific halibut. Compared to the other alternatives, including the no action alternative (Alternative 1), this could result in a substantial reduction in the bycatch of this commercial important species. The actual allocation for IBQ is set externally as part of the Amendment 21 intersector allocation action.

4.18 ESA-listed Salmon

4.18.1 Methods for Assessing Impacts

Table 4-81 shows the impacts, mechanisms, and indicators used to evaluate impacts to ESA-listed salmon. A qualitative assessment of changes in bycatch and bycatch monitoring is presented, because quantitative models to predict changes in salmon bycatch in the groundfish trawl fishery are not available.

Table 4-81. Overview of analytical approach used to compare baseline and future conditions of ESA-listed Chinook salmon under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes stock abundance	<ul style="list-style-type: none"> Increase/decrease in Chinook salmon incidental take Improved bycatch monitoring 	<ul style="list-style-type: none"> Bycatch rates Accuracy of catch estimates 	Qualitative assessment

4.18.2 Direct and Indirect Effects of the Alternatives on ESA-listed Salmon

The 2009-10 groundfish harvest specifications EIS (PFMC 2008b) evaluates bycatch of salmon under status quo management (Alternative 1). That analysis used information from a 2006 biological opinion (NMFS 2006b) prepared pursuant to reinitiation of consultation under ESA section 7, because an existing standard triggering reinitiation, 11,000 Chinook salmon caught in a given year by the whiting fisheries, was exceeded in 2005. These documents are incorporated by reference. A summary is provided in Section 3.18.

Management measures have been implemented in the whiting sectors to reduce bycatch of ESA-listed Chinook salmon. Season start dates are set to avoid higher bycatch rates occurring earlier in the year. As discussed in Section 3.6.1.1, in 2005, NMFS implemented a Salmon Conservation Zone prohibiting whiting vessels from fishing shoreward of a line approximating the 100-fathom isobath. Beginning in 2007, this was authorized as an inseason management measure for greater flexibility to respond to salmon bycatch conditions, which are highly variable from year to year. These management measures would continue under all of the action alternatives. In terms of impact of the nontribal whiting sectors, using 1998-to-2007 observer data, the mothership sector had the highest salmon bycatch rate (0.0465 Chinook salmon/mt), but the shore-based sector had the highest overall catch, accounting for

31 percent of the total catch from all sectors (including tribal harvesters, who are not subject to the proposed action). The action alternatives do not include any new measures to address Chinook salmon bycatch in the whiting fishery. Under the catch control tools proposed in the action alternatives, IFQs or co-ops, there may be changes in the spatiotemporal pattern of the whiting fishery. Under status quo (Alternative 1), the mothership and shore-based sectors operate under Olympic fishery conditions, where a premium is placed on harvesting fish quickly to maximize each individual's share of the sector's whiting quota allocation. However, the correlation between a potentially slower-paced and longer-lasting whiting fishery and salmon bycatch rates is unknown, especially since the action alternatives do not include any new incentives to avoid Chinook salmon bycatch (since this is not within the scope of the proposed action). Given that bycatch rates vary highly from year to year for reasons that are probably not controlled by the operational characteristics of the fishery (e.g., salmon abundance, overlap in the spatiotemporal distribution of salmon and whiting), there is no reason to suppose that Chinook salmon bycatch under the action alternatives would differ from that under status quo.

Analysis of 2002-to-2006 observer data presented in the 2006 biological opinion showed that salmon bycatch in the nonwhiting trawl fishery is a relatively rare event with a few tows accounting for a disproportionate share of the estimates of catch.¹¹⁷ Thus, in terms of salmon bycatch, the distribution of effects is highly skewed. In terms of reporting strata, bycatch rates are generally greater in depths less than 250 fathoms and between Cape Falcon (northern Oregon) and Cape Mendocino (northern California). The stratum with the highest bycatch rate in the 2002-to-2006 period was Cape Falcon to Cape Blanco (central Oregon coast) at less than 125 fathoms. As discussed elsewhere (Section 4.14, Section 4.17.2.5), fleet consolidation resulting from implementation of IFQs for the nonwhiting fishery (proposed in all action alternatives) and the comparative advantage of different coastal regions could lead to changes in the distribution of fishing effort compared to status quo. Central Oregon shoreward of the RCA is one area identified as likely to be trawled less intensively (see Appendix C, page C-17). If such a change in the distribution of nonwhiting trawl fishing effort bears out, it could result in reduced bycatch of Chinook salmon.

As with the whiting fishery, the action alternatives do not contain any new measures intended to mitigate Chinook salmon bycatch in nonwhiting fishery. Thus, except for the effect of potential changes in the distribution of fishing effort, discussed above, there is no reason to expect that bycatch would change (increase or decrease) under the action alternatives.

All the action alternatives contain a provision that would allow gear switching (use of any legal groundfish gear) by vessels managed with IFQs (either a single shoreside sector under Alternatives 2 and 4, or the nonwhiting sector under Alternative 3). The 2006 biological opinion concluded that salmon bycatch in fixed gear fisheries is negligible. Therefore, gear switching by trawl permitted vessels is not likely to increase salmon bycatch, and could decrease it.

Impacts to ESA-listed species may be more directly addressed under ESA mandates. As already noted, past consultations have established a Chinook salmon catch threshold for reinitiation. This standard applies only to whiting fisheries, in part because those sectors are subject to full observer coverage so total Chinook salmon bycatch can be accurately determined. As noted elsewhere, under all the action alternatives, all trawl sectors, including nonwhiting bottom trawl, would be subject to 100 percent at-sea observer coverage, allowing accurate and timely determination of Chinook salmon bycatch as occurs in the whiting sectors under status quo (Alternative 1). If Chinook salmon catch were to increase, section 7 consultation could be reinitiated. Under the consultation process, NMFS Protected Resources

¹¹⁷ A subsequent analysis of WCGOP data (Heery, *et al.* 2009) reports salmon bycatch rates in 2007. Although the magnitude of bycatch is lower in 2007 compared to earlier years, the spatiotemporal distribution is broadly similar.

Division (as the consulting agency) can propose discretionary and nondiscretionary measures to address such circumstances.

4.18.3 Cumulative Effects on ESA-list Salmon

The 2009-10 groundfish harvest specifications EIS (PFMC 2008b) describes exogenous ongoing and future actions and trends affecting Chinook salmon. That information is incorporated by reference and summarized below.

Groundfish biennial harvest specifications: This process sets overall harvest levels for groundfish fisheries and allocations to particular sectors. The setting of OYs (ACLs) indirectly affects the amount of fishing effort that will occur. Combined with the bycatch rate, this can affect the resulting catch of Chinook salmon.

Nongroundfish fisheries: Salmon are subject to target fisheries and caught incidentally in other nongroundfish fisheries. Target fisheries are managed to avoid take of ESA-listed salmon stocks, but a certain level of take is unavoidable when accessing nonlisted stocks.

Nonfishing actions: Salmon are vulnerable to a wide variety of actions and trends not related to fishing. Because salmon are anadromous, degradation of freshwater habitat from a wide variety of sources is an important contributor to stock decline. Cyclical changes in ocean conditions (broadly due to climate forcing) have been demonstrated to influence stock productivity substantially during juvenile and adult phases of the life cycle.

These exogenous factors would impact Chinook salmon to the same degree across all the alternatives.

4.18.4 Summary of the Impact of the Alternatives on ESA-listed Salmon

There are no features of the action alternatives that directly affect Chinook salmon take, so there is little basis for distinguishing between the action alternatives in terms of impacts. Fleet consolidation could result in redistribution of fishing effort. As discussed above, an analysis of factors motivating redistribution of fishing effort suggests that it may decline in nearshore areas of the central Oregon coast where observer data indicate salmon bycatch rates are higher. Greater consolidation may occur under Alternative 2 while, among the other action alternatives, Alternative 3 may result in the least consolidation (Alternative 1, no action, would have the least consolidation). Alternative 4 may result in intermediate levels of consolidation. Gear switching is a provision of all the action alternatives for IFQ managed fisheries. According to the 2006 biological opinion (NMFS 2006b), this gear type has a negligible bycatch rate for salmon. Any gear switching may, therefore, contribute marginally to a reduction in Chinook salmon bycatch. With these features of the alternatives in mind, but considering exogenous factors contributing to cumulative impacts, it is not possible to determine whether impacts to ESA-listed salmon would differ under any of the action alternatives (Alternatives 2 to 4) compared to no action (Alternative 1).

4.19 Other Protected Species (Marine Mammals and Seabirds)

Section 3.19 describes other species protected under the ESA and the MMPA that occur in the action area. Six marine mammal species are known to have interacted with groundfish trawl gear: California sea lion, harbor seal, harbor porpoise, Pacific white-sided dolphin, northern elephant seal, and Stellar sea lion (unidentified sea lions are also recorded, which could be either California or Stellar). Various seabird species have been observed taken in the groundfish trawl fishery; none is ESA-listed.

4.19.1 Methods for Assessing Impacts

Table 4-82 shows the impacts, mechanisms, and indicators used to evaluate impacts to other protected species. A qualitative assessment of changes in bycatch and bycatch monitoring is presented, because quantitative models to predict changes in protected species bycatch in the groundfish trawl fishery are not available.

Table 4-82. Overview of analytical approach used to compare baseline and future conditions of marine mammals and seabirds under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes stock abundance	<ul style="list-style-type: none"> • Increase/decrease in protected species incidental take • Improved bycatch monitoring 	<ul style="list-style-type: none"> • Bycatch rates • Accuracy of catch estimates 	Qualitative assessment

4.19.2 Direct and Indirect Effects of the Alternatives on Marine Mammals and Seabirds

As with ESA-listed salmon discussed in the previous section, the principal impact to marine mammals under the alternatives would be due to take mortality from interaction with trawl gear. Take is a function of the abundance and distribution of the animal and characteristics of the fishing gear and fishery operations, which contribute to overall vulnerability to take in the fishery. Changes in the level and distribution of fishing effort under the action alternatives can be only be assessed qualitatively, and information on the distribution of affected marine mammal species pertains to broad regions and habitat types. Therefore, it is difficult to forecast whether the action alternatives would affect protected species differently than they are affected under status quo. Information on incidental takes under status quo can be presented, and certain features of the action alternatives, which may affect bycatch rates, can be discussed.

Table 4-83 reproduces indicators of marine mammal stock status from 2009 SARs (Allen and Angliss 2009; Carretta, *et al.* 2009). Except for the Eastern U.S. Stellar sea lion stock, which is reported in the Alaska SAR, the stocks are reported in the Pacific SAR. One stock is classified as strategic, the Eastern U.S. Stellar sea lion stock. Table 4-84 and Table 4-85 report marine mammal bycatch (incidental take) estimates from the At-sea Hake Observer Program and WCGOP for the 2002-to-2006 and 2002-to-2005 periods, respectively (NMFS SHOP & WCGOP 2008). Taking the point estimates from the tables below and averaging them over the time period suggests that the whiting fishery takes 0.98 California sea lions, 1.86 Steller sea lions, 0.86 northern elephant seals, and 0.5 harbor seals on average per year. A similar calculation can be made for the nonwhiting fishery. This indicates an average of 58.47 California sea lions, 3.36 Steller sea lions, 0.62 harbor porpoise, and 1.5 white-sided dolphins taken annually by this fishery sector.¹¹⁸ Compared to the overall estimate of fisheries injury/mortality for the stocks, the values suggest the groundfish trawl fisheries are a modest contributor to impacts to these stocks.

¹¹⁸ Since the report includes unidentified sea lion take, that take is distributed proportionately between the two species to arrive at the estimate.

Table 4-83. Stock indicators reported in 2009 Stock Assessment Reports.

Stock	N Estimate	N min	PBR	Fisheries Injury/Mortality	Strategic ?	SAR Last Revised
California Sea Lion (U.S.)	238,000	141,842	8,511	≥159	N	2007
Stellar Sea Lion (E. U.S.)	45,095-55,832	44,404	1,998	1.4	Y	2009
Northern Elephant Seal (CA breeding)	124,000	74,913	4,382	≥8.8	N	2007
Harbor Seal (CA)	34,233	31,600	1,896	389	N	2005
Harbor Seal (OR/WA)	24,732	22,380	1,343	≥13	N	2007
Harbor Porpoise (N. OR/S. CA)	39,581	28,833	114	≥0.8	N	2009
Harbor Porpoise (N. OR/WA coast)	15,674	11,383	114	≥0.8	N	2009
Pacific White-sided Dolphin (CA/OR/WA)	20,719	17,201	155	1.4	N	2008

Table 4-84. Bycatch estimates of marine mammals in the whiting fishery.

	2002	2003	2004	2005	2006
California Sea Lion	0	0	2.1 (1.5-3.0)	0	2.5 (1.4-4.6)
Stellar Sea Lion	1.2 (0.6-2.3)	1.1 (0.7-1.8)	0	2.4 (1.4-4.3)	3.6 (2.3-5.7)
Northern Elephant Seal	0	0	3.4 (2.3-4.9)	0	0
Harbor Seal	0	0	0	1.2 (0.6-2.7)	1.3 (0.6-2.9)

Table 4-85. Bycatch estimates of marine mammals in the nonwhiting fishery.

	2002	2003	2004	2005
California Sea Lion	34.8 (17.9-67.5)	163.1 (103.0-258.4)	10.0 (4.6-21.4)	19.7 (9.7-39.9)
Stellar Sea Lion	11.5 (4.4-30.3)	0	0	0
Unidentified Sea Lion	7.8 (2.1-28.8)	0	0	0
Harbor Porpoise	0	0	3.1 (0.9-10.0)	0
Pacific White-sided Dolphin	0	7.5 (2.0-27.4)	0	0

The SHOP/WCGOP report also presents information on seabird take. In the whiting fishery, the following species were observed, and bycatch estimates were made: black-footed albatross (2-3/year, 2003 to 2006), common murre (<2/year), northern fulmar (~6/year), and sooty shearwater (<1/year). In addition, unidentified auklets or murrelets and other unidentified seabirds were taken in low numbers (<2/year). In the nonwhiting fishery Brandts cormorants, common murrens, Leachs storm petrels, and northern fulmars were observed taken, 2002 to 2006. In addition unidentified cormorants, gulls and storm petrels were observed taken. The total number of seabirds estimated taken during the period was 575, 50 percent of which were common murrens. However, the bycatch estimate was driven by one observation of 33 murrens taken in a single tow in 2003.

As noted previously, there is no information to indicate definitively how changes in management would affect marine mammal and seabird take. In the absence of information, it may be assumed that the level of take reported above for status quo management of fisheries would continue under any of the action alternatives. However, several factors could alter the level of take. Although it is difficult to predict what the effect would be, the following changes could occur under the action alternatives.

Fleet consolidation could lead to an increase in target species CPUE. As a result, the amount of overall fishing effort could decline, remain stable, or increase, and the number of vessels is expected to decline. Effort would decline if overall catch remains constant relative to status quo; however, harvesters may be able to access greater amounts of target species yield, resulting in stable or increasing levels of effort. A combination of fewer vessels expending the same or diminished level of fishing effort could result in fewer interactions with protected species.

Individual accountability (control of Qs or co-op shares) is expected to reduce Olympic or race-for-fish conditions in the fishery. This would give harvesters the opportunity to make more efforts to avoid protected species bycatch, if technically or operationally feasible. However, the program does not include individual incentives for protected species bycatch reduction, so it would be matter of individual harvesters' recognizance.

As discussed above (Sections 4.18 and 4.14), consolidation could also lead to changes in the distribution of fishing effort. This could affect the bycatch of protected species. Looking at the observer data referenced above, the Monterey INPFC area (Cape Mendocino to Point Sur) showed the highest number of marine mammal takes (11 out of 17). This is also the area with the highest number of observed seabird takes. Central California shoreward of the RCA is an area where trawl fishing may decline according to the comparative advantage analysis (Appendix C, Section C.1). To the degree that trawl fishing declines in this area, this may reduce incidental takes of marine mammals, given that the species observed taken are more likely to occur closer to the coast (i.e., shoreward of the RCA).

The program feature with the greatest implications for protected species bycatch is the gear switching provision. This principally applies to vessels managed with IFQ that have sufficient Qs for species that can be efficiently targeted with fixed gear (e.g., sablefish, Pacific cod). They can harvest species against their Qs/QPs using any legal groundfish gear, and fixed gear (pot, bottom longline) would be the most likely choice. The SHOP/WCGOP report (NMFS SHOP & WCGOP 2008) also includes estimates of marine mammal and seabird bycatch in the LE fixed gear fishery. The only marine mammal observed taken, 2002 to 2005, was the California sea lion. Black footed albatross, western gulls, brown pelican, unidentified cormorants and unidentified birds were observed, and bycatch estimates were derived. As noted in Section 3.19, the brown pelican is listed as endangered under the ESA.

For 2009, the sablefish pot fishery was uplisted from a Category III fishery to a Category II fishery under the MMPA, because of interactions with the endangered humpback whale (2009 List of Fisheries, 73 FR 73032; December 1, 2008). Humpback whale interactions with pot and trap gear fisheries off the west coast (including the commercial sablefish pot gear fisheries) were documented in data available from the NMFS Large Whale Disentanglement Network. Based on analysis of these data, NMFS estimated that three humpback whales were seriously injured or killed between 2002 and 2006 due to entanglements with pot or trap gear, one of which was with sablefish pot gear in September 2006. A single serious injury or mortality of a humpback whale results in a level of take of 0.2 animals per year, or 8 percent of the PBR. In addition to data from the Large Whale Disentanglement Network, NMFS also considered other factors prior to its listing of the pot or trap gear fisheries as Category II, including the type of gear being used, stranding records, and the distribution of marine mammals in the area of the fishery. Gear switching by trawl vessels under the action alternatives could increase the risk of such takes (and other marine mammals as discussed above), especially since analysis elsewhere in this chapter suggests that gear switching is more likely to occur among trawl vessels operating in the Central California region.

4.19.3 Cumulative Effects on Other Protected Species (Marine Mammals and Seabirds)

Both marine mammals and seabirds are subject to various sources of human-induced and natural mortality, and other factors affecting population viability. These are catalogued in the SARs (Allen and Angliss 2009; Carretta, *et al.* 2009) and incorporated by reference. Exogenous factors include the following:

- Take of marine mammals and seabirds in other fisheries (fishery mortality/injury estimates in the SARs capture all these sources)
- Nonfishing sources of direct mortality (e.g., ship strikes, oil spills), also discussed in the SARs
- Degradation of nesting habitat for seabirds and disturbance of haul out areas for marine mammals
- Climate forcing affecting food chain dynamics, producing more or less prey (further discussed in Section 4.20)

These exogenous factors have an equal effect under all of the alternatives; therefore, while they would increase the overall magnitude of impacts under each alternative they do not change the relative impact when comparing the alternatives.

4.19.4 Summary of the Impact of the Alternatives on Other Protected Species (Marine Mammals and Seabirds)

Three factors were identified that could affect incidental take of marine mammals: fleet consolidation affecting the distribution of fishing effort, reduction in Olympic (race-for-fish) fishery conditions leading to greater ability to avoid takes, and trawl vessels managed under IFQs switching to fixed gear, which may have different impacts on these protected species compared to trawl gear. Alternative 2 would likely lead to the greatest level of consolidation, while Alternatives 1 (no action) and 3 would result in the least consolidation, and Alternative 4 would result in an intermediate level (see discussion in previous sections for rationale for this conclusion). Consolidation could lead to fishing areas where observed take of marine mammals and seabirds is relatively higher (i.e., Central California shoreward of the RCA). In Alternative 1 (no action), Olympic fishery conditions are more pervasive in the whiting fishery, since it is under season/quota management compared to trip limit management for the nonwhiting sector. All the action alternatives implement catch control tools for the whiting sectors (either IFQs or co-ops) that would reduce Olympic conditions in the whiting sectors. However, the action alternatives do not contain any individual incentives for harvesters to avoid protected species take, so any such change in fishery conditions may not have any effects compared to no action. Finally, the gear switching provision, which is part of all the action alternatives for IFQ managed fisheries, could increase the risk of takes of some protected species over the no action alternative (Alternative 1). In particular, it was noted that the current sablefish pot fishery has been recategorized as a Category II fishery under the MMPA because of interactions with humpback whales. A Category II fishery is one where annual mortality and serious injury of a stock in a given fishery is greater than 1 percent and less than 50 percent of the PBR level.

4.20 Habitat and Ecosystem

A description of the California Current large marine ecosystem can be found in Section 3.20. Below is a brief description of the California Current ecosystem model used to further the understanding of complex interactions off the west coast.

The California Current ecosystem model, dubbed “Atlantis,” was constructed by the Northwest Fishery Science Center scientists and included dynamics of species and functional groups of ecologically similar species, predator/prey interactions, oceanographic/climatic features (daily hydrodynamic flows, salinity, temperature), and fishery removals (Brand, *et al.* 2007). Examples of functional groups include habitat-forming species (kelp, corals, and sponges), benthic invertebrates, zooplankton, phytoplankton, and vertebrates. The California Current model extends from the U.S./Canada border to Point Conception, California, and out to the 1,200-m isobaths. In the model, this area is divided into 62 spatial zones, including depth layers. This three-dimensional aspect of the model allows for input and modeling of fish migrations and movement behavior, fleet dynamics, and spatial management. The full parameterization for the California Current is described in Brand *et al.* (2007), although some modifications and additions have been made since, including the addition of canary rockfish and English sole groups, minor updates to stock abundance, and updated diet data.

The Atlantis model was used to assess the ecosystem impacts of trawl rationalization. These effects are measured through the indirect effects fishing will have on other species based on known relationships in the food web. The results shown here serve only as an indication of the type of effect that may occur.

4.20.1 Broad-Level Effects of Rationalization on the California Current Ecosystem

The California Current large marine ecosystem is not predicted to be substantially impacted by rationalization, although it is difficult to make predictions about a complicated system that has many inputs to productivity. Changes in catch induced by moving from status quo management to share-based management, may result in changes to the ecosystem’s food web that are perceptible. Changes in location of catch and changes in the type of gear utilized may result in changes to the amount and kind of EFH impacted. Such changes in habitat impacts may have an effect on the ecosystem; however, that link, while logical, is difficult to demonstrate, as noted in the EFH EIS (PFMC 2004c). Direct effects of fishing are most accurately captured in projections from single species stock assessments, which are evaluated in Section 4.16.

Indirect effects that could occur include keystone predation (a predator indirectly increases the abundance of competitors of its prey via consumption of the prey); tri-trophic interactions (increase in plant/algal abundance caused by the control of herbivores by prey); exploitation completion (a reduction in a consumer or producer resulting from the reduction of its prey or resources by another consumer species); apparent competition (reduction of a species resulting from increase in a second species that enhances predation by a shared enemy); indirect mutualism (positively correlated changes in two species resulting from predation by each on the competition of the other's main prey); indirect commensalism (similar to indirect mutualism, but one potential indirect mutualist is more generalized in diet and also feeds on the main prey of the other indirect mutualist); habitat facilitation (one organism indirectly improves the habitat of a second by altering the abundance of a third interactor); apparent predation (an indirect decrease in a nonprey produced by a predator or herbivore, e.g., a predator removes a prey species, and the decline of the prey results in the decline of a third species); and indirect defense (the indirect reduction of a predator or herbivore by a nonprey; e.g., competition by a nonprey can reduce the abundance of a prey and this its predator) (Menge 1997). The Atlantis model predicted minor indirect effects on prey species.

While not captured in the Atlantis model, rationalization is expected to result in fleet consolidation. A broad-level effect of consolidation is that some fishing vessels are expected to become inactive and may fall into disrepair. This was seen after the buyback program consolidated the trawl fleet, and several of those vessels have become public health, safety, and environmental health problems that harbor masters and port authorities are forced to address. There are no mitigating measures in the trawl rationalization

program to help vessel owners, harbors, and communities deal with potential derelict vessels that may result from trawl rationalization consolidation.

4.20.2 Potential Impacts, Mechanisms, and Metrics

Change in condition of the ecosystem (as indicated by minor indirect effects on prey species) was not substantially different under any of the program’s proposed analytical scenarios. Therefore, the change in condition of the ecosystem will be evaluated by comparing conditions under status quo management to conditions under a rationalized management program.

Several catch scenarios were developed that could occur in a rationalized fishery. The following metrics were utilized to examine the potential impacts of the catch scenarios under rationalization on the California Current ecosystem in comparison to the status quo management catch scenario.

Table 4-86 provides an overview of the analytical approach used to compare baseline and future conditions of the California Current large marine ecosystem under the alternatives, including EFH. The analytical approach includes 1) potential impacts, 2) mechanisms that relate the proposed action to the impacts; 3) measurement criteria or indicators used in assessing each type of impact, and 4) models and data sets used in the analysis.

Table 4-86. Overview of analytical approach used to compare baseline and future conditions of the ecosystem under the alternatives.

Potential Impacts	Impact Mechanisms	Measurement Criteria or Indicators	Data and Models
Changes species abundance	Changes in catch that can be traced through the food web	Changes in predator and prey abundance and trophic relationships	Atlantis ecosystem model
Changes in fishing effects (and area management) on EFH	Shifts in location of catch and gear switching	Description of changes in area and duration of bottom contact of groundfishing gears	Geographic shift model and qualitative assessment

Change in the Catch Amount of Target Species and Key Predator/Prey Species: Trawl rationalization is anticipated to result in an increased amount of target species catch. Other species are expected to have variable levels of utilization, including maximum utilization (taking the full allocation or OY) of some species. This high utilization of target and other species could have an impact on the California Current ecosystem, especially if those species are important predators or prey in the food web. This potential impact was evaluated by applying several catch scenarios to the Atlantis model. Direct effects of fishing (catch and fishing mortality) were modeled with the intent of detecting indirect effects, primarily through predator/prey tradeoffs under each catch scenario. Outputs of this model are primarily a qualitative assessment of changes in dominant trophic relationships resulting from the four catch scenarios.

Four scenarios for future catch (landings and discards) under a rationalized trawl fishery were developed for input to the Atlantis model. The scenarios were based on the idea that the behavior of harvesters would change under a rationalized fishery and that change would allow them to access more target species than had been accessed under status quo management.

Constraining overfished species include canary rockfish (*Sebastes pinniger*), yelloweye rockfish (*S. ruberrimus*), darkblotched rockfish (*S. crameri*), Pacific ocean perch (*S. alutus*), bocaccio rockfish

(*S. paucispinis*), and cowcod (*S. levis*). Underutilized species include arrowtooth flounder (*Atheresthes stomias*), Dover sole (*Microstomus pacificus*), shortspine (*Sebastolobus alascanus*) and longspine thornyheads (*S. altivelis*), slope rockfish, chilipepper rockfish (*Sebastes goodie*), yellowtail rockfish (*S. flavidus*), lingcod (*Ophiodon elongatus*), and various flatfish species that make up the “other flatfish” complex.

The catch scenarios were as follows:

- Status Quo = catch roughly the same as those that occurred from 2003 to 2006.
- Scenario 1 (low-catch amount scenario) = minimal increases in catch of underutilized species compared to the status quo scenario. Bycatch rates are assumed to be 55 percent of status quo.
- Scenario 2 (moderate or medium-catch amount scenario) = moderate increases in catch of some underutilized species. Bycatch rates are assumed to be 30 percent of status quo.
- Scenario 3 (high-catch amount scenario) = substantial increase in catch of underutilized species. Bycatch rates are assumed to be 15 percent of status quo.

In all the Atlantis model catch scenarios, total catch of constraining species (e.g., canary rockfish) remained constant or increased only slightly. An assumption in the model was that harvesters have the highest preference for flatfish stocks and thornyheads due to the ability to catch these stocks with low bycatch rates, and other target species have a lower harvester preference.

The Effect of Shifts in Fishing Locations on EFH: Trawl rationalization is anticipated to result in geographic changes in harvest patterns, and consequently, the potential for changes in impacts to EFH. Trawling occurs over hard or soft substrates, and general shifts in fishing location would translate to either an increase or decrease of trawling in certain areas. No change in trawled substrate type would occur in areas that are currently closed to trawling, because no changes are anticipated to RCAs or other EFH conservation measures. To examine this impact, the model described in Section 4.2.1.3 is used to illustrate the predicted geographic shifts in fishing patterns. This is paired with either a hard or soft bottom substrate type, which was obtained from the 2004 EFH EIS (PFMC 2004c). A qualitative discussion follows, indicating whether that area may see an increase, decrease or no change to fishing effort.

The Effect of Shifts in Gear Types on EFH: Trawl rationalization is also anticipated to result in opportunity to switch from trawl gear to fixed-gear, which is thought to be less destructive to bottom habitat. One specific provision of Amendment 20, Adaptive Management, could provide an incentive to switch from bottom trawl to fixed-gear, which could have implications on EFH conservation.

4.20.3 Direct and Indirect Impacts of the Alternatives

4.20.3.1 Change in the Catch Amount of Target Species and Key Predator/ Prey Species

The potential change in catch volumes as a result of trawl rationalization was run through the Atlantis model. The results illustrated several findings:

- Miscellaneous nearshore species and small, shallow-water rockfish showed the most noticeable change in abundance in the model through indirect effects. This is driven by higher fishing-induced lingcod mortality than under status quo, which subsequently reduced lingcod predation on such species.
- Differences in groundfish mortality as a result of rationalization were not predicted by the model to have strong impacts on the food web, beyond the direct effects on harvested species.

- Strong indirect effects appear to be limited only to forage species such as nearshore fish, and were not seen on target species.

Tradeoffs were observed between large demersal predators (lingcod) and two principal prey items: miscellaneous nearshore fish and shallow small rockfish. The high catch amount scenarios led to the highest levels of depletion of target species, including large flatfish (e.g., arrowtooth flounder), large demersal predators (lingcod), deep small rockfish (e.g., longspine thornyhead), midwater rockfish (e.g., yellowtail and chilipepper rockfish), deep large rockfish (e.g., shortspine thornyhead), and small flatfish (e.g., Dover sole). Those high catch amount scenarios resulted in reduced predation on those species' prey. Prey species that showed increases in the model include sculpin (Cottidae) and white croaker (*Genyonemus lineatus*), particularly in response to the reduced abundance of lingcod. Twenty percent of lingcod diet is composed of nearshore fish species. Minor increases (2 percent) in abundance of shallow small rockfish (such as shortbelly rockfish *Sebastes jordani*) also showed in the model. Twenty-one percent of lingcod diet consists of shallow small rockfish.

4.20.3.2 The Effect of Shifts in Fishing Locations on EFH

In order to determine what impacts would occur to habitat from changing to rationalized fishery management from status quo, the areas fished were examined (before and after rationalization), as well as which habitat types occurred in those areas. The following table shows the delineated bycatch areas (GeoHab Areas) and the amount and percentage of each polygon associated with either a hard or soft substrate.

Table 4-87. Induration composition of bycatch polygons (areas in hectares).

GeoHab Area	blank	hard	soft	Grand Total	blank	hard	soft
34d 25' to EEZ-S, in	2,299.2	1,075.9	32,335.6	35,710.8	6.44%	3.01%	90.55%
34d 25' to EEZ-S, out	3,835.2	29,239.7	397,093.6	430,168.6	0.89%	6.80%	92.31%
36d 08' to 34d 25', out	448.8	20,598.4	87,574.6	108,621.8	0.41%	18.96%	80.62%
38d 25' to 36d 08', in	15.1	6,602.4	94,296.3	100,913.8	0.01%	6.54%	93.44%
38d 25' to 36d 08', out		1,173.4	46,749.1	47,922.6	0.00%	2.45%	97.55%
40d 10' to 38d 25', in	2.6	313.3	33,576.3	33,892.2	0.01%	0.92%	99.07%
40d 10' to 38d 25', out		0.4	43,328.4	43,328.7	0.00%	0.00%	100.00%
42d 30' to 40d 10', in	7.8	936.6	46,729.3	47,673.6	0.02%	1.96%	98.02%
42d 30' to 40d 10', out		3,608.3	71,790.0	75,398.3	0.00%	4.79%	95.21%
43d 55' to 42d 30', in	2.6	3,509.9	25,919.8	29,432.3	0.01%	11.93%	88.07%
43d 55' to 42d 30', out		2,522.6	31,957.3	34,479.8	0.00%	7.32%	92.68%
45d 35' to 43d 55', in	0.8	8,592.8	50,657.3	59,250.9	0.00%	14.50%	85.50%
45d 35' to 43d 55', out		2,083.2	49,890.0	51,973.2	0.00%	4.01%	95.99%
47d 40' to 45d 35', in	0.5	528.4	80,676.3	81,205.2	0.00%	0.65%	99.35%
47d 40' to 45d 35', out		1,910.9	54,552.3	56,463.2	0.00%	3.38%	96.62%
EEZ-N to 47d 40', in	6.0	356.3	28,610.5	28,972.8	0.02%	1.23%	98.75%
EEZ-N to 47d 40', out			19,169.2	19,169.2	0.00%	0.00%	100.00%
Grand Total	6,618.7	83,052.6	1,194,905.8	1,284,577.1	0.52%	6.47%	93.02%

The polygons highlighted in grey are those areas that are predicted to experience a decrease in fishing effort (see Section 4.2.1.3 and Appendix C for the geographical shift model description), and, therefore, a decrease in trawl gear contact with the bottom. In four areas (grey rows in Table 4-87), the majority (88 percent to 98.7 percent) of the substrate is soft bottom.

All other polygons (white rows in Table 4-39) may or may not have a complementary increase in trawl fishing effort after the implementation of trawl rationalization. It is difficult to determine which areas may have an increase in trawl effort. Impacts to EFH from trawl gear have been mitigated by past and ongoing Council actions.

4.20.3.3 The Effect of Shifts in Gear Types on EFH

Gear switching may reduce the impacts to habitat that is currently trawled; however, since many types of habitat are not accessed by trawl gear because of footrope restrictions (such as rocky reef habitat), gear switching may result in more fishing effort being exerted on untrawlable habitat. Use of fixed gear could have modest adverse impacts on untrawlable habitat. The EFH EIS (evaluating Amendment 18) (NMFS 2005) describes impacts to bottom habitat from pot and longline gear (Sections 3.5.8.5 and 3.5.9.4), and that information is incorporated by reference. Shifting of pots and lines during retrieval, entanglement of lines with biogenic habitat, and lost gear can adversely affect untrawlable habitat, particularly areas with complex biogenic features (corals, sponges, etc.). The specific effects on any gear switching cannot be predicted, because it is unknown whether this would result in an increase in fishing in sensitive habitats compared to status quo, and the intensity of effects depends on the way the gear is deployed.

4.20.4 Cumulative Effects of on Habitat and Ecosystem

A discussion of cumulative effects on the California Current ecosystem includes trends and actions that are occurring, have occurred, or would be expected to occur exogenous to rationalization, as well as effects that could likely occur under a rationalized management program. The Atlantis model was able to produce a simple simulation of the California Current ecosystem with some, but not all, RFFAs and trends. Therefore, Atlantis is useful in evaluating some cumulative effects related to these actions and trends. Furthermore, as discussed above, there are no discernable differences in terms of the effects of the action alternatives compared to one another; the analysis focuses on the contrast between status quo (Alternative 1) and the general effects of trawl rationalization (action alternatives) on habitat and ecosystem.

Sections 3.3 and 3.4 describe historic fishery management decisions, the RFFAs, and the identifiable trends and Section 3.20 describes baseline conditions of the ecosystem. Past, present, and RFFAs that apply to the ecosystem include the overfished status of seven groundfish species and related rebuilding efforts; bycatch reduction; designation of EFH; and MPAs and RCA closed areas applicable to groundfish trawl gear. Trends that apply to the ecosystem include changes in the use of ocean areas (such as additional wave energy sites and MPAs), changes in land use, continued rebuilding of overfished species, and cyclical and continuing climate change.

Regardless of the fishery management program, the effort to rebuild species and reduce bycatch will continue to influence the amount and type of fish removed by the trawl fishery and will, therefore, affect ecosystem function to some degree. There would be much more individual accountability for fishery removals under the action alternatives (rationalized fishery management program), supported by higher levels of observer coverage (at or near 100 percent). Status quo (Alternative 1) management has shown that closed areas have contributed to the reduction of bycatch of overfished rockfish species, and the benefits of those closed areas would be expected to continue under rationalization.

Changing ocean uses, such as adding alternative energy arrays, create de facto MPAs where fish harvesting is restricted or banned. Changing uses, combined with the present protected/conservation areas, will create more localized protection for groundfish in that particular area, but may do little to

further decrease bycatch of key constraining species or bolster overall integrity of the large marine ecosystem. Climate change may alter the areas where groundfish species occur and can be harvested, but the effect of this on the ecosystem under status quo or rationalization is unknown.

The Atlantis model was used to simulate possible outcomes as a result of climate change. These outcomes were combined with possible catch scenarios under rationalization to estimate the cumulative effect of both rationalization and fishing under an environment altered as a result of climate change. The model was “forced” to account for climate change by depleting shelled benthos, such as bivalves, snails, corals, and sea urchins. A reduction in the populations of these types of species is expected as a result of ocean acidification that is linked to climate change. The noteworthy changes in results that stemmed from food web connections were declines in English sole and dogfish. Compared to a case without ocean acidification where the populations of English sole doubles, under the ocean acidification condition, the population of English sole fell to 6 to 40 percent of initial levels (depending on fishing mortality). Dogfish were not affected to the same degree: without acidification, they increase in abundance to levels that are approximately double initial levels; with ocean acidification, they increase to 1.9 times initial levels (or a 10 percent difference).

Other possibilities stemming from ocean acidification were run through the model. These possibilities resulted in a decline in skates and rays and an increase in miscellaneous nearshore fish species such as croakers and sculpins. The decline in skates was linked to a simulated extinction of sea urchins, while miscellaneous nearshore species increased as a result of a decline in their predator, dogfish.

Overall, the groundfish resource under rationalized fishery management is anticipated to be harvested closer to the OY for many of the species than it would be under status quo. The effect of rationalization on the marine ecosystem is predicted to be minor, but, when combined with possibilities under a more acidic ocean, some species may see reductions in biomass levels. To the extent that these potential effects are known ahead of time, managers have the possibility of adjusting harvest specifications to be more in line with what the resource can sustain under those more acidic conditions.

Current and future MPAs, as well as trawl gear improvements/modifications, could reduce the effect trawling has on the ecosystem. Increased catch accounting and bycatch accountability associated with the rationalization program would reduce uncertainty in stock assessments, as well as providing more accurate catch information, additional information on seabird and marine mammal takes in groundfish trawl fisheries, and better tools for dealing with fish stock range changes due to climate change compared to status quo.

4.20.5 Summary of the Impact of the Alternatives on Habitat and Ecosystem

As discussed above, the features of the alternatives that would have potential effects on habitat and ecosystem are common to all of the action alternatives. For that reason, it is only possible to contrast the effects of the action alternatives collectively with ongoing effects under the no action alternative (Alternative 1). Nearshore species and small, shallow-water rockfish may see increased abundance due to higher lingcod fishing mortality, a predator on these stocks. Expected increases in fishing mortality on target stocks are not expected to have strong impacts on the food web. High-relief bottom habitat, especially areas with substantial biogenic presence, is more sensitive to the adverse effects of fishing, with groundfish trawl gear having greater effects than other types of groundfish gear. Past actions limiting the use of certain types of gear (e.g., large footropes) and EFH closed areas have mitigated the impacts of trawling. Fleet consolidation and related factors under the action alternatives could change the spatial distribution of fishing effort, having differential impacts on EFH compared to no action (Alternative 1). An examination of the areas where fishing effort may decrease, according to the

geographic shift model described in Appendix C, shows that 6.9 percent of the area is classified as hard substrate compared to 6.47 percent of the mapped area of the west coast EEZ (Table 4-87). Although this indicates that these areas have a slightly higher proportion of hard substrate than the total area, there is considerable variation within particular areas, and any redistribution of effort into these areas cannot be predicted. Gear switching, a feature of all the action alternatives, could result in an increase in deployment of fixed gear in some untrawlable areas compared to the no action alternative (Alternative 1). Although fixed gear results in fewer impacts compared to trawl gear, an overall increase in the use of this gear in high relief, untrawlable areas could have an adverse effect compared to no action.

CHAPTER 5 SUMMARY OF OTHER ENVIRONMENTAL MANAGEMENT ISSUES

Federal regulations at 40 CFR 1502.16 require an EIS to compare the environmental impact of the alternatives considered in the analysis. Chapter 4 comprehensively assesses these impacts. However, the regulations identify classes of impacts that, while inherent in the analysis, are not explicitly discussed in Chapter 4. For that reason, these types of impacts are briefly discussed here, based on the information provided in Chapter 4.

Short-term uses versus long-term productivity. The proposed action does not directly affect the tradeoff between short-term use and long-term productivity of fish stocks since this is a function of setting harvest limits (OYs/ACLs), done under a separate periodic process. By requiring individual accountability and requiring comprehensive catch monitoring, the proposed action should make short-term use (catches) consistent with sustaining long-term productivity. However, this relationship ultimately depends on the correct specification of harvest levels.

Irreversible resource commitments. An irreversible commitment represents some permanent loss of an environmental attribute or service. The proposed action is likely to result in an irreversible commitment of some economic resources. Under rationalization, the groundfish trawl fleet is likely to consolidate, resulting in a smaller fleet size. Similarly, there is likely to be some consolidation of at-sea and shore-based processing facilities. The resulting impact of consolidation on communities is treated in detail in Section 4.14. Some of the surplus physical capital (e.g., vessels) may be put to other uses, for example in nongroundfish fisheries (Section 4.8). Other, less-mobile assets, such as shore-based processing plants, may not be redeployed.

Irretrievable resource commitments. A resource is irretrievably committed if its use is lost for time, but is not actually or practically lost permanently. The proposed action does not involve any direct irretrievable resource commitment, except for the fish that are harvested in the groundfish fishery.

Energy requirements and conservation potential of the alternatives. The proposed action may indirectly affect energy use through fleet consolidation. A smaller fleet, assuming that CPUE increases, would result in an overall reduction in vessel fuel use. However, there are various other factors that likely have a greater effect on overall energy use and efficient utilization. Changes in fuel prices, for example, could affect the level of fishing vessel operations independent of fleet consolidation.

Urban quality, historic resources, and the design of the built environment. The proposed action has no direct effect on these resources. However, impacts to communities related to consolidation could cumulatively affect private and public investment in coastal communities, including marine-related businesses and port-related infrastructure. These changes could also affect cultural and historic resources as fishing and fishing-dependent activities are supplanted, or simply disappear, changing the character of a coastal community. This concern is particularly true for those communities identified as vulnerable. See Section 4.14.

Possible conflicts between the proposed action and other plans and policies for the affected area. The proposed action is unlikely to substantially conflict with other plans and policies. The Council's other FMPs (salmon, CPS, and HMS) are most relevant to the proposed action in terms of the geographic area and resources covered. Section 4.8, nontrawl commercial harvesters, and Section 4.17.2.3, other fish resources, discuss the effects of the proposed action on other fisheries, which may be managed under Council FMPs.

Unavoidable adverse impacts. Impacts of the alternatives on the human environment are identified and evaluated in Chapter 4 of this EIS. The Executive Summary summarizes these impacts.

Mitigation. An EIS must discuss "means to mitigate the adverse environmental impacts" stemming from the proposed action (40 CFR 1502.16(h)), even if the adverse impacts are not by themselves significant. The mitigation measure incorporated into the proposed action and included in the preferred alternative (Alternative 4b) is the adaptive management provision, which annually sets aside up to 10 percent of the QPs in the shore-based IFQ fishery and up to 10 percent of the available aggregate harvest pounds for the Pacific whiting cooperative program. This harvest opportunity would then be allocated by the Council to meet specified objectives, including unforeseen impacts, such as geographic shifts in catch or landings, previously unidentified impacts to participants (e.g., processors), or unexpected barriers to new entry into the fishery.

CHAPTER 6 **CONSISTENCY WITH THE WEST COAST GROUND FISH FMP AND MSA NATIONAL STANDARDS AND REQUIREMENTS**

6.1 FMP Goals and Objectives

The Groundfish FMP contains three broad goals and 17 objectives intended to achieve those goals. Many of these are similar to the MSA's National Standards described in Section 6.2.

Management Goals

Goal 1 – Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.

Goal 2 – Economics. Maximize the value of the groundfish resource as a whole.

Goal 3 – Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Objectives.

To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:

Conservation

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates,

and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.

Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.

Objective 4. Where conservation problems have been identified for nongroundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a nongroundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of nongroundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

Objective 5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

Economics

Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.

Objective 10. Recognizing the multispecies nature of the fishery, establish a concept of managing by species and gear or by groups of interrelated species.

Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors

Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

Objective 13. Minimize gear conflicts among resource users.

Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Objective 15. Avoid unnecessary adverse impacts on small entities.

Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Objective 17. Promote the safety of human life at sea.

The trawl rationalization program is consistent with the management goals (Goals 1, 2, and 3) outlined in the groundfish FMP. The program is designed to improve conservation, in part, through total catch accounting (i.e., retained catch and discards) with 100 percent monitoring. The program is designed to improve the economics of the groundfish resource by increasing the profitability of participants in the fishery and increasing opportunities to harvest target species. The program is also designed to fully utilize the healthy groundfish stocks while remaining within harvest constraints of overfished species.

The trawl rationalization program is consistent with the objectives within the Groundfish FMP. The program is consistent with conservation objectives 1, 2, 4, and 5. The program is consistent with objective 1 because it continues to maintain an information flow on the status of the fishery and the fishery resource, which allows for informed management decisions as the fishery occurs. One hundred percent monitoring should provide for more informed management decisions as the fishery occurs. In addition, for the shoreside IFQ fishery, it strives to make catch (retained and discarded) information available to participants much sooner via electronic reporting. The program addresses conservation objective 2 by creating a market system where harvest capacity can be better matched with the available resource. In addition, the program may lower discard rates through increased accountability and total catch accounting. The trawl rationalization program is intended to increase stability and profitability of the fishery. The program is consistent with objective 4 because it is intended to reduce the incidental take of Pacific halibut, a nongroundfish species, which will be managed under the trawl rationalization program with halibut IBQ. The program is consistent with objective 5. Fishing in different areas and using different gear (e.g., switching to fixed-gear or modifying trawl gear) would change how much and what kind of EFH would be affected by fishing. However, the RCAs, areas closed to fishing with trawl and nontrawl gear, and EFH conservation areas will remain in place under the trawl rationalization program. Section 6.3 below describes the EFH assessment of the proposed action.

The program is consistent with economic objectives 6, 7, and 8. The program attempts to achieve the greatest possible net economic benefit to the nation from the managed fisheries (objective 6) by transitioning the trawl fishery to catch shares. The program is consistent with objective 7 by continuing to support year-round fishing and marketing opportunities and decreasing the risk of early season closures. The program is consistent with objective 8 by providing an opportunity for gear switching as an option for reducing regulatory or economic discards.

The program is consistent with utilization objectives 9, 10, and 11. The trawl rationalization program is intended to increase utilization of the groundfish resource by increasing opportunities to harvest healthy groundfish species while remaining within the constraints of overfished species (objective 9). The program continues to recognize the multispecies nature of the fishery and manage the fishery according to the species and groupings listed in the ABC/OY tables from 50 CFR 660, subpart G (objective 10). The program is consistent with objective 11, minimizing bycatch, as described in section 6.2 under MSA National Standard 9. It is also consistent with objective 11 by creating a program with 100 percent monitoring (i.e., total catch accounting) to improve estimates of total fishing-related mortality.

The program is consistent with the social factors described in objectives 14 through 17. The program is consistent with objective 14, accomplishes the change with the least disruption, because most current participants in the fishery would be eligible to receive harvest privileges. In addition, it continues year-round fishing opportunities. The program is consistent with objective 15 by creating a program where most recent participants in the fishery (many of which are small entities) would be eligible to continue participating in the fishery. Those small entities that choose to exit the fishery should receive financial compensation from selling their permit or share of the resource. In addition, for the shoreside IFQ fishery, an AMP would be allocated an amount of harvest privileges that could be used to mitigate any adverse impacts, including impacts on small entities, that might result from the trawl rationalization program. The program is consistent with objective 16, minimizing adverse economic impacts on fishing communities, as described in section 6.2 under MSA National Standard 8. The program is consistent with objective 17, safety at sea, as described in section 6.2 under MSA National Standard 10.

For Groundfish FMP objectives not discussed above, the trawl rationalization program is still consistent with those objectives. However, those objectives are not specifically addressed through the trawl rationalization program.

6.2 National Standards

An FMP or plan amendment and any pursuant regulations must be consistent with ten national standards contained in the MSA (§301).

National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The alternatives for rationalization of the trawl fishery would support efforts to achieve OY and prevent overfishing. Both the co-op and the IFQ alternative would increase individual accountability for total catch, including bycatch, and would give fishermen greater discretion as to when and how to fish. This would be expected to provide greater opportunity to extract the full OY of higher biomass species while avoiding lower biomass species. The 100 percent monitoring and increased accountability should reduce the risk of overfishing. The no action alternative would retain the current management regime which can result in forgone harvest of higher biomass species due to closures caused by harvest of lower biomass species.

National Standard 2 states that conservation and management measures shall be based on the best scientific information available.

The analyses contained in this document constitute the best available scientific information.

National Standard 3 states that, to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The EIS for the 2009 Groundfish Specifications, describes the management units for Pacific Coast groundfish. None of the alternatives analyzed in this document would modify those management units.

National Standard 4 states that conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The trawl rationalization program was developed through the Council process, which facilitates substantial participation by state representatives. Generally, state proposals are brought forward when alternatives are crafted and integrated to the degree practicable. Decisions about catch allocation between different sectors or gear groups are also part of this participatory process, and emphasis is placed on equitable division while ensuring conservation goals. None of the alternatives analyzed would discriminate against residents of different states. However, both the co-op and the IFQ alternative would establish a foundation for making allocations of harvest privileges. These alternatives were structured to provide fair and equitable allocations of both target species and overfished species to participants. The proposed action is intended, in part, to reduce bycatch and improve total catch accounting. Some important components of the trawl rationalization program that will promote conservation are (1) 100 percent observer coverage and dockside monitoring for total catch accounting (landings and discards), (2) increased individual accountability for catch should reduce the risk of OY overages, (3) increased target catches and minimized bycatch, (4) reduced number of active fishing vessels and increased operating efficiency may reduce gear and habitat or protected species interactions, and (5) allowing trawlers to switch to longline or pot gear may reduce some habitat impacts. The alternatives include provisions to guard against accumulation of excessive shares including provisions for accumulation limits and divestiture.

National Standard 5 states that conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

None of the alternatives analyzed in this document was designed solely for the purpose of economic allocation. However, NMFS and the Council have been working in this fishery to address the need for reduction in fleet capacity. In addition to meeting the conservation and management needs of the fishery, the alternatives analyzed in this document are expected to economically rationalize the groundfish trawl fishery.

National Standard 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The approach in the co-op and IFQ alternatives would be to provide greater flexibility to individual fishermen to determine when and how to fish. This flexibility would enhance the ability of fishermen and managers to respond to unexpected circumstances. In addition, the preferred alternative includes an adaptive management reserve of harvest privileges that could be used to address unexpected contingencies.

National Standard 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

Generally, by coordinating management, monitoring, and enforcement activities between NMFS and the three west coast states, duplication, and thus cost, is minimized. Monitoring and enforcement programs, such as the use of fishery observers, are very important to the success of the rationalization alternatives. While these features would increase management costs, they are necessary to effective management. The analysis does consider cost-control mechanisms such as limiting landing hours and landing sites. In addition, fisherman may form co-ops or pool their resources, including sharing quota on a single vessel and sharing observers among vessels, to reduce costs.

National Standard 8 states that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

This document evaluates the effects of the alternatives on fishing communities (Chapter 4), and these effects have been taken into account in developing the preferred alternative. The preferred alternative represents the Council's judgment of the best way to conserve and rebuild fish stocks as soon as possible while taking into account the trawl industry and coastal fishing communities. The analysis indicates that some side effects of rationalization may include geographic shifts in fishing effort and location of processors. To the extent that these shifts do occur, some communities could experience negative impacts. The preferred alternative would minimize the negative impacts to the extent possible by limiting the amount of quota that can be consolidated. In addition, the preferred alternative includes an AMP that would be allocated an amount of harvest privileges that could be used to mitigate any adverse impacts, including community impacts, that might result from the trawl rationalization program.

National Standard 9 states that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

The rationalization alternatives are designed to improve total catch accounting and to reduce bycatch. The alternatives should reduce regulatory discards, increase target catches, and promote greater individual responsibility for avoiding bycatch. They would also provide for greater flexibility for fishermen to decide how, when, and where to fish, including allowing trawlers to switch to longline or pot gear that may reduce some habitat impacts or minimize bycatch of certain species. In addition, closed areas that keep fishing away from areas where overfished species are most abundant would remain in place and would, therefore, reduce bycatch.

National Standard 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The preferred alternative would provide fishermen with increased flexibility in determining when, where, and how to fish. This is expected to reduce incentives to fish in unsafe conditions.

6.3 Other Applicable MSA Provisions

The preferred alternatives are intended to facilitate harvest of OY while allowing for rebuilding of overfished stocks in compliance with section 304(e) of the MSA.

Chapter 4.20 in this EIS constitutes an EFH assessment of the proposed action's impacts, as required by 50 CFR 600.920 (e)(3).

6.4 Goals and Objectives of This Proposed Action

Over the past 20 years, fishery management programs—from limited license entry to IFQs to fishing cooperatives—have evolved. In 1999, the NRC produced a study of share-based fishery management programs around the country called *Sharing the Fish* (NRC 1999), which helped refine the national discussion of the pros and cons of this type of natural resource management. Since then, Congress has allowed IFQ programs to be developed, and several such programs have been implemented around the country. The MSA was reauthorized in 2007, with specific sections added to set the national standards and requirements of LAPP—a catch-all phrase that includes ITQ, IFQ, and cooperative fishery management programs. In addition to the requirements laid out in the MSA, the Council has region-specific goals and objectives for the west coast groundfish fishery in the groundfish FMP and in Amendment 20 of the FMP.

Table 6-1 summarizes guidelines, objectives, and goals identified for this action (Section 1.2.3), in the groundfish FMP (Chapter 2.0 in the FMP), and in the MSA (including Section 301(a), National Standards for fishery conservation and management, and Section 303A, LAPPs). The guidance is organized into 11 topic areas: conservation; net benefits and efficiency; disruption; excessive shares; fairness and equity, sector health; labor (captains, crew, and processing plant workers); communities; small vessels, small entities, and new entrants; auctions and cost recovery; and program performance monitoring and modification. This guidance was used to develop the alternatives and to evaluate the effects of the alternatives.

Table 6-1. Policy guidance from MSA, Groundfish FMP, and Amendment 20 (A-20) goals and objectives.

Guidance	Reference
Conservation	
Allocations Reasonably Calculated to Promote Conservation	MSA - National Standard 4(b)
LAPPs shall assist in rebuilding overfished species	MSA - 303A(c)(1)(A)
LAPPs shall promote fishery conservation and management	MSA - 303A(c)(1)(C)(ii)
Maintain an information flow on the status of the fishery... as the fishery occurs	GF FMP Objective 1
Reduce nongroundfish mortality	GF FMP Objective 4
Minimize adverse impacts on EFH	GF FMP - Objective 5
Total catch accounting; Reduce bycatch, discard mortality, and ecological impacts	A-20 Objective 1 and 3
Consider biological stock structure, not exceeding the OY/ABC, minimizing localized concentrations of fishing effort, and accounting for total mortality	A-20 Constraints 1, 2, 3, and 4
Net Benefits and Efficiency	
Consider Efficiency	MSA - National Standard 5
Contribute to reducing capacity	MSA - 303A(c)(1)(B)
Attempt to achieve the greatest net economic benefit to the nation	GF FMP Objective 6
Maximize the value of the groundfish resource as a whole	GF FMP Goal 2
Provide for a[n] ... efficient groundfish fishery	A-20 Objective 2
Promote measurable economic benefits	A-20 Objective 6
Disruption	
Accomplish change with the least disruption of current domestic fishing practices, marketing procedures, and the environment	GF FMP Objective 14

Guidance	Reference
Excessive Shares	
No particular individual, corporation, or other entity [shall] acquire an excessive share of privileges	MSA - National Standard 4(c)
Address concerns over excessive geographic or other consolidation in the harvesting or processing sectors of the fishery	MSA - 303A(c)(5)(B)(ii)
Ensure that LAPP holders do not acquire an excessive share by (i) establishing a maximum share to hold, acquire or use, and (ii) establishing other measures to prevent inequitable concentration	MSA - 303A(c)(5)(D)
Avoid excessive quota concentration	
Establish a review process to determine whether any illegal antitrust acts have occurred.	MSA - 303A(c)(1)(J)
Fairness and Equity	
The excessive share objectives also relate to fairness and equity considerations.	
Allocation shall be fair and equitable to all such fishermen	MSA - National Standard 4(a)
Establish procedures to ensure fair and equitable initial allocations, including consideration of (i) current and historical harvests; (ii) employment in the harvesting and processing sectors; (iii) investments in, and dependence upon, the fishery; and (iv) the current and historical participation of fishing communities;	MSA - 303A(c)(5)(A)
Issue privileges to persons who substantially participate in the fishery (as specified by the Council)	MSA - 303A(c)(5)(E)
Provide an administrative appeals process regarding initial allocation decisions	MSA - 303A(c)(1)(I)
Environmental Justice: Identify and address , as appropriate, disproportionately high and adverse human health and environmental effects of its programs... on minority populations and low income populations.	EO 12898
Avoid provisions where the primary intent is a change in marketing power balance between harvesting and processing sectors	A-20 Constraint 5
Sector Health	
Provide for a viable, profitable . . . groundfish fishery	A-20 Objective 2
Promote measurable economic . . . benefits through the seafood catching, processing, distribution elements, and support sectors of the industry	A-20 Objective 6
Maximize the value of the groundfish resource as a whole	GF FMP Goal 2
Promote year-round marketing opportunities and extend those opportunities as long as practicable during the fishing year	GF FMP Objective 7
Avoid unnecessary adverse impacts on small entities	GF FMP Objective 15
Labor: Captains, Crew, and Processing Plant Workers	
Include measures to assist... entry-level and small vessel owner-operators, captains, crew... through set-asides of allocations... or economic assistance in the purchase of quota	MSA - 303A(c)(5)(C)
Promote measurable... employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry	A-20 Objective 6
Promote the safety of human life at sea	MSA - National Standard 10 GF FMP - Objective 17
Communities	
Consider importance of fishing to communities in order to provide sustained participation and to minimize adverse impacts	MSA - National Standard 8 GF FMP Objective 16 A-20 Objective 5
Consider basic cultural and social framework of the fishery through (i) the development of policies to promote sustained participation of... fishing communities that depend on the fisheries, including regional or port-specific landing and delivery requirement; (ii) procedures to address concerns over excessive geographic or other consolidation in the harvesting or processing sectors of the fishery	MSA - 303A(c)(5)(B)
Include measures to assist , when necessary and appropriate... fishing communities through set-asides of harvesting allocations... or economic assistance in the purchase of quota	MSA - 303A(c)(5)(C)

Guidance	Reference
<p>If a program is created in which fishing communities are given a special standing (e.g., a direct allocation to qualified fishing communities), the Council is required to consider the following criteria:</p> <ul style="list-style-type: none"> (i) Traditional fishing or processing practices in, and dependency on, the fishery; (ii) The cultural and social framework relevant to the fishery; (iii) Economic barriers to access the fishery; (iv) Existence and severity of projected economic and social impacts associated with implementation...; (v) Expected effectiveness, transparency and equitability; and (vi) Potential for improving economic conditions in remote coastal communities... 	MSA - 303A(c)(3)(B)
<p>Minimize negative impacts resulting from localized concentrations of fishing effort (this constraint is also listed under "Conservation")</p>	A-20 Constraint 3
Small Vessels, Small Entities, and New Entrants	
<p>Promote sustained participation of small owner-operated fishing vessels</p>	MSA - 303A(c)(5)(B)(i)
<p>Include measures to assist, when necessary and appropriate, entry level and small vessel owner-operators . . . through set-asides of harvesting allocations... or economic assistance in the purchase of quota ¹¹⁹</p>	MSA - 303A(c)(5)(C)
<p>Avoid unnecessary adverse impacts on small entities</p>	GF FMP Objective 15
Auctions and Cost Recovery	
<p>Auctions, or other systems to collect royalties, shall be considered for initial or any subsequent allocation</p>	MSA - 303A(d)
<p>Assess and provide a program of fees paid by the quota holders that will cover the costs of management, data collection and analysis, and enforcement activities</p>	MSA - 303A(e)
Program Performance Monitoring and Modification	
<p>Take into account the management and administrative costs of implementing and overseeing the IFQ or co-op program and complementary catch monitoring programs, and the limited state and federal resources available.</p>	A-20 Constraint 9
<p>Regular review and monitoring of the program for progress in meeting the goals, 5 year formal review</p>	MSA - 303A(c)(1)(G)
<p>Privileges may be revoked, limited or modified at anytime. Provide for revocation</p>	MSA - 303A(b)(2) MSA - 303A(c)(1)(K)

¹¹⁹ An Assisted Purchase Program may be developed to aid in financing quota purchase by small vessel fishermen and first time purchase by entry-level fishermen (MSA - 303A(g)(1)).

CHAPTER 7 CROSS-CUTTING MANDATES

7.1 Other Federal Laws

7.1.1 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. The Council's preliminary preferred alternative would be implemented in a manner that is consistent, to the maximum extent practicable, with the enforceable policies of the approved coastal zone management programs of Washington, Oregon, and California. This determination will be submitted to the responsible state agencies for review under Section 307(c)(1) of the CZMA. The relationship of the groundfish FMP with the CZMA is discussed in Section 11.7.3 of the Groundfish FMP. The Groundfish FMP has been found to be consistent with the Washington, Oregon, and California coastal zone management programs. The recommended action is consistent and within the scope of the actions contemplated under the framework FMP.

7.1.2 Endangered Species Act

As described in Section 3.10, a variety of ESA-listed threatened and endangered species occur within the action area. These include salmon, marine mammals, turtles, and seabirds. While some of the alternatives may alter the timing, intensity, and location of fishing activities, these changes are not expected to significantly affect interactions of the fishery with protected species. With respect to ESA-listed salmon, only Chinook are expected to interact with the fishery. NMFS manages the trawl fishery to comply with incidental take levels of Chinook set forth in ESA section 7 consultations.

7.1.3 Marine Mammal Protection Act

The MMPA of 1972 is the principle Federal legislation that guides marine mammal species protection and conservation policy in the United States. Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoise, as well as seals, sea lions, and fur seals; while the USFWS is responsible for walrus, sea otters, and the West Indian manatee.

Off the west coast, the Steller sea lion (*Eumetopias jubatus*) eastern stock, Guadalupe fur seal (*Arctocephalus townsendi*), and Southern sea otter (*Enhydra lutris*) California stock are listed as

threatened under the ESA. The sperm whale (*Physeter macrocephalus*) Washington, Oregon, and California stock, humpback whale (*Megaptera novaeangliae*) Washington, Oregon, and California - Mexico Stock, blue whale (*Balaenoptera musculus*) eastern north Pacific stock, and Fin whale (*Balaenoptera physalus*) Washington, Oregon, and California stock are listed as depleted under the MMPA. Any species listed as endangered or threatened under the ESA is automatically considered depleted under the MMPA.

West coast groundfish fisheries are considered Category III fisheries, indicating a remote likelihood of or no known serious injuries or mortalities to marine mammals, in the annual list of fisheries published in the FR. Based on its Category III status, the incidental take of marine mammals in the west coast groundfish fisheries does not significantly impact marine mammal stocks. However, recent west coast fixed-gear fisheries, including sablefish pot fisheries, have demonstrated a take of humpback whales, which may result in a recategorization of these fisheries to Category II. Consultation under the MMPA would then be needed to implement Category II fisheries in the next biennium. The proposed action could affect the intensity, duration, and location of groundfish fisheries through processes such as fleet consolidation and gear conversion. Impacts to marine mammals are discussed in Chapter 4.

7.1.4 Paperwork Reduction Act

The purposes of the Paperwork Reduction Act (PRA) are to minimize the burden of information collection by the Federal Government on the public; maximize the utility of any information thus collected; improve the quality of information used in Federal decisionmaking, minimize the cost of collection, use, and dissemination of such information; and improve accountability. The PRA requires Federal agencies to obtain clearance from the Office of Management and Budget before collecting information. This clearance requirement is triggered if certain conditions are met. "Collection of information" is defined broadly. In summary, it means obtaining information from third parties or the public by or for an agency through a standardized method imposed on 10 or more persons. Collection of information need not be mandatory to meet the trigger definition. Even information collected by a third party, if at the behest of a Federal agency, may trigger the clearance requirement. Within NMFS, the Office of the Chief Information Officer is responsible for PRA compliance. Obtaining clearance can take up to 9 months and is one aspect of NMFS's review and approval of Council decisions.

The proposed action, as implemented by any of the alternatives considered in this EIS, may require collection of information subject to the PRA.

7.1.5 Regulatory Flexibility Act

The purpose of the RFA is to relieve small businesses, small organizations, and small governmental entities of burdensome regulations and recordkeeping requirements. Major goals of the RFA are (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action. An IRFA is conducted unless it is determined that an action will not have a "significant economic impact on a substantial number of small entities." The RFA requires that an IRFA include elements that are similar to those required by EO 12866 and NEPA. Therefore, the IRFA has been combined with the RIR, and both are substantially based on the analyses contained in this EIS document. Appendix H contains analytical conclusions specific to the RFA and EO 12866.

7.2 Executive Orders

7.2.1 EO 12866 (Regulatory Impact Review)

EO 12866, Regulatory Planning and Review, was signed on September 30, 1993, and established guidelines for promulgating new regulations and reviewing existing regulations. The EO covers a variety of regulatory policy considerations and establishes procedural requirements for analysis of the benefits and costs of regulatory actions. Section 1 of the EO deals with the regulatory philosophy and principles that are to guide agency development of regulations. It stresses that, in deciding whether and how to regulate, agencies should assess all of the costs and benefits across all regulatory alternatives. Based on this analysis, NMFS should choose those approaches that maximize net benefits to society, unless a statute requires another regulatory approach.

The RIR and IRFA determinations are part of the combined summary analysis presented in preliminary draft form in Appendix H of this document.

7.2.2 EO 12898 (Environmental Justice)

EO 12898 obligates Federal agencies to identify and address disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States as part of any overall environmental impact analysis associated with an action. NOAA guidance (NOAA Administrative Order [NAO] 216-6, at '7.02, states that "consideration of EO 12898 should be specifically included in the NEPA documentation for decision-making purposes."

Section 8.5 in Appendix A to the 2005-06 groundfish harvest specifications EIS (PFMC 2004a) describes a methodology, using 2000 U.S. Census data, to identify potential "communities of concern" because their populations have a lower income or a higher proportion of minorities than comparable communities in their region. Based on this information, but focusing on more isolated, rural coastal communities, Section 4.14 of this document discusses the potential effects of the proposed action on communities. Fishery participants make up a small proportion of the total population in these communities, and their demographic characteristics may be different from the community as a whole. However, information specific to fishery participants is not available. Furthermore, various segments of the fishery-involved population may differ demographically. For example, workers in fish processing plants may more often be from a minority population, while deckhands may be more frequently low income in comparison to vessel owners.

Participation in decisions about the proposed action by communities that could experience disproportionately high and adverse impacts is another important principle of the EO. The Council offers a range of opportunities for participation by those affected by its actions and disseminates information to affected communities about its proposals and their effects through several channels. In addition to Council membership, which includes representatives from the fishing industries affected by Council action, the GAP, a Council advisory body, draws membership from fishing communities affected by the proposed action. While no special provisions are made for membership to include representatives from low-income and minority populations, concerns about disproportionate effects on minority and low-income populations could be voiced through this body or to the Council directly. Although Council meetings are not held in isolated coastal communities for logistical reasons, they are held in different places up and down the west coast to increase accessibility.

The Council disseminates information about issues and actions through several media. Although not specifically targeted at low-income and minority populations, these materials are intended for

consumption by affected populations. Materials include a newsletter, describing business conducted at Council meetings, notices for meetings of all Council bodies, and fact sheets intended for the general reader. The Council maintains a postal and electronic mailing list to disseminate this information. The Council also maintains a website (www.pcouncil.org) providing information about the Council, its meetings, and decisions taken. Most of the documents produced by the Council, including NEPA documents, can be downloaded from the website.

7.2.3 EO 13132 (Federalism)

EO 13132, which revoked EO 12612, an earlier federalism EO, enumerates eight fundamental federalism principles. The first of these principles states Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people. In this spirit, the EO directs agencies to consider the implications of policies that may limit the scope of or preempt states' legal authority. Preemptive action having such federalism implications is subject to a consultation process with the states; such actions should not create unfunded mandates for the states; and any final rule published must be accompanied by a federalism summary impact statement.

The Council process offers many opportunities for states (through their agencies, Council appointees, consultations, and meetings) to participate in the formulation of management measures. This process encourages states to institute complementary measures to manage fisheries under their jurisdiction that may affect federally managed stocks.

7.2.4 EO 13175 (Consultation and Coordination with Indian Tribal Government)

EO 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. At Section 302(b)(5), the MSA reserves a seat on the Council for a representative of an Indian tribe with Federally recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes that the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes U&A fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer its fisheries and to establish its own policies to achieve program objectives.

Section 4.15 describes the effects of the proposed action on tribal fisheries. The proposed action does not affect the tribes' treaty rights. Through the Council process the proposed action has been developed in consultation with the affected tribes through their representative on the Council.

CHAPTER 8 LIST OF PREPARERS

Council Staff

Name	Primary Contribution
Merrick Burden	Analytical design; model development; impact analysis (harvesters, captain and crew, nontrawl commercial harvesters, processors, communities), Appendix A contributor, Appendix B, Appendix C
Heather Brandon	Impact analysis (management agencies, groundfish, protected species, ecosystem), Appendix A contributor
John Coon	Project management
Christopher “Kit” Dahl	Analytical design; document management; Executive Summary, Chapter 1, Chapter 2, impact analysis (labor, input suppliers, tribal harvesters)
Jennifer Gilden	Impact analysis (communities)
Jim Seger	Project management, model development, Chapter 2, Appendix A, Appendix E

Other Contributors

Name	Affiliation	Participation
Stephen Freese	NMFS Northwest Region	Appendix A contributor (tracking, monitoring and enforcement; NMFS impacts)
Jamie Goen	NMFS Northwest Region	NMFS Project manager, Chapter 2
Michael Taylor	Consultant	Impact analysis, processors; model development
Ed Waters	Consultant	Data analysis, model development, income impact estimates
Kevin C. Duffy	NMFS Northwest Region	Document management for completion of EIS

CHAPTER 9 **ACRONYMS AND GLOSSARY**

Acronym	Definition
ABC	allowable biological catch. The ABC is a scientific calculation of the sustainable harvest level of a fishery and is used to set the upper limit of the annual TAC. It is calculated by applying the estimated (or proxy) harvest rate that produces maximum sustainable yield to the estimated exploitable stock biomass (the portion of the fish population that can be harvested).
ACL	annual catch limit
AFA	1998 American Fisheries Act
AMP	Adaptive Management Program
BCC	Bird of Conservation Concern
B _{MSY}	the biomass that allows maximum sustainable yield to be taken
BRD	bycatch reduction device
BSAI	Bering Sea/Aleutian Islands
Bycatch EIS	The Pacific Coast Groundfish Fishery Management Plan Bycatch Mitigation Program Final Environmental Impact Statement
CCA	Cowcod Conservation Area(s)
CDFG	California Department of Fish and Game
CDQ	community development quotas
CEQ	Council on Environmental Quality
CFA	Community Fishing Association
CFGC	California Fish and Game Commission
CFR	Code of Federal Regulations
Council	Pacific Fishery Management Council
CPS	coastal pelagic species
CPUE	catch per unit of effort
CV	coefficient of variation

Acronym	Definition
CZMA	Federal Coastal Zone Management Act
DAP	dedicated access privilege
DEIS	draft environmental impact statement
DSL	Division of State Lands
DTS	Dover sole, thornyhead, and trawl-caught sablefish complex
EA	environmental assessment
EBFM	ecosystem-based fishery management
EC	Enforcement Consultants
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EFHRC	Essential Fish Habitat Review Committee
EFP	exempted fishing permit
EIS	environmental impact statement
EMS	electronic monitoring system
ENSO	<i>El Niño</i> Southern Oscillation
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	The instantaneous rate of fishing mortality. The term “fishing mortality rate” is a technical fishery science term that is often misunderstood. It refers to the rate at which animals are removed from the stock by fishing. The fishing mortality rate can be confusing because it is an “instantaneous” rate that is useful in mathematical calculations, but is not easily translated into the more easily understood concept of “percent annual removal.”
FCZ	Fisheries Conservation Zone
FEAM	Fishery Economic Assessment Model
FEIS	final environmental impact statement
FEP	Fishery Ecosystem Plan
FERC	Federal Energy Regulatory Commission
FMA	Fishermen’s Marketing Association
FMP	fishery management plan
F _{MSY}	the fishing mortality rate that maximizes catch biomass in the long term
FMU	fishery management unit
FR	Federal Register

Acronym	Definition
GAC	Groundfish Allocation Committee
GAO	Government Accountability Office
GAP	Groundfish Advisory Subpanel
GCA	groundfish conservation area
GMT	Groundfish Management Team
GOA	Gulf of Alaska
GPS	global positioning system
HAPC	habitat areas of particular concern
HG	harvest guideline(s)
HMS	highly migratory species
IBQ	Individual bycatch quota
IEP	Independent Experts Panel
IFQ	individual fishing quota
IMPLAN	Impact Analysis for Planning - a regional economic impact model
INPFC	International North Pacific Fishery Commission
IPHC	International Pacific Halibut Commission
IRFA	initial regulatory flexibility analysis
LAP	limited access privilege
LAPP	limited access privilege program
LE	LE fishery
LEP	Limited Entry Permits
LO	lack of objection
M	instantaneous rate of natural mortality (as opposed to F, fishing mortality)
MAFMC	Mid-Atlantic Fishery Management Council
MBNMS	Monterey Bay National Marine Sanctuary
MBTA	Migratory Bird Treaty Act
MFMT	maximum fishing mortality threshold
MLPA	Marine Life Protection Act
MMPA	Marine Mammal Protection Act
MPA	marine protected areas
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSC	Marine Stewardship Council

Acronym	Definition
MSST	minimum stock size threshold
MSY	maximum sustainable yield
mt	metric ton
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration – the parent agency of National Marine Fisheries Service
NOI	notice of intent
NPFMC	North Pacific Fishery Management Council
NPOA	National Plan of Action
NRC	National Research Council
NTEP	National Type Evaluation Program
NWFSC	Northwest Fisheries Science Center
NWR	National Marine Fisheries Service, Northwest Region
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
OFWC	Oregon Fish and Wildlife Commission
OLE	Office of Law Enforcement
OPAC	Ocean Policy Advisory Council
OSCZ	Ocean Salmon Conservation Zone
OSHUA	Optimum Species Harvesting Unified Allocation
OTC	Oregon Trawl Commission
OY	optimum yield
PacFIN	Pacific Coast Fisheries Information Network. Provides commercial fishery information for Washington, Oregon, and California. Maintained by the Pacific States Marine Fisheries Commission.
PBR	potential biological removal
PDO	Pacific decadal oscillation
POP	Pacific ocean perch – a rockfish species that was declared overfished in 1999
PRA	Paperwork Reduction Act
PSMFC	Pacific States Marine Fisheries Commission

Acronym	Definition
QP	quota pound
QS	quota share
QSM	quota species monitoring
RCA	Rockfish Conservation Area
RCW	Revised Code of Washington
RFA	Regulatory Flexibility Analysis, or Regulatory Flexibility Act
RFFA	reasonably foreseeable future action
RIR	Regulatory Impact Review
ROD	Record of Decision
RPC	raw product costs
SAC	Sanctuary Advisory Council
SAFE	stock assessment and fishery evaluation
SAFMC	South Atlantic Fishery Management Council
SAR	stock assessment reports
SFA	Sustainable Fisheries Act of 1996 – amended the MSFCMA
SFT	selective flatfish trawl
SHOP	Shoreside Hake Observation Program
SPR	spawning potential ratio
SRP	Scientific Research Permits
SSC	Scientific and Statistical Committee
TAC	total allowable catch
TIQC	Trawl Individual Quota Committee
TISEC	tital in-stream energy conversion
T _{MAX}	the maximum time to rebuild an overfished stock, according to National Standard Guidelines. Depends on biological, environmental, and legal/policy factors
T _{MEDIAN}	median year
T _{MIN}	The minimum time to rebuild an overfished stock, according to National Standard Guidelines. Technically, this is the minimum amount of time in which a fish stock will have a 50 percent chance of rebuilding if no fishing occurs (depends on biological and environmental factors).
T _{TARGET}	the target year, set by policy, for a fish stock to be completely rebuilt
U&A	usual and accustomed (usually used when referring to tribal fishing, hunting or gathering areas)

Acronym	Definition
USFWS	U.S. Fish and Wildlife Service – a representative of USFWS is a nonvoting member of the Council
VMS	vessel monitoring system
WCGOP	West Coast Groundfish Observer Program
WCN	World Conservation Union
WDFW	Washington Department of Fish and Wildlife – a representative of WDFW sits on the Council
WFWC	Washington Fish and Wildlife Commission
WPFMC	Western Pacific Fishery Management Council
YRCA	Yelloweye Rockfish Conservation Area

CHAPTER 10 COMMENTS ON THE DEIS AND RESPONSES

10.1 The Proposed Action

10.1.1 Program Costs

Commenters: Fishermen's Marketing Association; Fort Bragg fishery participants; Environmental Defense Fund et al.; Oregon Trawl Commission; Pacific Coast Federation of Fishermen's Association; The Nature Conservancy; Tommy's Marine Service

Seven commenters directly addressed program costs. Those comments are summarized as follows along with our response. Other commenters addressed program costs as a justification for modifying elements of the tracking and monitoring program. These comments are summarized and responded to under the section on tracking and monitoring.

Comment 1: Costs are not fully divulged or analyzed. The range of cost estimates varies greatly. Industry-born costs and fee structures are not specified. Incremental costs have to be specified, as well as areas of cost savings. Only costs directly necessary for the management of the trawl rationalization program should be included (costs related to the collection and processing of data not needed for the catch shares program should not be included). The lack of well-developed cost information violates NEPA.

Response: The DEIS covered a range of potential costs. The economic information provided was sufficient for NEPA purposes and adequate for a reasoned choice among the alternatives.

Additional economic information is provided in RIR/IRFA in this FEIS (see Appendix H). This additional information describes costs along with estimates of the distribution of these costs between the Federal government and the private sector.

Comment 2: Costs are more than industry can bear and the amount industry pays should be limited to the 3 percent specified in the MSA. Catch monitoring should not impose a disproportionate cost on small vessels.

Response: Analyses indicate that the program benefits will outweigh the program costs. One commenter mentioned that program compliance costs in combination with the costs of acquiring QS would be too much of a burden. In response, it should be noted that the amounts that industry must pay to support program costs should reduce the value of the QS. For those participants who feel the costs are too much of a burden, they have the option of selling or leasing their QS.

The MSA states that fees charged for LAPPs are in addition to other fees charged under the MSA. Congress explicitly allows the Secretary to require use of specified gear, require that observers be carried on vessels, and collect royalties. Requiring that industry make arrangements for the presence of a trained observer as a condition for participating in the program does not violate the 3 percent limit on cost recovery, which is specified in the statute to collect agency costs of implementing the LAPP programs. Industry payments for observers go directly to private companies and will vary based on labor markets and private contractual arrangements rather than any fee established by the government.

Since arrangements to pay for observers will be among private parties, the government has little control over the payment structures and the relative costs imposed on small vessels. As noted at the April 2010 Council meeting (http://www.pcouncil.org/wp-content/uploads/I1b_SUP_PSMFC_RPT_APRIL_2010_BB.pdf), the agency intends to cover part of the observer costs, subject to the availability of Federal funding, during the first three years of the program. In addition, as stated at Council meetings, vessels can and are encouraged to coordinate with each other and with the observer providers to reduce costs and provide more efficiency.

Comment 3: Intent to have industry directly pay for some costs (in excess of 3 percent) should have been disclosed in the EIS.

Response: The analysis in Section A-2.2.3 of the EIS indicates that it is likely that industry would have to pay for the observer and shoreside monitoring costs as a payment in addition to the 3 percent. Direct payment for observers is also mentioned at the bottom of page 293 and page 297 of the DEIS. Adjustments will be made to the sections on impacts on harvesters so that it will be easier for the public to find this information. It is also highlighted in the RIR/IRFA attached to this FEIS. The public will have additional opportunity to comment on the Council recommendations during the comment period on the Amendments and on the proposed rules to implement the Amendments.

Comment 4: Benefits will lag costs. Industry will not be able to cover increased costs, particularly for observers, in the interim or the long-term.

Response: As noted at the April Council meeting, the agency intends to cover part of the observer costs, subject to the availability of Federal funding, during the first three years of the program (see document on website provided above). This is intended, in part, to address the transition period.

In specific response to this comment, the EIS recognizes that not all benefits from the program will occur at inception (page 295). The EIS anticipates that the value of the fishery will increase through a variety of mechanisms, including increased efficiency of operations of existing vessels, the transfer of effort to the most efficient vessels, and increased retention of target species. For the nonwhiting trawl fleet alone, it is anticipated that the first two of these mechanisms may yield benefits of around \$14 million. With respect to transfer of quota to more efficient vessels, while QS transfers will be prohibited in the first two years, there would be an opportunity for QP to be transferred annually to the most efficient producers. The more difficult it is for vessels to cover their costs, the more likely and rapidly transfer of QP to most efficient operators will occur. The EIS discusses the possibility that it may take more time for markets to develop to absorb increases in the retention of target species.

However, it is expected that the initial benefits from increased efficiency should compensate for the increased compliance costs.

In general, within the limits of the available data and the models that can be constructed using that data, the analysis projects impacts. The Council and the agency recognize there is uncertainty about the eventual impacts; the program contains many opportunities for adaptive response if actual impacts vary from those projected in a substantially negative fashion.

The Council and the MSA are both very clear that the LAPP systems provide revocable non-compensable privileges, subject to modification. The MSA and the Council's FMP allow the Council to modify the program at any time, after going through the appropriate public process. Additionally, the Council specifically set aside 10 percent of quota for adaptive management, included a program review after five years, and a review of accumulation limits after two years. Also, there will be additional opportunity for review and modification during the specification process through which the Council establishes its biennial regulations.

10.1.2 Monitoring, Compliance, and Control Systems

Commenters: Arctic Storm Management Group, Environmental Defense Fund, Oregon Trawl Commission, The Nature Conservancy, Tommy's Marine Service, United Catcher Boats

Comment 5: In order to reduce costs, the catch monitoring program should be a simple, "bare minimum" program sufficient to verify catch and make the IFQ/co-op programs work.

Response: NMFS will implement a monitoring program sufficient to make the trawl rationalization program work while minimizing cost where possible. As the commenter states, full catch accounting is crucial to the program's success. This will be accomplished through at-sea observers to monitor discards, shoreside monitors to document landings, and the requisite reporting, data processing, and data storage systems. Harvesters will face costs from several sources, including costs specifically for at-sea observers and cost recovery fees intended to recover the agency's actual costs directly related to the management, data collection, and enforcement of the LAPP program.

While NMFS will establish observer duties and priorities, as well as specify harvesters' obligations through regulation, the amount charged for observers will be determined by third party providers and is also governed by applicable maritime wage laws. Observer work duties would prioritize catch monitoring over other duties as long as any other statutory requirements can be fulfilled (e.g., documenting protected species interactions consistent with the ESA). Since vessels are typically assessed at a flat daily rate based on time on board the vessel, there is likely little or no incremental cost of additional duties (e.g., biological sampling) as long as these tasks can be accomplished in a normal work day in addition to all duties related to catch monitoring.

Shoreside monitors also will be contracted through third party providers, with any costs for their services negotiated between the provider and first receiver (the responsible party for landings) with NMFS establishing basic requirements including job qualifications. In that respect the discussion above is relevant, MSA §303A(e) states that cost recovery under LAPPs shall be for programs "directly related to and in support of" the LAPP. NMFS must implement an adequate monitoring program to make the trawl rationalization program work effectively. These types of costs would be covered through a cost recovery fee (up to 3 percent of ex-vessel revenues), rather than third party contractual arrangements. The cost recovery rulemaking will be done as a trailing action after the Council has developed the mechanism, per the statutory requirements.

Comment 6: Fishery observers should not be placed on catcher vessels in the whiting mothership sector, because monitoring of the small amount of discards likely to occur could be accomplished just as effectively and at less cost with EMS, including cameras. A similar comment was made with respect to shoreside whiting catcher vessels.

Response: The preferred alternative specifies observers on whiting catcher vessels. NMFS has stated that it intends to work with the Council in the future to determine whether EMS might be an appropriate type of monitoring for both mothership and shoreside whiting catcher vessels.

Although neither whiting mothership catcher vessels nor shoreside whiting catcher vessels engage in sorting of catch at sea, they vary somewhat in operational characteristics. Mothership catcher vessels detach the codend from the trawl net and deliver it to the processor. Shoreside catcher vessels dump unsorted catch into the fish hold for delivery to the processing plant. In both cases, the intention is that all of the catch is retained for delivery with monitoring occurring at the processing location. Compliance with this requirement may be relatively straightforward, but accurate estimation of discards, whether unintentional or due to exigent circumstances (e.g., equipment failure, emergency) may not be possible with current EMS technology. Although discards may be low in most cases, there may be situations where large volumes of fish are discarded (because of problems with the trawl net, for example).

Similarly, even small amounts of bycatch species discard need to be identified by species if constraining sector allocations apply. Current technology may not allow accurate species identification in these situations. Commenters note that EMS with cameras has been tried in the shoreside whiting fishery under EFPs. The Council Enforcement Committee has stated that human observation will be necessary because currently this fishery is subject to a “maximized retention” requirement that allows some level of self-reported discards, while under IFQ management this will change to a full retention requirement (see Agenda Item E.10b, Supplemental EC Report, June 2009). Furthermore, incentives will change under IFQs, which make harvesters fully accountable to cover all catch with QP and increase the motivation to misreport or under-report discards (especially of highly constraining bycatch species). Harvesters are likely to be more motivated to evade detection so the greater scope for vigilance offered by a human observer is necessary.

Comment 7: Shoreside monitoring provisions could be streamlined, which would lower costs. Recommendations are to allow substantial flexibility in the deployment of observers to various tasks (e.g., shoreside compliance monitors, redeployment among vessels as part of a single contract); eliminate processor production reports because compliance monitors will be gathering the same information; ensure that compliance requirements (landing declarations, site licensing) do not reduce vessels’ flexibility in determining landing locations; use observer and shoreside compliance monitor supplied information to track catch against IFQ, rather than the official record of landed catch; and do not require electronic logbooks unless cost savings can be demonstrated.

Response: As supported in the attached RIR/IRFA (Appendix H), the DEIS found that harvesters are likely to experience revenues greater than costs (see also Appendix A, pp 409-418). The monitoring and compliance program will be specified through rulemaking (the program components rule). With respect to measures to allow greater flexibility in deploying observers and shoreside compliance monitors, NMFS intends to streamline regulatory requirements through the public Council process to achieve flexibility.

Comment 8: Develop EMS for fixed gear used under the IFQ program, because use of fixed gear provides economic and environmental benefits. However, because of lower catch volume and associated revenue, observer costs would be a disincentive to switch from trawl gear to fixed gear.

Response: As stated in other responses, the monitoring program must accurately account for total catch. If the efficacy of an EMS can be demonstrated (either through the EFP as discussed by the commenter, through the adaptive management program implemented in year 3 of the program, or other means) future Council decision-making could lead to program modifications to allow EMS to substitute for observers. The Council, in developing their preferred alternative, intended to provide fishermen with the flexibility to use fixed gear under the IFQ program. Overall, IFQs are intended to give fishermen greater flexibility to discover profitable fishing strategies based on costs and opportunities. This might prompt innovation by harvesters to find ways to profitably use fixed gear even with the additional cost of paying for observers. At the same time, the Council and NMFS support continued trials to test EMS for this use.

Comment 9: Baseline socioeconomic data should be collected prior to implementation as well as post-implementation to better understand program effects, but the DEIS does not explain why such baseline data are not being collected.

Response: The Council's preferred alternative (element A-2.3.2) includes a mandatory data collection program for socioeconomic data (costs, revenues, ownership, and employment), which would be implemented as part of the proposed action, and notes that collection before program implementation would be beneficial (see Appendix D, p. D-17, D22-23). The DEIS does specify that baseline socioeconomic data should be collected both before and after program implementation. These regulations will be proposed in the program components rule.

In addition to the mandatory data collection program, NMFS Northwest Fisheries Science Center is developing a voluntary data collection program regarding social impacts. The collection is designed to provide a baseline description of the industry, as well as allow for analysis of changes the program may create for individuals and communities in the fishery. The study includes both pre-implementation information and post-implementation information (see 75 Federal Register 26197, May 11, 2010).

Comment 10: The EIS should explain what protections would be applied to confidential business information that might be collected. In particular, information on sale and lease prices for IFQs and co-op shares may be collected in a "central registry" and this information should not be made public, especially in unaggregated form.

Response: Release of information is controlled by the Freedom of Information Act and the data confidentiality provisions in MSA §402(b) (and pursuant regulations at 50 CFR 660 Subpart E). Generally speaking, unaggregated data cannot be released.

Comment 11: Because violations can be detected through catch monitoring data systems, additional enforcement presence seems unnecessary under the program.

Response: The Council has an ongoing role in the design of the enforcement program through its Enforcement Consultants (EC) committee. The EC represents both state and Federal enforcement agencies. Preliminary estimates of changes in enforcement staff necessary for the trawl rationalization program are found on page 577 of the DEIS. The RIR/IRFA in this document includes enforcement cost estimates based on a plan adopted by the Council at the April 2010 meeting. As the commenter notes, "enforcement is a critical piece of management," but the assertion that the catch monitoring system alone will be a sufficient enforcement tool is incorrect. Many types of violations by their very

nature will not be detected through catch monitoring, because their intent is to frustrate the monitoring system.

Catch shares (IFQs, co-op shares) fundamentally change the incentive system. While individual accountability is expected to result in positive behavioral changes, such as the discovery of bycatch reduction methods, the incentive to evade catch accounting can increase. Enforcement is thus a critical piece of the program's integrity; if participants are not confident that others are playing by the rules, or will be prosecuted if cheating, each person's willingness to abide by the rules is degraded. In addition, given the likelihood that the violations most likely to threaten the integrity of the program are those where catch monitoring is evaded, enforcement is more than just detection. It also involves developing cases by bringing forward admissible evidence and pursuing prosecutions. To the degree that changed incentives increase the likelihood of catch accounting evasion, more enforcement presence will be necessary.

10.1.3 Initial Allocation of Catch Shares, IFQ

Commenters: Arctic Storm Management Group; Coos Bay Trawlers Association; Crab Boat Owners Association; Deronden-Pos, Henry; Hawley, Keith; Fishermen's Marketing Association; Fort Bragg fishery participants; Natural Resource Consultants (Pacific Dawn Fisheries); The Nature Conservancy; Ocean Gold Seafoods, Inc.; Oregon Trawl Commission; Starbound LLC; United Catcher Boats; and Yeck, Fred Seadawn Fisheries

10.1.3.1 General Comments on Allocation of Catch Shares

Comment 12: Creating a fishing business is capital intensive. The next generation won't be able to afford to fish. Fishing has always been a "work your way up from the bottom" business. We need a forward-looking management plan that provides a transition to a rationalized fishery, without the burdens of significant additional investment the average fisherman cannot afford and will likely not make. It will require the redirection of limited capital, badly needed for infrastructure and vessel improvement to acquisition of needed quota.

Response: This is a forward-looking management program. It is expected to improve the economics of the overall trawl fishery. Economic analysis of the fishery indicates that the average nonwhiting shoreside fisherman is either breaking even or losing money (not fully covering its capital costs). Fishing businesses that don't receive an initial allocation may participate either by acquiring QP each year from quota shareholders or acquiring long-term security through the purchase of QS. Those fishing businesses that do not choose to acquire QS will have to compete each year in the market for QP. Their ability to purchase QP will depend on their ability to be more efficient than other fishing businesses, and thereby more able to offer a higher price for the QP. Fishing businesses that choose to do so will be able to increase the security of their investments by acquiring QS.

The Council recognizes that for new entrants, the cost of acquiring individual quota will add to the expense of entering the fishery. An increase in profits (before taking into account the cost of the quota and normal profits after taking into account the cost of the quota) and stability is expected to compensate for the increase in costs. Under status quo management, the value of a new entrant's capital investment would be at greater risk because of the potential erosion of fishing opportunity through the increased effort of others. With respect to the capital badly needed for infrastructure and vessel improvements, this is a condition that has occurred under status quo management. There is no reason to believe that continuation of status quo would improve the situation; however, under IFQs, greater

economic stability may facilitate a safer fleet with a stronger infrastructure. Section A-2.2.2.d of Appendix A to the EIS identifies ways in which the Council considered the needs of new entrants.

With respect to new entrants working their way up from the bottom, the QS system provides an opportunity for individuals such as crew members to accumulate capital. For example, crew members might invest in some QS and sell their QP to the vessel each year, creating a stream of income which may be accumulated to allow them to purchase more QS and eventually a vessel.

Comment 13: The initial allocation of harvest privileges to shoreside fish processors is not legal. Specifically, the Council lacks statutory authority for such allocations. Shoreside processors do not “substantially participate” in the fishery. Even if shoreside processors could receive direct allocations to harvest fish, the allocations are based on processing history and are in effect shoreside processing privileges, which are not authorized under the MSA. In addition, the allocations will reduce competition and have anticompetitive effects. Finally, the allocation to processors are not “fair and equitable” as required by National Standard 4: 20 percent of the available harvest is taken off the top and allocated to processors, and harvesters’ bargaining power is decreased while processors’ power is increased.

Response: The Council’s preferred alternative designated that 20 percent of the shoreside harvest allocation of whiting would be initially allocated to shoreside processors, based on those processors’ history. The Council concluded that this initial allocation was fair and equitable, thus consistent with section 303A(c)(5) of the MSA, which requires the Council to “ensure fair and equitable allocations, including consideration of (i) current and historical harvests; (ii) employment in the harvesting and processing sectors; (iii) investments in, and dependence upon, the fishery; and (iv) the current and historical participation of fishing communities .” As explained in Section A-2.1.1.a (Appendix A) of the EIS, the Council took the statutory factors into account and determined that, among the various alternatives under consideration, the initial allocation of whiting harvesting privileges as a 20/80 percent split to processors and current permit holders was fair and equitable.

NOAA does not interpret MSA 303A(c)(5)(E) to prevent shoreside processors from receiving harvesting privileges. Section 303A(c)(5)(E) states that in developing a LAPP to harvest fish, a Council shall “authorize LAP to harvest fish to be held, acquired, used by, or issued under the system to persons who substantially participate in the fishery, including in a specific sector of such fishery, as specified by the Council.” The agency’s interpretation of that provision is that those who substantially participate in the fishery must be among those eligible to acquire QS, but are not the only entities or persons who can receive QS. In other words, as long as those who substantially participate in the fishery are included as those eligible, the provision of the statute is satisfied. The Council’s eligibility criteria provide QS to all owners of existing limited entry permits; hence to those entities that currently substantially participate in the trawl fishery.

As noted above, Section 303A(c)(5)(A) covers initial allocation and requires that the Council consider four factors in determining what would be a fair and equitable initial allocation. Of these four factors, three either implicitly or explicitly require the Council to take into account processing activities: (ii) employment in the harvesting and processing sectors; (iii) investments in, and dependence upon, the fishery; and (iv) the current and historical participation of fishing communities. As explained above, the Council considered a variety of different initial allocation criteria, and concluded that the preferred alternative was fair and equitable, and took into account the required factors.

The commenter also asserts that the allocation of harvesting privileges to processors constitutes the allocation of an opportunity to process a certain share of the catch and is therefore a processing privilege, and as noted by the commenter, such allocation would be inconsistent with past agency legal

opinions. In response, the nature of the primary business activities of those owning the QS does not change the nature of the privilege. The privilege represented by the IFQ is the privilege of catching the fish, nothing else

Finally, the commenter objects to the allocation of QS to processors because such an allocation will reduce competition and have anticompetitive impacts. This issue and the potential for anticompetitive results has been analyzed extensively in the EIS and was discussed and considered carefully by the Council. During development of the trawl rationalization program, the NOAA Office of General Counsel (GC) had informal consultations with the Antitrust Division of the U.S. Department of Justice. Based on those informal consultations and analysis of relevant facts and applicable legal rules, NOAA GC submitted a letter to the Council dated October 11, 2008, in which the antitrust savings clause in Section 303A of the MSA was noted and advised “that any fishery participants that are uncertain about the legality under the antitrust laws of the United States of any of their anticipated activities should consult legal counsel prior to commencing those activities.” The NOAA GC letter provided citations to guidance or resource documents available on the Federal Trade Commission website. The NOAA GC letter is available on the Pacific Council’s website at http://www.pcouncil.org/bb/2008/1108/F3d_SUP_GC_1108.pdf.

Comment 14: As a substantial participant in the fishery, the Nature Conservancy should be allocated quota.

Response: The Nature Conservancy cites as evidence of its status as a fishery participant its ownership of limited entry permits and that it has partnered with fishermen and local communities to continue fishing those permits using more sustainable practices. The EIS assumptions and the policy recommended by the Council both anticipate that the Nature Conservancy would receive an initial allocation of QS based on the permits it owns, i.e., they will qualify for QS just as any other permit holder qualifies for QS.

10.1.3.2 Allocation Formula, General

Comment 15: With respect to the initial allocation of catch history to catcher vessels in the mothership sector, the commenter supports the allocation periods and criteria but states that it is important to recognize that in the original Council motion, the word “worst” was purposefully not included and the motion just stated: “drop 2 years.” It was the intent of the PFMC to allow the permit owner the ability to decide which years to drop. Furthermore, there is no requirement for a vessel dually qualified in the MS and SS whiting fisheries to have the same drop years in both sectors.

Response: The word “worst” was used in the write up of the Council motions based on the assumption that no permit holder would choose to drop years that would result in a lesser allocation. Worst was interpreted to mean “worst” after taking into account relative catch history. Nevertheless, the commenter is correct and the language has been adjusted to state only that “two years” will be dropped, so that the permit owners might be allowed to choose to drop years other than their worst years. The commenter is correct that there is no requirement for a vessel dually qualified in the MS and SS whiting fisheries to have the same drop years in both sectors.

Comment 16: With respect to the analysis, one commenter noted that analysis of the impacts relative to the recent fleet activities might be improved.

Response: Some of the information sought by the commenter was available in Appendix A, covering the IFQ program. However, in response to this comment, Appendix B, covering the co-op program, has been augmented with (1) counts of the numbers of vessels participating in recent years and those eligible to participate under Amendment 15; and (2) a graph comparing the allocation of QS to each permit against the permit's recent harvest shares.

Comment 17: One commenter opposes the inclusion of additional qualifying years for determining the initial allocation and/or imposing a recent harvesting requirement, another supports the allocation qualification and catch history requirements for mothership catcher vessels that were adopted, and another voiced general support of the initial allocation formulas.

Response: No additional qualifying years or recent harvesting requirements have been imposed. For the at-sea mothership delivered, estimates of quota allocations have been updated based on new vessel identifier information acquired by PacFIN.

Comment 18: Several commenters addressed the allocation qualification and catch history requirements. Two commenters expressed a belief that MSA recency requirements are not being met because the allocation period of 1994-2003 is too out of date. One commenter suggested extending the history years to include years 2004 up to 2009 or as recent as possible. Another suggested increasing emphasis on recent years by moving the start of the allocation period from 1994 to 1997 and the end from 2003 to 2006 (and using 2003 through 2006 for the allocation period for overfished species), recognizing a new control date of January 1, 2007. The commenter further stated:

- This plan considers historical participation that will be 17 years old at the time of implementation (including harvest taken leading up to the groundfish disaster) but not 7-year-old history.
- It rewards the inefficiencies, inadequate infrastructure and lack of investment that characterized the qualifying year window. Since 2000 we have seen significant changes in the markets and technology in groundfish processing. Active fishermen will be required to buy or lease quota upon implementation of this program just to achieve their status quo fishing levels prior to its implementation.
- Approximately 40 percent of the nonwhiting groundfish allocated under this plan go to permits that are not active participants in the fishery. The initial allocation and species mix do not provide enough fish to live on.
- The allocation period includes years with inaccurate species composition and discard data that will skew the picture of the true state of nature.

Several other commenters voiced support for the Council's qualifying years. Those commenters expressed concern that any amendment to the allocation qualification and catch history requirements would result in delay in implementation.

Response: In determining initial allocations, the Council is required to consider several factors including current harvests and historic harvests. See 16 U.S.C. § 1853a(c)(5)(A); see also 16 U.S.C. § 1853(b)(6). Appendix A to the EIS includes a review of the Council's consideration of all of these factors, including a discussion of the rationale for considering a variety of dates for the allocation period, including start dates of 1994 and each year from 1997 through 2001. The allocation dates selected represent a balance between emphasis on more recent history and considering the historic fishing opportunities which may have had a determining effect on the levels of capital investment by individual firms. The start date of 1994 was selected because 1994 was the first year of the license

limitation program. The decision to utilize a long allocation period was deliberate; it is likely that capital investment is based on longer term opportunity and that capital persists after contractions in the fishery such as that reflected by the disaster declaration in 2000. On this basis it is appropriate to give some weight to landings from the 1990s. Because more fish was taken during that time period, the relative pounds approach (measuring catch history as a vessel's share of total catch) reduces the emphasis on a pound of fish caught in the 1990s as compared to a pound of fish caught after 2000. While some argue that fishermen who caught fish in the mid-1990s caused the disaster and should not receive QS for that fish, the catch taken in the mid-1990s was in line with what was allowed under the regulations and believed to be sustainable at the time.

The Council selected the ending year of 2003 because that year corresponds to the previously announced control date for the fishery. The Council adopted and published the control date of November 6, 2003. See 69 Fed. Reg. 1563 (Jan. 9, 2004); 70 Fed. Reg. 29713 (May 24, 2005). The Council believes it very important that the 2003 control date be used in order to prevent future fishery disruptions. The purpose of announcing a control date in advance of developing a LAPP is to discourage speculative entry into a fishery and increased harvest while the Council goes through the process of developing the program details. If the Council develops a pattern of announcing and abandoning control dates, then the announcement of control dates will become a signal to harvesters to intensify their efforts to catch fish in order to increase their odds of qualifying for greater initial allocations. Such a response would be disruptive to fisheries and exacerbate the challenges of meeting conservation objectives. Additionally, abandoning the original control date would reduce the perceived fairness of the program by rewarding those who fished speculatively after the control date (fishing primarily on the chance that the control date would be abandoned and they would acquire more quota as a result of their post control date fishing) at the expense of those who heeded the control date.

Further, the public was given significant notice of the use November 6, 2003, as a potential control date. The notice was originally published in the Federal Register on January 9, 2004, and an additional notice was published on May 24, 2005. Both notices were posted on the Council's website, with an explanation of the possible consequences of the control date. In addition, starting in October 2003, the Council and its Trawl Individual Quota Committee, held numerous public meetings and discussions at Council meetings on the trawl rationalization program, including the use of the control date and the alternative qualifying periods.

The Council disagrees with the commenter's assertion that Amendment 15 to the Groundfish management plan created a new control date of January 1, 2007, that should be controlling here. Nowhere does Amendment 15 address the 2003 control date or purport to change the qualifying period for the Groundfish trawl program. Amendment 15 was a limited interim action for the non-Tribal whiting fishery issued in anticipation of the trawl rationalization that in no way attempted to address matters beyond its limited scope. Moreover, the Council has explicitly stated that vessels that qualified for whiting fishery participation under Amendment 15 were not guaranteed future participation or inclusion in the Pacific whiting fishery under the provisions of Amendment 20 (see <http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-15/>)

With regards to "recency" concerns, the Council does take into account recent participation patterns in the fishery by allocating QS to current permit holders rather than to individuals or vessels that originally caught the fish. In this way, during the extensive period required to develop a program of this kind, entry and exit can occur and QS can be allocated in a less disruptive manner than would occur if the allocations went to the individuals who caught the fish historically.

While the overfished species allocation formula includes logbooks for 2003-2006, these records are used to determine the fishing pattern, not the overall level of harvest activity. The Council's

methodology for allocating overfished species is significantly different than the methodology for allocating target catch. The 1994-2003 period is still used to determine the target species allocation, and the harvest patterns from the 2003-2006 logbooks are used to determine the amount of overfished species an entity would need to take its target species. In this fashion, more recent information for the fishery is used without rewarding post control date increases in effort. The 1994-2003 harvest patterns were not used to determine a target species QS recipients need for overfished species QS. This is because of the substantial changes in fishing patterns which were induced by the determination that some species were overfished and the implementation of the RCAs and because the RCAs will remain in place after the trawl rationalization system is put into place. Therefore the Council considered that an estimate of likely patterns of activity should be based on a period of time when the RCAs were in place. The RCAs were not in place for most of the 1994-2003 period but were in place for 2003-2006.

One commenter made the point that the initial allocation, because it is different from the current distribution of harvest, may reward inefficiencies and reverse recent conservation gains, including reductions in bycatch. While it is possible that the initial allocation may not go to the most efficient and innovative harvesters, because of the need to draw a balance between control date and disruption, fairness and equity, recent participation and historic participation issues, it is expected that society will benefit over the long haul as the quota is transferred to use by the most efficient harvesters as the program progresses. Independent of the initial allocation, the QS system is expected to provide substantial incentive for vessels to avoid bycatch. One hundred percent observer coverage will ensure full individual vessel accountability. These individual vessel incentives are expected to preserve gains made in bycatch avoidance in recent years.

The same commenter also made the point that the discard and catch composition data quality from those years is poor and will skew the picture of the true state of nature. The allocation formula does not use discard data from the mid-1990s. With respect to catch composition data, it has been accepted that these data may skew the mix of species any particular permit would receive away from its actual catch, simply because the catch composition data was designed to estimate catch at the fleet level rather than the individual vessel level. Catch composition data has the same problem whether it is from the mid-1990s or early 2000s. While the catch composition data might be of better quality in more recent years, the Council felt that it was more important that the control date and longer allocation period be maintained and worth the tradeoff entailed in relying on older catch composition data.

In summary, the Council did not revisit the qualifying period for initial allocation—no additional qualifying years will be considered. The Council does not anticipate delays in implementation related to the initial allocations.

Comment 19: There are many permit holders who haven't delivered a fish in 20 years that have gotten larger allotments than more active vessels. It is unfair that permits that have not made payments for the buyback program will receive an initial allocation.

Response: The permit system has only been in place since 1994 and only one permit has no shoreside landings during that period of time. All permits will receive an initial allocation of non-overfished species, Petrale sole, and canary rockfish based on the equal division of QS associated with the history of the permits bought back plus an amount of QS related to the actual 1994-2003 deliveries by the permit. The Council was aware that this will include some permits that have not made landings since the inception of the buyback loan payback program (December 2003). The Council has chosen what it believes to be the best balance among a variety of possible allocation approaches.

Comment 20: The Nature Conservancy strongly supports the Council’s action to allow entities who qualify for an amount of QS in excess of the accumulation caps a reasonable period of time (four years from the initial allocation of QS under the program) to divest of their excess quota.

Response: This is part of the Council’s final recommendations.

10.1.3.3 Allocation of bycatch/overfished species IFQ

Comment 21: Bycatch mortality rates should be applied to all management units to determine catch amounts debited to quota pounds, just as it is for Pacific halibut.

The Council considered whether the IFQ fishery should have mandatory retention of IFQ species or if participants could discard IFQ species. Application of discard mortality rates was not included for IFQ species because most bycatch species expected to constrain target fisheries assume discard mortality rates of 100 percent. For the few IFQ species that may have greater viability, tracking of discard mortality would be impracticable because it would increase the complexity and costs of the program. Complexity would increase because protocols for determination of viability have not been developed for application to voluntary discards of IFQ species. Costs would increase because of the research necessary to develop such protocols, and because of the substantial additional time an observer would need to spend documenting the amount and condition of the fish being discarded.

The situation for Pacific halibut is quite different from that of IFQ species bycatch. Pacific halibut is regulated under an international treaty with specific prohibitions, including the prohibition of retention of halibut by vessels with trawl gear. Trawl vessels are required to discard all halibut immediately. Observers track viability of halibut as part of their sampling duties; unlike other species, observers have established methods for evaluating the survival likelihood of individual halibut in order to report mortality estimates to the International Pacific Halibut Commission. Moreover, the amount of halibut bycatch in any particular tow is quite low; such that observers are able to accommodate viability sampling for Pacific halibut in addition to the observer’s other duties.

Comment 22: Fort Bragg fishery participants will be adversely affected by the allocation formula for canary rockfish. Fort Bragg nonwhiting trawl vessels will only receive the minimum allocation of canaries, since they did not get any under the Council’s final preferred alternative (“FPA”). In general, the FPA formula for the IC/IFQs gives more fish to permit holders who did not fish for certain species than to those who did. The program has been compromised by a Council decision to not allocate “overfished” species in the same manner as all the other species, but to use a method based on a constrained fleet outside of the time frame which the rest of the program is based. The allocation of overfished species should have been treated the same as all other species instead of using a different date range and methodology.

Response: The Council considered and rejected the option of allocating overfished species for nonwhiting trips using the same method as for other nonwhiting IFQ species as not appropriate under the circumstances. In particular, the relative weighting approach, by which landings for a year are measured as a percent of all landings for the year and species, would have given a particularly high amount of credit for pounds caught during the rebuilding period. Additionally, QS would have been allocated to those who targeted some of the overfished species in the mid-1990s (before they were declared overfished) rather than to those who need such QS to access current target species. Accordingly, the Council rejected the approach of using the same allocation formula for overfished species as for nonwhiting target species based on the desire to not reward bycatch during the rebuilding

period and in order to provide QS to those who would need it to cover incidental catch taken with their target species QS allocation.

In response to the situation of the Fort Bragg vessels, the Council revised its initial FPA so that all permits would receive an allocation of canary rockfish from the equal division of the pool of QS associated with the catch history of the buyback permits. This amounts to the equal division of about 45 percent of all the canary QS.

Comment 23: On page 546 of the DEIS, the Council and NMFS speculate that “Fort Bragg’s vessels do not appear to rely on fishing grounds with a relatively high bycatch of constraining overfished stocks. Therefore, covering constraining overfished species with IFQ is not expected to substantially affect Fort Bragg.” This is incorrect. Because we will not receive IFQs anywhere near our needs under the FPA for overfished incidental catch species other than canaries, we will be unable to fish for our long-time target species if Amendment 20 is passed as written.

Response: The statement that Fort Bragg vessels do not appear to rely on fishing grounds with relatively high bycatch rates of constraining overfished stocks is based on vessel logbooks from 2003 through 2006 (to determine fishing patterns) and 2003 through 2006 West Coast Groundfish Observer Program observations (to determine fleet bycatch rates). Both of these sources of data were used to analyze the alternative to allocate overfished species based on QS allocations of nonwhiting target species.

After the adoption of its FPA, the Council heard public comment with regard to concerns of the owners of Fort Bragg trawl vessels over the initial allocation of QS for constraining overfished species. The Council considered such testimony and subsequently revised its initial FPA so that all permits would receive an allocation of canary rockfish from the equal division of the pool of QS associated with the catch history of the buyback permits. The Council declined to revise the FPA for constraining overfished species other than canary.

Comment 24: Vessels should not be rewarded with larger initial allocations of QS for exceeding trip limits or being allowed to fish in restricted areas under an exempted fishing permit.

Response: The Council considered whether illegal landings or landings from trips under EFPs should be used as a basis for the calculation of initial allocations of QS. The Council motion disallows use of illegal landings, such as landings in excess of cumulative trip limits, in QS calculations. With regard to landings history from EFPs, the Council considered not only that vessels fishing under EFPs had opportunities that were not available to other vessels, but also that had the vessels not been taking part in these special activities they would have put more effort into other fisheries or groundfish targeting strategies. If vessels fishing under EFPs had put their effort into other available groundfish strategies, they would have more landings history, regulations would have been more constraining on the fleet, and the landings opportunity for other vessels not fishing under EFPs would have been diminished. After considering these issues, the Council determined that landings from trips under EFPs would count as a basis for initial allocations of QS, but landings from nonwhiting EFP trips that are in excess of the cumulative trip limits in place for non-EFP fishery would not count.

10.1.4 Ownership of catch shares, IFQ

Commenters: Environmental Defense Fund; Food and Water Watch; The Nature Conservancy; Pacific Coast Federation of Fishermen’s Association

Comment 25: The proposed action should have included an owner-operator provision that limits who can hold quota to those who actually participate in the fishery.

Response: An owner-operator or owner-on-board provision was considered but rejected. In Section A-11 of Appendix A, three reasons are identified for rejection of the provisions: first, the impracticality of such a provision in a multispecies fishery which would rely heavily on quota trading to match quota mix to catch mix; second, the substantial increase in tracking and monitoring costs that such a provision would entail; and third, the owner-operator mode of organization is less dominant in the trawl fleet than in other, smaller boat, fisheries.

Comment 26: Eligibility to own language may be overly broad. This could lead to QS being held by some outside the fishery which could dissipate the economic benefits to fishery participants and fishing dependent communities. Therefore, we propose that the Council (1) identify tracking ownership patterns as a critical data collection need and (2) commit to evaluating the effectiveness of eligibility rules in meeting the objectives of the IFQ program during the 5-year review.

Response: As identified by this commenter, the Council considered this issue several times but decided to retain broad “eligibility to own” rules because of other concerns such as enforceability and tracking issues. NMFS has already published a final rule to collect information needed to track ownership patterns, and the effectiveness of eligibility rules will automatically be reviewed with all other program provisions during the 5-year review. The commenter suggested that participants be put on notice of a potential change in ownership rules. The regulations will specify and participants will be on notice from the start of the program that the quota system constitutes the granting of a fishing privilege, not a right, and any aspect of the program may be changed without compensation. The commenter also proposed that information be collected on the disposition of QP issued to QS holders. Tracking the use of QP was considered at length as part of a use-or-lose provision and it was determined that such a tracking system would be cost prohibitive.

Comment 27: The DEIS should give greater specificity to the need for a clearly defined and enforceable limit on control. Despite Council action to the contrary, given the great complexity of relationships in the fishing industry between and among fishermen and processors, the commenter believes the affiliate test would be a more clear way to determine control. The Council should then establish a “safe harbor” exemption from control limits for certain types of desirable and transparent arrangements that promote community stability, reduce bycatch, and improve monitoring and accountability. The commenter strongly supports Council action to create such a safe harbor through a “Community Fishing Association” program.

Response: The commenter acknowledges the individual and collective rule adopted by the Council, and that types of control other than ownership are still subject to the control limits. The commenter suggests the superiority of an affiliation test under which all of the QS owned by an entity would count against any other entity that owns more than a 10 percent share of the QS owning entity. This is supported as providing a “bright-line rule” for the evaluation of ownership.

In the program adopted by the Council, control is evaluated through relationships that go beyond direct ownership. The commenter suggests nine other control standards based on rules from the Alaskan fishery. These same standards are identified in the DEIS as ones that NMFS might incorporate into its rules in order to implement the general policy guidance provided by the Council (pages A-318 and A-319). The commenter also provides different situations and arrangements that should be considered. Each of these situations is covered in the EIS.

In addition, during the Council “deeming” process on the initial allocation and appeals regulations, the Council requested that NMFS revise the original draft implementing language to make it clear that in certain situations someone could control QS by controlling QP, which would constitute a violation of the control limit. At the April 2010 Council meeting, the Council deemed the revised draft implementing language as necessary or appropriate to implement Amendment 20.

The Council has committed to evaluation of a special control limit (“safe harbor”) for community fishing associations as part of a trailing amendment.

Comment 28: Lower accumulation limits should be included in the preferred alternative. Alternative 4b supports QS accumulation limits that are so high as to be meaningless. There are no control limits on quota pounds at all.

Response: The Council adopted accumulation limits that reflect the current level of concentration in the fleet, as reflected by the harvest activity of individual permits. After consideration of a variety of approaches, the Council adopted control at levels more constraining than necessary to address concerns related to the effective functioning of QS markets. This was done in order to achieve certain objectives related to the distribution of QS ownership. The method used to develop the QS control limits is explained in the EIS. The commenter does not provide the standard by which the evaluation is made that the control limits are “meaningless.” With respect to limits on the control of QP, the limits on QP control are in place but indirect. As explained in the previous response, the Council adopted revised regulatory language to make it clear that in certain situations someone could control QS by controlling QP, which would constitute a violation of the control limit.

Comment 29: The Council should have considered the needs of smaller ports and fishing communities when setting accumulation limits. One percent is normally considered a prudent accumulation limit in IFQ fisheries. Some of the smaller ports along the West Coast could vanish completely under the scenarios adopted by the Council.

Response: Accumulation limits for IFQ fisheries range widely depending on the needs and circumstances of any particular fishery. The U.S. surf clam and Wreckfish IFQ programs have no limits and rely on antitrust laws to ensure excessive control does not occur. Limits in the New Zealand system range from 10 to 40 percent, and limits in Iceland’s IFQ system run from 12 to 35 percent. Nova Scotia has a limit of 2 percent. Limits in the halibut and sablefish IFQ fisheries in Alaska are set at 0.5 and 1.0 percent. The Council has set aggregate limits that will facilitate fleet consolidation and an increase in efficiency. It is recognized that fleet consolidation will have an impact on communities; however, other measures are provided to mitigate impacts on communities (see Section 10.1.5). Under an IFQ program, communities will have opportunities to plan and control their destiny through the acquisition of QS, if they so desire. Furthermore, the Council may use part or all of the 10 percent quota set aside in the AMP to mitigate impacts on communities and will be considering a trailing amendment to allow community fishing associations to acquire quota, potentially in excess of control limits.

10.1.5 Community involvement and Community Fishing Associations

Commenters: Crab Boat Owners Association, Food and Water Watch, Pacific Coast Federation of Fishermen’s Associations, The Nature Conservancy

Comment 30: The preferred alternative should include provisions allowing CFAs to be established rather than deferring this program component to a later, trailing action. Fishing community representatives were not adequately consulted, CFAs were not adequately considered

by the Council, and CFAs were not sufficiently analyzed in the EIS as required by the MSA. Without CFAs, the trawl rationalization IFQ will only go to limited entry trawl permit holders and not to offset effects of consolidation on other fishermen and smaller ports. One commenter provided detailed comment on how CFAs should be structured under a trailing action.

Response: The assertion that community representatives were not adequately consulted or involved in the development of the program is incorrect. The community representative on the TIQC engaged in significant outreach efforts that included meetings with community and local environmental group representatives and distribution of information to an extensive contact list. The results of this outreach effort and community concerns thereby raised was summarized in Appendix H to the Council's 2005 scoping report (see pp. 108-112). The TIQC also discussed community-related issues at length; as with all Council committees, their meetings were open to the public and opportunities for public comments from non-committee members were provided.

Another example of community outreach may be found in the 2004 Environmental Defense report submitted to the Council summarizing the results of a survey of community stakeholders and their concerns over the development of the trawl rationalization program.

The Council also distributed information to communities through various channels. First, the Council regularly publishes a newsletter detailing Council activities, including the development of the proposed trawl rationalization program ultimately becoming the preferred alternative detailed in the DEIS. In 2004, the Council also distributed a scoping information pamphlet on the proposal as part of the scoping process, which was widely distributed. An information pamphlet directed at captain and crew members in the groundfish fleet was also distributed in both English and Spanish and was posted in affected ports by Sea Grant extension agents during this scoping period. These information materials described the Council's proposed action, and explained how comments could be submitted to the Council and how to engage in the Council process.

In June 2005, the Council directed the analytical team in consultation with the Council's SSC to draft a range of alternatives for community involvement in the trawl rationalization program. Then in November 2005, the Council devoted substantial time to the consideration of options to address community impacts, including the distribution of QS to communities. DEIS Appendix A, pp. A-41 to A-42, summarizes results of the process, noting the difficulty in identifying an appropriate representative body within the community that would hold QS. As described there, at that time community leaders did not express interest in receiving an initial allocation of QS because of the administrative and political costs of managing such an allocation. Furthermore, communities (through whatever organizational mechanism) have not been precluded from acquiring groundfish limited entry trawl permits, which would make them eligible for the initial allocation of QS associated with a permit. Additionally, the Council's preferred alternative includes a very broad definition of who may own QS so communities are not precluded from acquiring QS once the program is implemented. Appendix A of the 2005 Council's scoping report also contains an analysis of community measures and effects in the context of the use of regional area restrictions.

Although the Council considered incorporating provisions for CFAs into the alternatives early in the development process, no strong recommendation or advocacy was voiced by members of the public or representatives on the TIQC, which was intended to represent a cross section of interests for the development of recommendations on structuring the trawl rationalization program. Proposals for including provisions for CFAs in the program emerged later on, when the Council was at the point of adopting a preferred alternative in November 2008, in part tied to the issue of how to deal with QS holding in excess of accumulation limits. Further refinement of the preferred alternative, which occurred at Council meetings in 2009, included additional consideration of CFA provisions.

Specifically, at the April 2009 Council meeting, Agenda Item F.4 addressed CFAs, and it was at this time that the Council concluded that it would be more appropriate for CFA provisions to be implemented through a trailing action. However, the moratorium on the transfer of QS during the first two years of the program, combined with provisions to allow divestiture of QS over accumulation limits during years 3 and 4 of the program, were designed to facilitate the transfer of QS to CFAs. The moratorium is in part intended to slow the movement of QS holdings out of communities during a time when the trailing action for CFAs can be developed and implemented in a considered fashion. Recommendations for how to structure the CFA provisions in a trailing action, provided by one commenter, are welcome and should be brought forward as that proposal is developed. The Council is likely to begin developing CFA provisions in 2010 so that they could be in place before the QWS divestiture period begins.

10.1.6 Adaptive Management Program

Commenters: Environmental Defense Fund; Pacific Coast Federation of Fishermen's Associations; Radtke, Hans

Comment 31: The DEIS should better describe the process for designing and implementing the AMP and include a quantitative analysis of the adverse effects on communities stemming from delayed implementation. The AMP should be implemented before the third year of the IFQ program, as proposed in the preferred alternative, in order to better address the adverse effects stemming from the transition from the current management system to IFQ management.

Response: Quantitative analysis of the potential impacts of delayed implementation is hampered by lack of specifics about how the program would function.¹²⁰ The AMP would not change the total amount of QP available to cover catch; instead it affects the distribution of the QP reserved for the AMP. The difference in the way QP or resulting landings would be distributed due to the AMP and the distribution based on initial quota allocations would depend on program objectives and the particular distribution formula used. Although the Council considered various approaches to how quota would be distributed under the AMP, no final recommendations for distribution formulas were identified as part of the preferred alternative. Without this information, it is not possible to quantify the differential effects of not implementing the program in the first two years.

One of the uses of the AMP is to react to unanticipated and unintended consequences of the program. By definition, it is not possible to predict associated impacts of unanticipated consequences. Given these impediments to a quantitative prediction, the DEIS presents a qualitative description of the potential range of impacts and their intensity.

With respect to the recommendation that the AMP should be implemented on day 1 of the program, it should be noted that it would still take time for the impacts of IFQ management to emerge and then to craft an appropriate response through the AMP. Thus, implementing the AMP on day 1 of year 3 may not in practice delay very much the application of AMP to emerging impacts compared to having a program framework set up on day 1 but still needing to identify the impacts that need to be addressed with AMP quota. Development of the AMP during the first two years of the program can take into account adverse impacts of the program as they emerge.

¹²⁰ These details are to be worked out during the two years before the AMP goes into effect.

10.1.7 Designating the Whiting Sector Co-ops Limited Access Privilege Programs

Commenters: Arctic Storm Management Group, Food and Water Watch, Pacific Whiting Conservation Cooperative, United Catcher Boats

Comment 32: In relation to these provisions, the co-ops for whiting mothership catcher vessels and for catcher-processors do not meet the definition of a LAPP. Furthermore, if they are considered LAPPs, any fees assessed should only be for the applicable costs directly attributable to the two fishery sectors within which the co-ops would be established and not to cross-subsidize the IFQ program for the nonwhiting fishery. One commenter supported defining the catcher-processor sector as a LAPP.

Response: At the time the DEIS was published (November 2009), the Council had taken the position that a permit should not be required for the catcher-processor co-op and that therefore the catcher-processor sectors would be a LAPP. In June 2008, the Council was advised by legal counsel that “if the allocation is issued to the co-op and the co-op is required to have a permit then the program would be a LAP but if the co-op is not required to hold a co-op permit then it would not be a LAP” (minutes of the 194th Pacific Fishery Management Council Meeting, June 6-13, 2008, p. 51). On this basis, the Council voted down a motion to include a requirement for permits for the catcher-processor co-op made by the NMFS representative to the Council (Amendment 3 to Motion 41).

However, during the regulatory deeming process, the Council decided to reconsider the issue of requiring permits for co-ops. After providing advance notice of its intent to reconsider this issue, the Council changed its position by agreeing that a permit should be required for co-ops formed as part of the trawl rationalization program in both the mothership and catcher-processor sectors. NMFS advised the Council of the necessity of permitting co-ops so that they could be effectively tracked and held accountable. By issuing a permit to the co-ops as described in the Council program, the co-ops meet the definition of a LAPP.

As indicated in the comments, the question of whether the co-ops in either sector are determined to be part of a LAPP is of concern because of the provisions in the MSA on cost recovery. Section 304(d)(2)(A) authorizes NMFS to collect fees “to recover the actual costs directly related to the management, data collection, and enforcement” of a LAPP, which “shall not exceed 3 percent of the ex-vessel value of the fish harvested.” Issues related to these cost recovery provisions will be taken up as part of a trailing action when the Council develops the cost recovery methodology required by section 303(A)(e) and NMFS during the implementation of the cost recovery program.

10.1.8 Expressions of Support for Program or Program Elements

Commenters: Midwater Trawlers Cooperative; Moore, Steve; Pacific Whiting Conservation Cooperative; United Catcher Boats

Comments 33:

- **The members of United Catcher Boats support the declaration system for participation in mothership co-ops as outlined in the preferred alternative. United Catcher Boats also supports the provision of a 20 percent minimum of catcher vessel permit holders necessary to form a co-op and that co-op membership is voluntary.**
- **The members of United Catcher Boats support the Council's preferred alternative that requires hard cap management at the co-op level of widow, canary, darkblotched rockfish,**

and Pacific Ocean Perch and the allocation methods presented in the final Council analysis and in the DEIS.

- Pacific Whiting Conservation Cooperative fully supports the final preferred alternative with respect to the catcher-processor sector.
- Midwater Trawlers Cooperative fully supports the Pacific Fisheries Management Council, and NMFS' development of Trawl Individual Quota (TIQ) for the Pacific trawl fisheries. Midwater Trawlers Cooperative has been a participant in the TIQ process at both Council and Committee meetings since inception in 2003.
- I am in favor of the individual quotas.

Response: We note these expressions of support for the program.

10.1.9 Mothership Co-op Declaration Date

Comment 34: The FEIS should explicitly identify September 1 as the date for notification of NMFS under the mothership co-op declaration system.

Response: At its April 2010 meeting, after providing public notice of its intent to reconsider its final action on this matter, the Council modified its final motion to specify that by September 1 mothership catcher-vessel permits must notify the mothership of their intent to change their mothership affiliation, and that by December 1 they must notify NMFS of the new mothership to which they are obligated for the coming year.

10.2 Need for Action, Problem Statement

Commenters: Food and Water Watch; Forve, Matt; West Coast Seafood Processors Association

Comment 35: The need for action lacks a clearly articulated vision of desired outcomes or problem statement. Furthermore, "rationalization" is not a clearly defined concept; the commenter concludes that it means "the fishery is being privatized and commoditized at the behest of special interests, and they, to persuade the public and possibly themselves, rationalize their anti-social actions." Instead, the action should focus on an outcome in the best interests of society as a whole, which would require estimates of nonmarket (unpriced) benefits.

Response: The commenter presents a lengthy discussion of possible definitions of the term rationalization, based on a footnote to the description of the proposed action on page 3 of the DEIS that lists a variety of commonly accepted definitions, which are not in any case mutually exclusive. In fact, the term "trawl rationalization" is a shorthand intended to capture social and economic objectives and associated conservation benefits of a proposed management program that includes both IFQs and co-ops. While this term may connote various aspects of all the commonly accepted definitions in the footnote, the commenter's exercise in semantics to derive an alternative rationale does not substitute for the actual, and clearly articulated, rationale laid out in the next two sections of the DEIS. DEIS Section 1.2.3 includes a succinctly stated goal: "Create and implement a capacity *rationalization plan* that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch" (emphasis added), capturing the intended meaning of the term rationalization. The

commenter's exposition of the term mainly serves to support an alternative vision, or rationale, that the commenter believes the Council should have substituted for the rationale that they actually adopted.

Comment 36: The need for action based on the claim that the trawl fishery is currently viewed as economically unsustainable is unsupported by the evidence presented in the DEIS. Second, the claim that the proposed action will reduce bycatch is not supported by the DEIS analysis.

Response: The EIS provides a detailed problem statement developed by the Council early in the process highlighting the interconnected problems of capacity, economic inefficiency, and bycatch management, which together have made it difficult for groundfish trawl sectors, and groundfish fisheries in general, to achieve optimum yield. The actual problem statement does not claim that the purported economic unsustainability of the fishery is the sole basis for the proposed action. It is relevant to note that economic analysis of the fishery indicates that the average nonwhiting shoreside fisherman is either breaking even or losing money

The second claim, that the proposed action will not reduce bycatch, uses a partial citation; the sentence in full reads "By itself an IFQ program may have few direct conservation benefits, *but substantial indirect benefits*" (emphasis added). The commenter then implies that if IFQs (or more generally, management measures making harvesters fully accountable for their catch) have no conservation benefits, then it must be instead that the proposed management program relies on a "stimulation of a conservation ethic" suggesting voluntary compliance based on a perfect alignment of self interest and social objectives in the absence of other institutional constraints. Nowhere in the DEIS is there a claim that a so-called conservation ethic by itself would be sufficient to meet the objectives of the proposed action. However, a study ((Redstone Strategy Group and Environmental Defense 2007) analyzing pre- and post-implementation performance of 10 LAPPs, including all seven U.S. programs, cites interviews with fishery participants and other sources showing that QS value "transformed the mindset of fishermen, who developed a real stake in the outcome of their fishing practices" (p. 7).

The commenter further claims that the bycatch reduction objective is not supported by analysis, and argues that the main piece of empirical evidence used to model possible bycatch reduction scenarios, results from an exempted fishing permit (the "arrowtooth EFP"), is of limited applicability, which is not acknowledged in the DEIS. In fact the uncertainties associated with using the EFP data are disclosed and discussed in Appendix C (on page C-19), containing detailed documentation of the models used in support of the impact analyses. The analysis in the DEIS supporting predictions that trawl rationalization will lead to reductions in the bycatch has a theoretical basis, informed by empirical evidence; in this context the results from the arrowtooth EFP are indicative, not predictive. The arrowtooth EFP was conducted "with requirements nearly identical to what would be expected under a rationalized fishery" (p. 244) and thus a parallel set of incentives. The model is used to show "order of magnitude" estimates of the amount of regulatory discard occurring under status quo regulations and associated loss of revenue and to present a range of increases in fleetwide revenue that could result if bycatch rates were reduced.

Conditions in the west coast groundfish trawl fishery, and characteristics of the proposed action, are in important ways unique. No other IFQ program includes complete monitoring and full accountability for such a wide range of species and is so constrained by the kind of low harvest limits imposed to rebuild overfished stocks. However, the lack of specific empirical evidence does not invalidate the expectation that under the proposed action harvesters have more incentive to avoid overfished species compared to status quo regulations, because of individual accountability and greater access to target species if bycatch rates are reduced. Other studies and reviews support the proposition that individual accountability fostered by IFQs (or the small group collective responsibility of the whiting co-ops) helps to reduce bycatch. *Sharing the Fish* ((NRC 1999), a report on IFQs requested by Congress from the

NRC, includes bycatch reduction as part of the rationale for implementing IFQs, noting that harvesters can more carefully choose their time and area of fishing, which may “reduce bycatch of non-target species since operations can be moved to target more favorable harvesting conditions, or it might allow the opportunity to develop practices that could reduce bycatch” (p. 35). The aforementioned report ((Redstone Strategy Group and Environmental Defense 2007) found that “nearly all the fisheries experienced decreases in their respective discard rates” when the LAPP was implemented.

The commenter references the “rebuilding paradox” where increasing abundance of overfished species is lagged by comparable increases in harvest limits; as bycatch becomes harder to avoid so it becomes harder to keep catches below established limits. Although it is true that bycatch will become harder to avoid as these stocks recover, the underlying incentive structure in the proposed action would still operate. Harvesters would have incentive to engage in both behavioral changes and invest in or discover bycatch reducing technology as long as these investments are less than the imputed cost of the IFQ needed to cover bycatch species.

Comment 37: The proposed action does not meet the stated purposes of increasing net economic benefits, creating individual economic stability, providing full utilization of the trawl sector allocation, mitigating environmental impacts, and achieving individual accountability of catch and bycatch.

Response: We disagree. Chapter 4 of the DEIS extensively evaluates the effects of the preferred alternative and offers evidence on how the action may address the purpose and need. Appendices A and B contain additional detailed analysis of specific program elements.

10.3 Range of Alternatives

Commenters: Daspit, William; Ecotrust; Food and Water Watch

Comment 38: Commenters claim that the Council did not consider a sufficiently broad range of alternatives. One commenter argues that alternatives should have been presented across a range “from the broad public interest at one end, to the interests of a very few at the other.” As such, the public and policymakers were not presented with a real set of choices. Commenters proposed alternatives that should have been evaluated in the DEIS but were not:

- Food and Water Watch proposes a “cap-rent-recycle model of catch share management” using fixed terms for QS ownership coupled with periodic auctions to recover resource rent. Resulting revenues would be used by government to “support eco-friendly community-based cooperative catching and marketing business models.” The commenter argues that under this alternative the social (external) cost of resource extraction would be recovered by the public. The commenter cites a statement by the Council’s SSC suggesting that fixed-term QS and auctions was not sufficiently analyzed in the DEIS (see Appendix F). A second commenter also advocated including fixed-term QS and auctions in the range of alternatives.
- Ecotrust argues for genuine “mitigation” measures to address environmental objectives. The DEIS should have included alternatives with strong incentives to reduce bycatch of overfished species and encourage switching to nontrawl gear. The commenter recommends several mechanisms that could be used to penalize fishermen who catch overfished species, but protect against market distortion and hoarding of overfished species quota. The commenter argues that the only mechanism included in the alternatives that

could potentially address these objectives—the AMP—is subject to multiple, competing claims and won't be implemented until year 3 of the program.

- **Ecotrust also advocates for initial allocation of quota shares and pounds to community entities and crew and captains or facilitating such allocation in the future (e.g., by holding back a portion of the quota share to allocate once communities have organized appropriate receiving entities). The commenter argues that the Council did a poor job in outreach to communities, which contributed to lack of inclusion of such alternatives.**
- **Mr. Daspit presents the “Optimum Species-Harvesting Unified Allocation (OSHUA) plan” that proposes a different mechanism to allocate harvest opportunity to individual fishery participants. Under this plan, catch shares would be allocated to groundfish limited entry permits (fixed gear permits, open access, and trawl). The commenter includes a detailed description of the plan in his comment, which he notes was described at Council meetings during public comment periods.**

Response: CEQ regulations at 40 CFR 1502.14 call on agencies to “rigorously explore and objectively evaluate all reasonable alternatives.” Case law on this topic links the range of reasonable alternatives to the definition of the proposed action. The DEIS on page 3 describes the proposed action as creating “a management regime under which the owners of Pacific Coast groundfish limited entry permits with trawl endorsements are more individually accountable for catch of target and nontarget species harvest by the vessels that their permits are registered to.” This action is intended to address “problems with capacity, economic inefficiency, and bycatch management interconnected with problems related to the ability to achieve optimum yield (OY), the need for a precautionary management approach, the need for a flexible system that allows for variations and contingencies, long-term and short-term concerns for communities, and safety” (DEIS, p. 3, footnote omitted).

Furthermore, the Council engaged in a lengthy scoping process during which they solicited public input on a wide range of issues and proposals not only, in the words of CEQ, “to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the environmental impact statement process accordingly” (40 CFR 1500.4(g)). Bearing in mind the proposed action, purpose and need, and scoping process, below is a consideration of commenters’ proposed alternatives, which either were not considered, or considered but eliminated from further detailed analysis.

The “cap-rent-recycle model” alternative

This alternative would have government capture resource rents to be used for public purposes. The use of fixed-term QS that would be auctioned off periodically is one method to achieve such “rent capture.” The Council considered fixed terms and auctions but rejected this mechanism from further detailed study. In doing so, the Council considered the analysis contained in Appendix F of the EIS and the critique of the analysis presented by their SSC. The Council rejected inclusion of fixed-term QS and auctions in the range of alternatives, because (1) auctioning quota at the outset of the program could make it more difficult for the groundfish trawl fleet to successfully transition to IFQ/co-op management, and (2) exclusion of auctions from the range of alternative does not imply that access privileges have been irrevocably distributed.

The Council intends to give further consideration of auctioning harvest privileges during the 5-year program review required in the program adopted by the Council.

Ecotrust’s environmental “mitigation alternative”

These proposals focus on using environmental performance standards and other means to encourage trawlers to switch to fixed gear, which they assert has fewer adverse impacts on benthic habitat, to reduce and/or avoid bycatch, and to achieve other environmental benefits. In response, we note that such measures may be proposed if not already a part of the proposed action (40 CFR 1502.14(f)) but such separate measures do not have to be implemented. (Broadly, the alternatives include measures to mitigate various adverse effects to harvesters and other stakeholders and resources described in the DEIS.) Consistent with 40 CFR 1502.14(f), no additional mitigation measures have been identified. The commenter’s mitigation proposals are viewed in this context. While considering and possibly mitigating new adverse habitat impacts is an MSA provision—indeed, in 2006, the Council and NMFS implemented Groundfish FMP Amendment 19 to comprehensively address fishing-related impacts to essential fish habitat—this action is not expected to result in new habitat impacts for which mitigation could be proposed. The preferred alternative would allow IFQ holders to use fixed gear, if they choose to pursue such a strategy. While there are no incentives to encourage gear switching, the existing provision alone may have a mitigating effect compared to status quo, since trawl-endorsed permits are currently prohibited from using other gear types to fish against their bimonthly limits. Any vessel switching gear types with less habitat impacts would represent a reduction in impacts compared to existing, ongoing habitat impacts due to trawl fishing under status quo.

The commenter also recommends environmental performance standards tied to preferential allocation of quota. Such proposals may go beyond the scope of the proposed action, which focuses on creating new incentives based on individual accountability for catch, and certainly goes beyond mitigating any effects associated with the proposed action. The commenter’s bycatch reduction proposals tend to focus more on the claimed market distorting effects that quota scarcity may engender (note that the DEIS impact analysis includes an evaluation of “thin market conditions” resulting from quota scarcity).¹²¹ As stated in their comment letter, the commenter’s proposals would “punish less responsible fishermen and safeguard against malicious market manipulation.” Such proposals would add additional complexity to the program by introducing “market distortions” linked to particular policy objectives. The purported adverse effects to be so mitigated, although identified in the DEIS, cannot be precisely specified or fully predicted, making it impractical to specify such measures in advance. In this regard, the Council included the AMP in its proposal as another mitigation measure. The commenter suggests this is the only means to mitigate bycatch and so its delayed implementation means there are “no mitigation measures in place on day 1 of the Program.” However, as explained above, the proposed action as a whole is intended to be mitigative so the AMP is not the only means of mitigating adverse impacts. Also, as discussed elsewhere in these responses (see Section 10.1.6), the initial two-year hiatus in the AMP (when reserved QP are “passed through” pro rata to quota shareholders) may not make a substantial material difference in actual implementation, given that the Council would have needed time to develop methods and procedures to allocate AMP quota in any case. Additionally, since AMP quota is designed to address impacts from the program and unintended consequences, it follows that those impacts must occur before they can be addressed.

¹²¹ Furthermore, reducing bycatch, as it defined in the MSA as discards, does not by itself necessarily reduce fishing mortality—the ultimate environmental objective—if discards are converted into retained catch (in other words, the same fishing mortality rate applies). The program will result in more accurate monitoring and accounting of total catch, which will yield environmental benefits when coupled with the fact that the sum of quota pound holdings (and co-op catch history assignments) cannot exceed the trawl sector’s allocated portion of the OY/ACL. However, as discussed in Chapter 1 of the DEIS, these catch limits are specified external to this proposed action.

Initial allocation of QS to communities and to captain and crew was considered in the development of the alternatives but rejected from further consideration. The 2005 Scoping Results Document reflects preliminary consideration of these allocations. Appendix A (Section A-2.1.1) discusses the reasons why allocation proposals of this type were rejected from further consideration. In addition, response to comments on community involvement (see Section 10.1.5) discusses Council efforts to solicit input from communities during the development of the trawl rationalization proposal.

The OSHUA Plan

The OSHUA plan is beyond the scope of the proposed action, given that it considers the application of a catch privilege system to all groundfish fishery sectors. The Council discussed the OSHUA plan. Some components of the plan were part of the alternatives while other aspects were rejected. However, the Council concluded that OSHUA measures addressing the groundfish trawl fishery alone were so complicated and contentious that any expansion of scope to other sectors would have likely paralyzed the decision-making process. In the FEIS, Chapter 2 has been augmented to provide a more complete explanation of the challenges presented by the OSHUA plan.

10.4 Resources and Stakeholder Profiles (Chapter 3) and Effects of the Alternatives (Chapter 4)

10.4.1 Harvesters, Harvesting, and Bycatch

Commenters: Food and Water Watch, Tommy's Marine Service, West Coast Seafood Processors Association

Comment 39: The claim that the proposed action will increase ex-vessel revenue and profits is not supported. There is no comparison of revenue under the alternatives compared to no action (Section 4.6.2). The DEIS asserts that it is likely that buyers will be able to find new markets, yet offers no analysis or evidence. Given the impacts of increased aquaculture and imports, combined with lower per capita consumption rates, we find it impossible to understand how the DEIS can reach this conclusion.

Response: We disagree. The analysis looks at the profitability of the nonwhiting shoreside fishery before and after ITQs; it indicates that profits will increase even if revenues do not. However, the expectation is that revenues will increase as a result of more efficient use of the bycatch being allocated to them. Figure 4-7 compares ex-vessel revenue under status quo to the action alternatives. Table 4-13 provides the estimated change in efficiency as a result of consolidation. Additional program costs are taken into account in the Lian et al. (2008) analysis cited in the footnote on page 297 of the DEIS.

The commenter cites a declining per capita consumption rate and increased aquaculture production among the reasons not to expect new markets to develop. The commenter is correct that aquaculture production has increased substantially over the last 10 years (U.S. Fisheries Statistics 2008), and is correct that there has been a slight dip in the US per capita consumption (comparing 2007 and 2008 to 2006). Overall per capita seafood consumption is up by roughly just over one pound relative to the mid-1990s (from about 15 pounds to just above 16 pounds). At the same time, the price index for groundfish was at 100 in 1997 and at 165 in 2008 (a 65 percent increase). Over that same period, the gross domestic product implicit price deflator has increased by only 28 percent (U.S. Fisheries Statistics 2003; 2008). Given these changes since the 1990s and given that West Coast nonwhiting landings are approximately one half of what they were in the mid-1990s (Table 3-17), it seems reasonable to expect that there is some opportunity to redevelop markets for West Coast groundfish that were lost only due to

constraints to protect overfished species. With respect to future allocations under status quo or the alternatives, the analysis demonstrates performance of the different alternatives using a baseline.

This commenter also noted that in order to properly assess impacts on profits, the analysis needs to use monitoring and implementation costs that were produced by NMFS at the same time the DEIS was finalized (November 2009). The cost estimates used in the DEIS were those available at the time the document was drafted. Updated monitoring costs based on the Council's adopted plan are provided in the RIR/IRFA .

Comment 40: Economic benefits will accrue to the fishery only with access to larger volumes of target species which, in turn, occurs only if bycatch is reduced. The claim that bycatch reduction will occur is not well supported. Bycatch reduction and resulting revenue increases that drive the "success" of the rationalization alternatives are not well analyzed or supported and demonstrate a major weakness in the DEIS (Subsection 4.2.1.3, Section 4.4.4, Section 4.6.2.1).

Response: Economic benefits are expected even without an increase in the volume of target species landed. The bycatch reduction expectations are supported by substantial empirical experiences and models based on behavior theory and substantial empirical evidence. See Section 10.2 of response to comments for additional response.

Comment 41: On a technical matter, Figures 4-4 and 4-5 are both blank on the compact disc provided to the public and on the DEIS posted on the Council web site.

Response: This has been corrected.

Comment 42: The buyback program and the QS associated with buyback history should be discussed. The public should be informed as to why this buyback catch history is being reallocated, including why the QS effectively purchased by taxpayers (noting that it is a public resource to begin with) is being given to private entities. Also, it is not clear if any of this allocation is going to the crab and shrimp sectors that were part of the original buyback agreement.

Response: The buyback program is described in Section 3.3.3.3 of the DEIS. The buyback program bought back Federal groundfish permits and state shrimp and crab permits. The buyback program is part of the baseline from which impacts are assessed. While for simplicity of reference and establishing a standard there are references to the QS associated with the buyback permits, there is in fact no such association until one is created (i.e., there is no prior claim that these permits had some QS which is now being reallocated to others). For example, the Council considered an option that would have allocated all the QS based on landing history of current permits and none based on the landing history of the buyback permits (i.e., no equal allocation element). The designation of an equal allocation amount based on the history of the buyback permits was viewed as an equitable way to help resolve the initial allocation issue, ensuring that the smaller producing harvesters were more likely to receive an initial allocation adequate to cover their needs while the larger producing harvesters, more likely to be better financed, might have to purchase more QS to maintain their recent harvest levels.

Nevertheless, in response to the commenter we note that the industry is actively paying landings taxes to pay back the public loan that was made to support the buyback program. The schedule calls for that loan to be paid back over about 20 years. The amount that was directly paid for by the Federal government (\$10 million) was based on an estimate of the tax revenue that the Federal government would receive from those who reported a capital gain as a result of selling their permits and vessels. With respect to allocations to those in the crab and shrimp sectors, such vessels will receive allocations

in proportion to their participation in the groundfish trawl fishery. The crab and shrimp vessels receive other benefits from the buyback program (the reduction in the number of vessels and permits participating in their respective fisheries).

10.4.2 Quota Allocation, Ownership, and Transfer, Including Auctions

Commenters: Ecotrust, Food & Water Watch, Pacific Whiting Conservation Cooperative, West Coast Seafood Processors Association

Comment 43: The analysis underlying the dismissal of fixed terms and auctions is unsatisfactory and too qualitative to warrant the strong conclusions, as recognized by the Council’s own SSC.

Response: The SSC’s report was part of the public record. The Council was aware of the concerns expressed by its SSC when it made its decision to defer consideration of an auction until the 5-year program review. The EIS has been revised to explicitly acknowledge the SSC’s concerns about the analysis contained in Appendix F of the EIS. One concern about using an auction for initial allocation was its potentially disruptive effects, particularly with respect to smaller, less well-financed harvesting operations. This issue is discussed further in Section 10.5.1.

Comment 44: All information about the proposed IFQ market should be disclosed in the EIS. This includes the identity of all limited entry trawl permit holders and/or all participants; all QS and QP holders; all transfers and amounts, dates, and prices; all landing locations and landing and discard information; all infringements; and all other relevant business information required to ascertain control, eligibility, accumulation, and other matters of public interest including the operations of cooperatives.

All information that is not subject to state and Federal confidentiality laws has been released. Similarly, all information that is collected in the future will be released except to the extent that state and Federal laws prohibit its release.

Comment 45: The Council fails to comprehensively analyze the environmental effects of its allocation formula for overfished species. There are several problems with the Council’s approach. First, the equal division and fleet-wide bycatch rate approaches are positively related to past bycatch landings during times when overfishing was occurring in the fishery. This perpetuates the root cause for the overfished status of several species—that is, the fact that historically too many of them were caught. Second, the allocation rules as designed also have the rather counter intuitive effect of penalizing fishermen who have historically been more successful at avoiding bycatch.

Response: The QS initial allocation formulas attempt to balance a number of issues including fairness and equity and trying to put the QS into the hands of those most likely to need it. The fishery is complex and constantly changing, and “perfect” information is not always available. Any initial allocation formula is controversial and because any formula represents balancing a number of different objectives, it will not be optimal with respect to any particular objective or all participants. However, the performance of the IFQ program with respect to bycatch control and reduction is not dependent on the initial allocation. The program includes individual vessel accountability for all bycatch and 100 percent observer coverage. On this basis, it is expected that catch limits will not be exceeded and over time quota will be transferred to those vessels able to make most effective use of it.

The commenter is incorrect in stating that any part of the formula is based on a particular permit's past catch of an overfished bycatch species. The allocation of overfished species is based on the depths and latitudinal strata in which the permit was fished during the rebuilding period (2003-2006), fleet-wide average bycatch rates for those strata that were observed by the WCGOP, and the amount of target species QS allocated to the permit. The equal allocation component of the program was included for equity reasons and benefits small vessels, as described in Section 10.4.1 in the response on the rationale for the treatment of the buyback permits.

Comment 46: The lack of provisions facilitating the buying, selling and leasing of QS or QP has environmental and economic implications omitted from the analysis. Search costs and asymmetric information will interfere with the negotiation process, and brokers will absorb most of the economic rents that are supposed to make the fleet more viable.

Response: It is incorrect that provisions are not included pertaining to the QS and QP markets. The Council's proposal calls for the publication of transfer prices and lists will be available indicating who owns the QS (as is currently the case with respect to information about who owns limited entry permits). Public release of all information will be consistent with the confidentiality provisions of the MSA and other relevant statutes; in general, NMFS intends to provide aggregate price information and the names of QS owners. Availability of appropriate information will reduce information asymmetry, reduce fishermen's search costs, and allow fishermen (or other QS buyers) to know whether the prices they are offering or being asked to pay are within a reasonable range.

The economic rents that are absorbed in the QS and associated transaction costs are not what make the fleet more viable over the long-term. Over the long-term new entrants will have had to purchase their QS, and the price paid for the QS, including transaction costs sometimes paid as brokerage fees, should represent the above normal profits that otherwise would have been available in the fishery. The long-term benefit of the program for industry is more stability at a normal profit level. To stay in business, brokers must provide a service that reduces the costs of transactions enough to pay for their fees.

Comment 47: There is a complete failure to account for the effects of permanently consigning 90 percent or more of all groundfish to the bottom trawl sector. The claim that "trawl gear is the only gear that can viably harvest much of the groundfish" (DEIS p. 52) has not been validated, and in any case, it does not apply to several species in question, including lingcod, thornyhead rockfish, and sablefish that are viably harvested by fixed gear, including longlines and pots.

Response: It is incorrect that there is a permanent consignment of 90 percent of the groundfish to the bottom trawl sector. First, no allocations are permanent; they may be changed by appropriate Council or agency action. In addition, Amendment 20 only pertains to the method used to manage the trawl allocation, regardless of the amount of fish allocated to the trawl fishery. Recent harvest levels were used for purpose of the analysis but such harvest levels are not necessary to maintain the program or justify program costs. The commenter is correct that not all species can only be harvested primarily by trawl gear and we note that for the species cited the allocation to trawl gear in Amendment 21 will be less than 90 percent. For other species where trawl gear is dominant (in many cases harvesting 99+ percent) to-date there have been no allocations in place that would have prevented other gear from harvesting those species if it were economically viable for them to do so. Nevertheless, in Amendment 21, if approved, the Council will be constraining trawl shares to somewhat lower levels to provide an opportunity for alternative fisheries to develop. If such fisheries do begin to develop, there would be an opportunity in the future to consider reallocations away from the trawl fishery.

Comment 48: Section 4.1.3 does not include in the reasonably foreseeable future action bullet points any reference to increased tribal allocations for Pacific whiting. Since tribal allocations are

taken “off the top” of available harvest, increases will have a direct impact on the amount of whiting available to both harvesters and processors. A reasonable range of increases needs to be analyzed under all alternatives.

Response: This is not a reasonably foreseeable future action. It is acknowledged that this negotiation process is underway, but resolution is at least two to three years out and the outcome is uncertain at this time. The action has not reached a proposal stage, the criterion listed in Section 4.1.3 for including a future event as in the list of reasonably foreseeable future actions. See previous comment regarding change in the trawl allocation.

Comment 49: The notes following Table 4-2 need clarification. Note #2 states the Council’s preferred alternative does not apply accumulation limits to QP. While this is correct, it should make clear that vessel limits still apply to QP.

Response: This clarification will be made. However, it should be noted that certain usage of QP may be used as evidence of the control of the underlying QS, as reflected in the Council’s discussion at the April meeting.

Comment 50: A commenter recommends that the EIS be expanded to evaluate the redistribution of quota from present to past participants in the Pacific whiting mothership sector under Amendment 20. Specifically, it was suggested that the EIS compare and contrast the number of vessels qualifying for the cooperative with the number of vessels qualifying under Amendment 15 and with the number of vessels actively participating in the fishery since 2000 until the present. Data should also be provided that shows the actual harvest of the vessels actively participating in the fishery since 2000 (status quo).

Response: The FEIS has been augmented to take this comment into account.

Comment 51: Chapter 4 refers to four CP companies, which was true when Chapter 4 was originally drafted, but, subsequently, there are now three companies with vessels licensed to participate in the CP sector. We recommend the DEIS be reviewed to ensure the CP sector is characterized accurately.

Response: We acknowledge that ownership in the CP sector has changed. Ownership in the fishery is frequently changing and it is not feasible or practical to keep the EIS completely up to date with these constantly changing conditions. In general, the standard that is followed is to use information on conditions in the fishery as it was available when the NOI to develop an EIS is published.

10.4.3 Participation by and Effect on Nontrawl Fisheries

Commenters: Ecotrust, Food and Water Watch, Pacific Coast Federation of Fishermen’s Associations

Comment 52: The analysis is predicated on the assumption that the only economical way to extract groundfish biomass from the ocean is through a small fleet of large trawlers. The economic analysis in the DEIS should have examined whether the fishery could be prosecuted using smaller vessels with different gear types.

Response: The analysis does not assume that the only way to economically extract groundfish is through a small fleet of large trawlers but rather includes that as a predicted outcome. With respect to the assumption that it is the trawl fleet that will access most of the fish, this assumption is based on

observations that, for most species and species groups (particularly flatfish species and whiting), no other fleet or gear type has developed to harvest the quantities of groundfish accessed by the trawl fleet, despite the absence of regulations which would prevent that from occurring under status quo. With respect to the analytical treatment of the policy options considered, the analysis does take into account that vessels may switch gears and that nontrawl vessels may acquire a trawl permit and quota.

The issue of whether other options should have been considered, such as providing nontrawl vessels greater opportunity to access the trawl allocation, is discussed in Section 10.1.8.

Comment 53: The DEIS fails to identify and evaluate impacts associated with the portfolio role of groundfish in many ports and fishing communities and the reduced flexibility for participating that would occur as a result of the trawl rationalization program.

Response: The commenter is incorrect regarding the impacts on flexibility. The DEIS identifies that trawl rationalization increases regulatory flexibility rather than decreases such flexibility. This conclusion applies to vessels using a variety of fishing strategies, including portfolio strategies (generally one vessel fishing in a number of different fisheries) used by both trawl and nontrawl gear, used within and across years, and used by communities. The issue of whether an option should have been considered to increase such flexibility even further by not requiring that a vessel hold a trawl permit in order to fish in the trawl fishery is addressed in Section 10.1.8.

Whether a vessel is using trawl or nontrawl gear in its portfolio approach, the portfolio approach would be more viable under trawl rationalization because permit operators will have the option to use different gears. Under the IFQ program, nontrawl vessels can acquire a trawl permit and QS and fish trawl QS using nontrawl gears. If an alternative gear type makes more sense financially, the permit operator has the option of fishing that gear.

The trawl rationalization program also provides vessels with more flexibility with respect to the timing of the groundfish harvest, making it easier to work the groundfish in around other fishing opportunities. Flexibility is provided by the trawl rationalization program whether a vessel rotates through its portfolio of fisheries on an annual basis or across many years, taking advantage of the opportunities present for a particular year. Vessels for which the portfolio pattern crosses many years can either acquire QP through leasing in years they participate or buy QS and lease their QP out in years they don't participate themselves.

For portfolio vessels using nontrawl gear, the IFQ program itself presents a new participation opportunity not present under status quo. Status quo provides no opportunity for these vessels to access the trawl allocation except through the acquisition of a trawl permit and use of trawl gears.

Under the trawl rationalization program, some communities will benefit while others won't. If the program results in fleet consolidation and the departure of trawl vessels from a particular port, there is concern that infrastructure may collapse and other fisheries will be forced out of the community. This possibility is one that is identified in the EIS, albeit not specifically labeled as a portfolio issue. The EIS identifies numerous ways in which impacts on communities are considered and all communities are provided some opportunity to have more control of the future of their own fishing industry through the trawl rationalization program. Options for communities include the direct purchase and control of QS to use as incentives to maintain fleet deliveries in the communities.

While the DEIS does not specifically name portfolio strategies and break out the impacts of the IFQ program on portfolio strategies, there is substantial discussion of the flexibility the IFQ program provides to vessels for determining their optimum mode of participation. The nature of the expected

effect is that rather than a vessel having to be “all in” or “all out,” as under status quo, the trawl rationalization program facilitates vessel participation at a variety of levels of production. While the model used to predict potential benefits predicts the benefits will be achieved through specialization, a portfolio approach will persist and may increase to the degree that it is competitive with or superior to the specialized approach.

Comment 54: There is insufficient analysis of the cumulative and secondary impacts with respect to spillover into other fisheries. The buyback program carefully took into account spillover effects and the trawl rationalization program the Council has not, instead relying on state-managed limited access systems to control spillover. In this context it is surprising, and inconsistent with its own previous mitigation measures, that the Council has made no efforts to avoid such negative spillover effects of Amendment 20.

Response: The analysis identifies spillover as a potential effect of the trawl IFQ program, the conditions for spillover and the fisheries into which spillover is likely to occur (Section 4.8.2).

The buyback program and mitigation measures were a Congressional program that was not implemented under Council authority. The Council does not have authority to implement complementary adjustments that might be appropriate for the state limited entry programs that control the fisheries into which spillover is likely to occur. The scope of action available to Congress in designing the buyback program was much greater than that available to the Councils.

There is also a key difference between the buyback and trawl rationalization programs. The buyback program provided a direct and immediate infusion of cash into the fishery, through the purchases of vessels and permits. This left active fishermen who sold out with an opportunity to use that cash to reenter and expand their effort into other fisheries, to the degree that permits in those other fisheries were available. The buyback program reduced the number of permits in other fisheries in order to limit this spillover effect. The trawl rationalization program does not provide a direct infusion of cash. An asset is created, the IFQ or mothership catcher vessel permit and history. Fishermen will receive cash only through the sales of these assets; however, such sales are more likely to represent transfer payments among members of industry

The Council took spillover factors into account when it rejected the option of providing “sideboards” to limit groundfish trawl vessels from expanding into other fisheries. Such provisions would have added to program complexity and inhibited flexibility. For example, see Section 4.8.2.

Comment 55: There is insufficient analysis of the cumulative and secondary impacts because of the omission of the impacts of a prior trawl rationalization program, the 2003 vessel buyback. The buyback was supposed to permanently retire the 40 percent of catch history associated with these vessels, and resulted in higher trip limits in the second half of the decade. These higher limits were not considered in the initial allocation calculation of the preferred alternative; instead, the Council chose to allocate based on the sum of the buyback history and the individual qualifying amounts. This may be a nuance, since arguably the total TAC remains the same, but the effect nonetheless is one of diluting the environmental benefits of the buyback program.

Response: We disagree. The purpose of the buyback program was to reduce the number of vessels that participate in the fishery. It was not intended to “bank” or remove the catch history of buyback vessels and preclude the use of that history by other vessels. It is not clear why the commenter believes that a different distribution of the allocation of trawl QS among trawl permits (one that takes the history of the buyback permits into account in a different way) changes the environmental effects of the program. The IFQ program is the means used to manage the trawl allocation. If the point of the comment is that there

should be a reduction in the trawl allocation, this issue is more directly addressed through intersector allocation (Amendment 21). Such a reallocation would reduce the higher trip limits cited by the commenter as a benefit recently received by the trawl fishery. See Section 10.1.8 for additional response on the issue of the amount allocated to the trawl sector.

Comment 56: There is insufficient analysis of the cumulative and secondary impacts because there is no analysis of Amendment 22, which contemplates the conversion of the open access fishery to limited entry.

Response: Under Amendment 22, the Council did not adopt a limited entry system for the open access fishery.

Comment 57: The DEIS is devoid of a meaningful discussion of the interlinked harvest strategies that fishermen employ to reach their livelihood goals. A more meaningful characterization of the interlinked harvest strategies would have shown earnings from groundfish as a percentage of overall revenues, whether by port, permit holder, or—with only a little more analytical effort—harvest portfolios. The picture that would then emerge is that the trawl rationalization program with the limitations it places on some of the LE fixed gear and OA groups significantly reduces those fishermen’s flexibility to respond to a variety of contingencies.

Response: We disagree. The DEIS addressed flexibility and a variety approaches (see above discussion on portfolios). The trawl IFQ program provides more access opportunities for non-trawl vessels rather than less.

Comment 58: The description of the natural environment in Chapter 3 is inadequate because it does not adequately address the considerable impacts the RCAs have had on consolidation of the open access and fixed gear ground fish fleets.

Response: The health of the open access and limited entry fixed gear fleets has been affected by many factors including the RCAs, increasing fuel prices, increasing insurance costs, etc. The RCAs do not cause the relative impacts of the alternatives to vary. The effects of the trawl rationalization program on the nontrawl fleets are analyzed.

Comment 59: Under the Council’s proposal, trawlers can switch to fixed gear and thereby compete with this other harvesting sector. In fact, this measure “could depress the price of fixed-gear-caught sablefish slightly if IFQ holders are more efficient producers” (p. 574). By contrast, fixed gear vessels cannot buy or lease trawl quota without purchasing a limited entry trawl permit.

Response: The commenter objects to fixed gear vessels having to buy a trawl permit to access trawl quota. Those trawlers who have entered the fishery since 1994 have had to buy trawl permits to access the trawl quota, thus in this respect other vessels would be on an even footing with trawl vessels. The reasons for requiring a trawl permit to participate in the IFQ program (as opposed to allowing anyone to acquire trawl IFQ) are discussed in the response to comment 62. Additionally, there seems to be a concern that if trawlers use fixed gear to catch trawl quota that fixed gear prices will be depressed, yet the commenter wants to increase fixed gear vessels’ ability to access trawl quota, not to use trawl gear but in order to use fixed gear. This would have a similar effect on prices, adversely impacting those fixed gear vessels that chose not to supplement their harvest by acquiring trawl IFQ.

Comment 60: The IFQ program protects the trawl fleet, a fleet with a number of undesirable characteristics. The DEIS is cognizant of the market trends that put a “premium for products

and services that can be produced with demonstrably lower environmental impacts” (p. 100), yet the permanent allocation of the lion’s share of groundfish to the trawl sector undercuts those other gear sectors that have a demonstrably lower impact on the environment. Gear types should be allowed to compete for access to the groundfish resource based on their ability to minimize bycatch and habitat damage.

Response: We disagree with the commenter’s characterization of the trawl fleet. That said, the DEIS identifies and discloses the potential adverse impacts of trawl gear cited by this commenter. To the degree that these impacts may exist, they are not increased under trawl rationalization and may be reduced because it allows more opportunities for use of fixed gear to harvest the trawl allocation. The Council actions under Amendment 20 provide an opportunity for the transition of harvest away from the trawl sector and its action under Amendment 21 limits the trawl fleet allocation to the lower end of its recent harvest share. Furthermore, the allocations provided to trawlers in Amendment 21 are not permanent and may be changed in the future as it is determined to be appropriate. Additionally, trawl rationalization is expected to decrease total trawling hours required to take a given amount of harvest. Amendment 20 allows some movement of harvest toward the nontrawl gear through gear switching and the transfer of IFQ to the nontrawl fleet. For the time being, that movement is constrained by the number of trawl permits available and the dictates of the market place, combined with any incentives or subsidies that may be created, which are discussed further below.

Comment 61: Trawl vessels would have a tough time competing in the free market with other gears in avoiding overfished species. Gear types should be allowed to compete for access to the groundfish resource based on their ability to minimize bycatch and habitat damage.

Response: The program as developed allows gear switching and the transfer of QS to nontrawl vessels that acquire trawl permits. If there is a competitive advantage in the use of nontrawl gear, there will be opportunity for that advantage to show itself in how the trawl IFQ is used. If it becomes apparent on that basis that the transfer of IFQ to nontrawl gear is being constrained by the IFQ programs, and that it is a problem, adjustments to the program can be made in the future.

Comment 62: The number of limited entry permits issued is arbitrary and has no impact or good rationale in a fishery regime making allocations to individual entities. Possession of a groundfish limited entry trawl permit should not be required to fish with IFQ using other gear types. This will allow the trawl allocation to support the most appropriate number of participants using the best mix of harvest strategies and gear. An IFQ system is supposed to be a “free market” solution to avoiding overfished species and rewarding the most efficient vessels, yet the market for which vessels can fish the QS is strictly limited to those who own a trawl permit. Thus, while the Council created a supposedly free market system, they also artificially restricted the market for QS down to the 150 or so permit holders.

Response: Under the Council’s FPA, the program would start off requiring possession of a limited entry trawl permit for a number of reasons. First, the scope of the action pertains to how the trawl allocation will be managed, the allocation for which a vessel is required to have a trawl permit. Those permits were issued as part of the Amendment 6 license limitation program. There is nothing in the program that would prevent a follow-on action with a broader scope. Second, the trawl permit requirement limits the maximum number of vessels which may participate in the fishery and therefore assists in the initial planning for the tracking and monitoring program and keeps program costs down. Third, there is an equity perception that it would be unfair to allow one gear group to acquire the allocation given to another but not the other way around, for example, the trawlers would not be given the opportunity to buy limited entry fixed gear sablefish quota for use with trawl gear.

Even though a trawl permit will be required, it is not required that the vessel with which the permit is registered use trawl gear or even be capable of using trawl gear. Moreover, on average there are about 120 trawl vessels that participate in the fishery each year. There are about 168 permits. This indicates some opportunity for nontrawl vessels to acquire trawl permits and use trawl IFQ. Further, it is expected that there will be consolidation in the trawl fleet, increasing the number of trawl permits potentially available for use by nontrawl vessels. Thus, despite the limited scope the IFQ system will allow for some use of trawl IFQ by nontrawl vessels.

Comment 63: Fixed gear vessels are unfairly disadvantaged while allowing trawl-permitted vessels to use fixed gear. The gear switching provision in Amendment 20, which allows trawl vessels to switch to limited entry gear (longlines or pots), effectively gives trawl vessels a fixed gear endorsement. Fixed gear vessels are not given trawl permits. So while trawl vessels get to have it both ways, open access boats and fixed gear limited entry boats are prevented from acquiring quota.

Response: Under the license limitation program, trawl vessels are already allowed to use fixed gear to take the trawl allocation, albeit they must do so under the open access regulations, which have much lower limits. Fixed gear endorsements give a vessel access to the fixed gear allocation. Allowing trawl vessels to gear switch (or other vessels to acquire a trawl permit and IFQ) does not give trawl permitted vessels access to the fixed gear quota; it merely allows the vessel to use nontrawl gear to take the trawl IFQ. Therefore, the IFQ program does not effectively give trawl vessels a fixed gear endorsement. On the other hand, a fixed gear vessel could acquire a trawl permit and trawl quota and would not have to use trawl gear to take that quota, it could use fixed gear. This allows nontrawl vessels to access the trawl IFQ allocation.

10.4.4 Processors

Commenters: Pacific Seafood Group, West Coast Seafood Processors Association

Comment 64: In Chapter 3, Table 3-1 on page 64 is inaccurate in that it assumes there is no effect on shoreside processors of trawl groundfish from bycatch reduction, sector allocations, habitat/ecosystem protection, or wind energy.

Response: With regard to Table 3-1, the accompanying narrative states that the table “shows which environmental components these categories of actions are most likely to affect.” There is no assertion that environmental components may not be affected in some way by the various categories of ongoing actions listed in the table, but analysts concluded that any such effects do not contribute in a substantial way to the types of cumulative effects disclosed and evaluated in Chapter 4. Acknowledging that there is the possibility of some kind of effect from these actions, the table key will be modified to state the blank cells indicate “minimal effect expected” rather than “no effect expected.”

Comment 65: Chapter 3 of the DEIS provides no basis for the claim that increased protein demand is likely to lead to an increase in real prices for wild-caught fish.

Response: The discussion of protein demand affecting prices is part of an enumeration of trends that may contribute to the cumulative effects of the proposed action. The commenter notes that the DEIS uses 2006 data to show that seafood consumption has been modestly increasing in the U.S. while more recent data show a decline in consumption between 2006 and 2008. The report cited by the commenter ((NMFS 2009a) shows that over a longer time horizon per capita seafood consumption is variable but increasing. For example, per capita seafood consumption was 12.5 pounds in 1980 and had increased to

16 pounds in 2008 with some oscillation in between, including the decline between 2006 and 2008 noted by the commenter. The DEIS more generally explains that increases in global population and living standards are likely to increase demand. Given that the supply of wild-caught fish is fixed by generalized maximum sustainable yield it is reasonable to assert that price increases could be an outcome. However, this discussion is qualified by acknowledging that increasing prices may be offset by other factors such as lower cost production and availability of substitute products.

Comment 66: In Chapter 3, the statement in Section 3.9 that many of the businesses that process west coast harvests are also involved in Alaska and foreign fisheries is not supported with any evidence.

Response: The statement about west coast processors being involved in Alaskan and foreign fisheries is part of a general introductory description of the west coast processing sector. A cursory search of the Web indicates that some west coast processing companies are also involved in Alaskan fisheries. However, we acknowledge that the number of processors involved in such activities is not enumerated. For that reason the statement will be revised to indicate that while there is anecdotal evidence of such involvement, it is not quantified in the description.

Comment 67: The commenter also had several recommended technical corrections to Chapter 3, including correcting references to whiting processors that should be to nonwhiting processors in Section 3.9.2 and reporting a firm no longer in business in Table 3-59.

Response: The text of the DEIS will be revised to ensure references to whiting and nonwhiting fisheries are correct. The caption for Table 3-59 will be revised to indicate the year for which the inventory of seafood processing companies is applicable rather than deleting the company the commenter notes has gone out of business. Because baseline conditions are continually changing (as reflected in the discussion of ongoing trends in Chapter 3), a time period needs to be chosen for data that is used to represent the baseline in the analysis. As discussed in Section 4.1.2, the baseline uses data from the 2004-2008 period (see Table 4-1). For that reason, indicating the time period in the table caption is deemed a better solution since there may be other changes in the status of listed companies since the information was compiled.

Comment 68: Section 4.5.4 in Chapter 4 makes a number of claims for benefits to consumers, which the commenters argue are unsupported or incorrect. They argue that “consumers will receive no benefits and perhaps will even suffer losses as a result of rationalization.”

Response: Section 4.5.4 concludes that “trawl rationalization is expected to have a modest beneficial impact to consumers” after enumerating several possible benefits. The commenter argues that claimed benefits are incorrect: greater product availability depends on bycatch reduction, which is unlikely to occur; groundfish is already available throughout the year and fleet consolidation is more likely to reduce year-round availability; and there is no evidence that new product forms will be developed. To respond, we believe our statements about potential benefits are valid, and we reiterate the qualified nature in which they are presented in the DEIS. First, based on review of other quota programs, it is reasonable to expect that trawl rationalization will lead to bycatch avoidance and greater product availability as discussed in comment response Section 10.2. Second, we do not expect that fleet consolidation will lead to reduced seasonal availability of product; consolidation better matches physical capacity to resource availability and will not restrict the ability to harvest throughout the year, subject to other constraints such as market demand and weather. Third, as discussed in the DEIS, the whiting fishery currently operates under derby conditions; trawl rationalization is expected to eliminate these conditions and allow a more measured pace of harvest. Although nonwhiting groundfish are generally available year-round under trip limit management, rationalization will give harvesters more flexibility

over the timing of harvests. Fourth, we recognize that the development of new products is not a given; however, trawl rationalization is expected to allow harvesters and processors to pursue different market opportunities, which may include new product forms, because the management system is structured to give harvesters much greater flexibility in making decisions about when and how to harvest.

Comment 69: Decreased production costs, increased utilization, more even timing of deliveries to processing plants, and market development are claimed as benefits (in Section 4.9), contrary to the commenter’s perspective.

Response: With respect to Section 4.9 (impacts to shoreside processors), first, the commenter asserts that the DEIS uses old and limited data and presents conflicting claims with respect to the potential for per-unit production costs to fall for harvesters. The FEIS in Section 4.9 has been revised to state clearly that the data used in the 2000 EA are the best available; they are the only data the agency has on this issue. As explained in that section, the information presented in Table 4-57 is useful to show that excess capacity existed for shoreside processors in 1997 and in 2000 after regulations that restricted fishing were implemented. This information supports the generally accepted view that there is excess capacity in the shoreside processing industry.

The commenter asserts that a statement made in the discussion of cumulative effects to communities (Section 4.14.6.1) that “changes in production costs have made it more expensive to harvest and process fish, and are likely to continue doing so” conflicts with the claim in Section 4.9 of reduced costs. The statement in Section 4.14.6.1 describes general trends applicable to both harvesting and processing. The discussion in Section 4.9 presents information suggesting that there may continue to be excess processing capacity. If the volume of fish landed increases, which the DEIS analysis finds likely, this spare capacity could be more efficiently used, a countervailing effect. In other words, overall costs may increase, but the availability of spare processing capacity could curb the rate of increase in costs, at least over the short-term.

In addition, the commenter asserts that the effects of cost increases on invested capital value and employment are not addressed in the DEIS. In response, the potential for stranded capital is discussed on pp. 425-426, and Section 4.12 discusses impacts to processing and other labor.

Next, the commenter disputes a claim that current regulatory discards of rockfish would be landed under trawl rationalization, increasing utilization and benefitting processors, noting that “many of these discards are due small size or the fact that the species is overfished.” In response, the DEIS specifically references regulatory discards, which are required to be discarded, while “economic discards,” which include small fish, are discarded for economic reasons (i.e., they are unmarketable). Overfished species are currently regulatory discards: very low trip limits or retention prohibitions are set for these species. Under trawl rationalization, these species could be retained with the only constraint being the requirement to match catch with QP. Increased landings of marketable species, especially of higher value rockfish, should benefit processors by increasing revenues and normal profits.

In addition, the commenter asserts that due to consolidation the “year-round fishery is likely to disappear” preventing the benefit of better matching deliveries to plant capacity. As discussed above, we disagree that consolidation will necessarily eliminate a year-round fishery; consolidation is expected to result in a better match between harvesting capacity and resource availability; although there may be substantially fewer vessels, they would have the capacity to deliver fish in response to any seasonal demand for product by processors (as reflected by processor willingness to pay for year round deliveries).

Finally, the commenter argues that “if the projected impacts of allocating all quota shares to harvesters (i.e., close to zero profits for processors) are correct, there is no money available to develop ... new markets.” Under the Council’s preferred alternative, 20 percent of whiting QS will be allocated to eligible processors (based on processing history). It is unclear what the commenter means by saying there will be “no money available” to processors for this purpose. Generally, market development is a financial decision made by the firm based on the expectation that resulting revenues will exceed the costs entailed and we expect that the program will enhance these expectations. If markets are not available, ex-vessel prices are likely to drop enough to allow the development of needed markets.

Comment 70: Aquaculture as an exogenous factor adversely affecting processors (by increasing price competition for groundfish products) is not mentioned in Section 4.9.4.2.

Response: On page 99, the DEIS identifies aquaculture as part of the “increased demand for protein affecting real prices” reasonably foreseeable future trend, stating “price increases may be mitigated by lower cost production methods in aquaculture and agriculture.” Section 4.9.4.2 does identify increased protein demand as an exogenous trend affecting processors. However, the discussion will be supplemented to note the qualification made in Chapter 3 that aquaculture could have a mitigating effect on this trend.

Comment 71: Monitoring costs are not identified as a cost to processors.

Response: The commenter points out that processors will be required to have plant monitors present for every groundfish offload. At the time the DEIS was drafted, it was unclear who would be responsible for covering the costs for shoreside compliance monitors to be on hand for deliveries will devolve to harvesters under the trawl rationalization program. However, in the development of proposed regulations, NMFS has determined that processors will be obligated to pay for shoreside catch monitors; the agency has announced its intent to cover in the first year 90 percent of the cost of hiring the monitor, subject to the availability of Federal funding (and phasing out the government portion by 2014). In practice, who actually pays the cost for shoreside catch monitors (as well as at-sea observers) could be subject to negotiation between processors and harvesters with outcome partly dependent on relative bargaining power. There are also other, associated costs that could devolve to processors. These costs may relate to accommodation of shoreside compliance monitors (e.g., designating a workspace, purchase of approved scales) and any agreed upon cost sharing that may be a part of ex-vessel price negotiations. The DEIS does acknowledge on page 433 that shoreside tracking and monitoring requirements, including the use of shoreside compliance monitors, could add to processor operating costs.

Comment 72: The conclusion in Section 4.6.3.4 (Table 4-28, DEIS pp 339-349) that a 25 percent allocation of nonwhiting groundfish to processors would allow them to capture the entire market for certain species is unsupported by the analysis.

Response: Table 4-28 simply illustrates a reasonable premise: that an allocation to processors is likely to give them an advantage in ex-vessel price negotiations, which may be substantial for species where market demand can be met with comparatively smaller quantities. This supports the conclusion that harvesters would be relatively worse off compared to alternatives where harvesters receive a larger proportion of the initial allocation (either 100 percent, 90 percent under the adaptive management provision, or 80 percent of the shoreside whiting allocation and 90 percent of the nonwhiting allocation, once the AMP is implemented, under the preferred alternative).

10.4.5 Communities, Income, and Employment

Commenters: Crab Boat Owners Association; Vince Doyle and Others; Ecotrust; Food and Water Watch; Radtke, Hans; Tommy's Marine Service; West Coast Seafood Processors Association

Comment 73: Use more recent employment/unemployment data in Table 3-74 and include nontrawl fisheries in the description of the Brookings port group as part of a reanalysis of port vulnerability rankings.

Response: Census data and other information used to characterize west coast ports were incorporated from other sources. Employment/unemployment information was drawn from a detailed compilation of 2000 decennial census data conducted as part of the environmental justice analysis contained in the 2005-2006 groundfish harvest specifications EIS (PFMC 2004a 916 /id /ft; Appendix A). (Detailed demographic information is generally not available for years between decennial censuses for the geographic scale of small coastal communities.) This information is included in the DEIS as part of the baseline description of west coast fishing communities. Updating the cited analyses was not part of the preparation of this FEIS. The time frame of the 2006 vulnerability analysis falls within the analytical time period identified for the baseline description as discussed in Section 4.1.2 (also see Table 4-1).

Comment 74: The socioeconomic impact analysis is deficient because it lacks net economic value modeling and relates fleet efficiency to vessel size, which is not supported by historical evidence.

Response: With respect to net economic value modeling, the DEIS uses a modeling exercise that suggests possible increases in harvesting vessel efficiency, which was published in a peer reviewed journal subsequent to publication of the DEIS ((Lian, *et al.* 2009a).

The commenter also states that vessel size, which is an important factor in the Lian et al. analysis, “is not a major indication of total ex-vessel revenue within a fishery” and presents several examples to suggest many factors that “make a length predictor unreliable.” First, ex-vessel revenue is different from vessel efficiency, which affects the cost of harvesting. Second, the commenter’s examples of factors affecting fleet size misconstrue the Lian et al. analysis and its use in the DEIS.

Comment 75: The socioeconomic impact analysis is deficient because the regional economic impact analysis is qualitative and not specifically associated with the impacts of the alternatives.

Response: The DEIS contains estimated region-wide income impacts presented for three scenarios positing different levels of bycatch reduction under trawl rationalization. The income impact estimates were derived using the modeling method found in other Council/NMFS environmental analyses and documented in the 2005-2006 Groundfish Harvest Specifications EIS (PFMC 2004a 916 /id /ft; Appendix D) The commenter asserts that there is enough information to make such estimates at the community level. We disagree. Given the uncertainties surrounding the regional distribution of effects of trawl rationalization, presenting income impacts estimates at a finer scale would lead to a false sense of precision. Presenting numerical estimates at the community level could be more misleading than informative, because of the specific assumptions that would have to be made about factors affecting the distribution of income at this scale. Information presented in Section 3.14 (see for example Tables 3-70 and 3-71) is used to indicate the historical distribution of fishery-related income among west coast ports, which can be compared to the regional estimates to get a sense of the relative effects among communities.

It is also important to make the more general point that the analytical framework in the DEIS uses qualitative methods. This framework and approach is described in Section 4.1. The EIS discusses the

uncertainty in predicting outcomes (Section 4.1.6), and for that reason the analysts chose to disclose and discuss the range of potential impacts but could not specify the potential intensity of a given impact. Within this framework, several quantitative models were developed to explore and illustrate potential effects. Section 4.2 describes these models and how they are used in the analysis. Appendix C documents these models.

Comment 76: The socioeconomic impact analysis is deficient because the discussion of ex-vessel price negotiation (Section 4.4.3) cites an unpublished paper by Lian et al. that relies on outdated cost estimates. The commenter argues that the paper relies on 2004 cost estimates while more recent data cited in the DEIS shows that nonwhiting trawl revenue has subsequently increased.

Response: As noted above, the Lian et al. paper has been published in a peer-reviewed journal ((Lian, *et al.* 2009b). While gross revenues have increased, costs have also increased. The Lian et. al. paper illustrates the magnitude of the substantial benefits that might be expected from trawl rationalization under trawl rationalization, both with and without an accompanying expansion of harvest. For these reasons the general conclusions of the Lian et al. paper are still relevant.

Comment 77: The socioeconomic impact analysis is deficient because the DEIS does not contain a proper social impact assessment that would disclose the social costs of the loss to the general public of the asset value of QS. Generalizations about benefits should be removed from the analysis.

Response: The EIS analysis is intended to disclose both environmental and socioeconomic impacts of the proposed action. As noted in response to comment 75, a qualitative analytical framework was used, with certain potential impacts illustrated through the use of quantitative modeling. This qualitative analytical approach acknowledges data and predictive limitations.

Comment 78: The way in which the composition of the industry will change should be presented, especially the emergence of a rentier class of quota shareholders and brokers and fewer captain and crew. The EIS should discuss how this rentier class will derive unearned extra-competitive profits.

Response: The DEIS discusses capture of rents, which would otherwise be dissipated, by quota shareholders. These quota shareholders could be fishery participants or others who then lease quota to fishery participants. Appendix E contains a detailed analysis of the impacts on the allocation of QS on the short- and long-term distribution of rents from the fishery. It discloses that the quota share owner benefits from the stream of rents thus generated and points out that under program rules a wide variety of entities, not just fishery participants, could acquire quota. In terms of change in composition of the industry, the DEIS discusses fleet consolidation and relative bargaining power between harvesters and processors, as well as the possibility that QS might be owned by non-participants. The DEIS also discusses the potential effects of the program on captain and crew, acknowledging the program is likely to result in fewer such jobs and will likely shift the compensation scheme from one based on a share system to a wage system.

Comment 79: Section 3.14 excludes ports where groundfish fisheries are part of a broader “portfolio strategy,” ports with nongroundfish fisheries that are likely to experience spillover effects, and ports historically active in the groundfish fishery. The communities are likely to experience adverse impacts that are not accounted for in the DEIS.

Response: Section 3.14 provides a general view of the characteristics of west coast ports by region. It provides information in tables and narrative that indicates the relative importance of groundfish fisheries

to the overall fishing economy of these regions and ports. Section 3.8.3 provides baseline information on nongroundfish fisheries. Section 4.14 considers impacts to nontrawl communities.

Comment 80: The socioeconomic impact analysis is deficient because the identification of vulnerable communities is outdated; an update would change resilience scores and the designation of some ports from not vulnerable to vulnerable.

Response: The analysis underlying the identification of vulnerable communities was part of the 2007-2008 groundfish harvest specifications EIS ((PFMC 2006). It used 2005 landings data to evaluate ports' engagement in fishing and dependence on groundfish. Census and other socioeconomic data were used to determine community resilience. Because of the time frame during which the EIS has been prepared, the most recent fishery data used comes from 2007 (fishery data is used for measures of dependence and engagement). Census and other data used to determine resiliency is generally not available at the geographic scale of ports for years more recent than the 2000 decennial census.¹²² The 2006 vulnerable communities analysis uses data within the baseline time period (2004-2008) used for the analysis. The DEIS incorporates this information by reference; the assessment of community vulnerability was conducted separately from the DEIS analysis. For these reasons, the cited vulnerable communities analysis provides a reasonably accurate assessment of community status consistent with the baseline time frame used in the EIS.

Comment 81: The socioeconomic impact analysis is deficient because Section 3.14.6 does not include information about community-based entities engaged in the acquisition of fishing-related assets.

Response: Information on these community-based entities was not available and, as noted elsewhere the baseline description of west coast fishing communities, takes a synoptic view. The Council discussed program provisions related to community fishing associations (CFAs; see comment response Section 10.1.5) and decided to implement such provisions through a trailing action. Therefore, inclusion of information about existing entities with similar purposes does not bear directly on the range of alternatives considered in the EIS.

Comment 82: The role processors play in providing critical fishery-related infrastructure in ports is not discussed in Section 3.9.3.

Response: Section 3.9.3 presents information on the flow of groundfish among west coast ports and processing centers. As the commenter acknowledges, the role of processing infrastructure is discussed in other sections of the DEIS. The commenter notes that such a discussion would illuminate shifts in processing center locations and its effect on other fisheries. There is substantial discussion in Section 4.14 of the potential effects of changes in the regional distribution of landings and the effects of fleet consolidation.

Comment 83: Reductions in fishery-related employment related to the proposed action are not considered or quantified in the context of impact on the general public in Section 4.5.5.

¹²² Inter-decennial census data, such as the U.S. Census American Community Survey is not available for geographic areas with less than 20,000 population and estimates at this scale are only available as 3-year averages. The first 5-year estimates, which will contain data at sufficiently large scale, will not become available until later in 2010. Most of the ports are too small to obtain demographic characteristics directly.

Response: As explained in the DEIS, the general public environmental component is defined as nonconsumptive users and nonusers of the resource. Fishery-related employment is not relevant in this context. Fishery-related employment is addressed elsewhere (e.g., Sections 4.7, 4.12-4.14).

Comment 84: Amendment 20 will severely impact Fort Bragg fishermen, their families, and suppliers.

Response: The DEIS discloses potential adverse impacts to Fort Bragg and other fishing communities.

10.4.6 Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Analysis (IRFA)

Commenters: Ecotrust, West Coast Seafood Processors Association

Comment 85: The RIR/IRFA analysis (Appendix H in the DEIS) is inadequate. The analysis needs to take into account impacts on the full range of affected entities. Considering effects at the scale of the whole nation for determining whether impacts are significant is not supported by EO 12866 or the Regulatory Flexibility Act. The evaluation of alternatives should include the additional alternatives proposed by the commenter elsewhere in their letter. The RIR/IRFA analysis is inadequate for the same reasons the commenter claims the impact analysis in Chapter 4 of the DEIS is inadequate.

Response: The RIR/IRFA analysis in Appendix H of the DEIS is preliminary. The RIR/IRFA analysis is tied to the regulatory process and its inclusion in the EIS is not required, but the EIS is frequently used as a way of disseminating this information to the public. Furthermore, the contents of the DEIS overlap with many, but not all, of the required elements of the RIR/IRFA analysis. However, the RIR/IRFA analysis has specific analytical requirements, such as cost-benefit analysis, that is not required in an EIS (40 CFR 1502.23). At the time the DEIS was published, the development of implementing regulations for Amendment 20 had not proceeded to a point where the RIR/IRFA analysis could be fully developed. A revised RIR/IRFA analysis has been prepared as part of Federal rulemaking and is included in this FEIS.

10.5 Policies, Legal Standards, and Requirements

10.5.1 Public Trust and Privatization

Comment 86: The commenter favors status quo and opposes Alternative 4b (the Council recommended alternative) citing concerns that Alternative 4b does not collect any resource rent and is chiefly concerned with putting anti-competitive measures in place so that the “winners” can extract extra-competitive profit. Alternative 4b provides access privileges with most of the attributes private property rights, exclusivity, tradability, and effective perpetuity. The Pacific coast limited entry trawl fishery, as with all other U.S. fisheries, should be maintained as a valuable public trust asset and not be doled out to private interests for free and forever.

Response: The policy recommended by the Council is one that balances several objectives. Imposition of the collection of resource rents without a phase-in process would be highly disruptive and likely result in the acquisition of harvest privileges by large well-funded entities with “deep pockets.” The Council considered a provision that would phase in the collection of additional resource rents through an auction. While the Council deferred further deliberation on this provision until the first 5-year review, it put the public on notice that such provisions would be considered. Congress and the Council

have both been clear and explicit that what is being granted is a privilege that is modifiable and revocable at any time without compensation to the privilege holder (see Section A-2.3.4 of the EIS).

Under status quo, the fishery resource is held in the public trust until sometime after it is captured and brought on board a vessel, at which point it becomes the private property of the vessel. Under the proposed alternative, the situation will be no different. What changes is how the harvest is controlled. Under status quo, those with trawl permits compete with one another on the fishing grounds to harvest the trawl allocation. Under trawl rationalization, those with trawl permits will compete with each other, crew, communities, processors and others in the private market place to determine who is willing and able to pay the most for the harvest privileges. This process is expected to result in an efficient outcome and convert currently wasted resources into profits. It is not clear why the commenter believes these measures to be anticompetitive. The profits will be captured by the holders of the harvest privileges who: will pay taxes on any capital gains (benefiting the public), will pay directly or indirectly for the costs of the program, and may at a later time be asked to pay additional rents or royalties. The public trust nature of the resources will not change; the harvest privileges are not given out completely freely; and the nature of what is being given out is not necessarily fixed even over the next several years, much less so “forever.”

Comment 87: The commenter voiced concern that the gifting of a valuable public asset worth many hundreds of millions of dollars is not accounted for and specifically asks: How much is this asset worth? Who is getting this asset? Is the public even aware that its asset is being given away for free and essentially forever? Has the PFMC made any effort to assess public sentiment over this giveaway of public wealth? How much annual resource rent (that could be used for better management and habitat restoration) is being forgone?

Response: The asset worth is assessed in Section A-2.1.1.a of the DEIS. The trawl permit holders would receive 90 percent of the nonwhiting QS, 80 percent of the whiting QS, and all of the mothership whiting and catcher processor allocations. The identities of these permit holders are a matter of public record available from the NMFS Northwest Region Limited Enter Permit Office. The 20 percent of the whiting QS going to first receivers is expected to be distributed among 11 companies listed on the Council website. The Council’s policy deliberations are a matter of public record, noticed in the Federal register, announced through the Council web site and mailing lists, and reported on frequently by the press. The issue of whether these assets are being given away free forever is discussed in the previous response. With respect to assessment of public sentiment, the Council has received considerable public comment and is considering policies authorized by Congress, one of the main authorities for determining public interest. The amount of annual resource rent is directly related to the value of the long-term harvest privilege, discussed in Section A-2.1.1.a.

Comment 88: Anti-competitive protections for the catcher processor whiting, and other whiting and nonwhiting sectors should be removed from the preferred alternative. The catcher processor sector is a LAPP and should be subject to LAPP requirements.

Response: The measures this commenter terms “anti-competitive” are part of the status quo program (under Amendment 6 and Amendment 15, participation in the trawl sectors of the fishery was limited). The Council reconsidered its policy at its April 2010 meeting and recommended to NMFS that co-op permits be required for mothership catcher vessel and catcher-processor co-ops, with the understanding that this modification would clearly subject these sectors to LAPP requirements.

10.5.2 Magnuson-Stevens Act, Including National Standards

Commenters: Crab Boat Owners Association, Ecotrust, West Coast Seafood Processors Association

Comment 89: We believe that the action alternatives do not successfully meet the national standards for fisheries management in Section 301(a) of the MSA. We also believe that the action alternatives do not successfully meet the national standards for fisheries management in Section 301(a) of the MSA.

Response: Specific issues are addressed below. During Secretarial review, NMFS will review the Council's recommended alternative to determine whether it complies with the MSA's National Standards.

Comment 90: National Standard 2 requires the use of the best scientific information available. The DEIS makes the assertion that the analyses contained within constitute that information. Given the flaws discussed at length above, we disagree.

Response: As explained in responses above, in response to public comment, descriptions of some of the information presented in the EIS have been revised. NMFS will review the entire record supporting the Council's recommended action to determine compliance with National Standard 2 and all National Standards.

Comment 91: National Standard 5 prohibits management measures that have economic allocation as their sole purpose. Note the discussion on Section 1.3.1 above (Analysis of need for action).

Response: National Standard 5 does prohibit measures that have economic allocation as their sole purpose. The trawl rationalization program is not such a prohibited measure. The need for trawl rationalization arises from a complex set of challenges relating to biological, social, and economic concerns. This action addresses the challenge of addressing bycatch in a complex multi-species fishery in which management requirements for several overfished stocks are constraining the ability of the fishery to achieve OY on other stocks. By giving individual participants more flexibility, accompanied by greater individual accountability, the action is expected to better allow for achieving OY while rebuilding overfished stocks.

The stated purpose for the action reflects the range of biological, social, and economic concerns:

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

NMFS notes that Sections 303(b)(b) and 303A of the MSA specifically authorize the establishment of limited entry and LAPP programs.

NMFS will review the proposed action to determine its consistency with National Standard 5 prior to making a final decision.

Comment 92: Individual quota programs are economic programs and they do not work without allocation when different sectors compete for the same fish but only one of those sectors is proposed to be rationalized.

Response: Section 2.6 of the analysis explains the Council’s rationale for recommending the IFQ program. As stated in Section 2.6, the purposes of Amendment 20 are not merely economic but pertain to bycatch reduction and catch accounting as well. While allocations play an important role in implementation of an IFQ program, such allocations could be made through the biennial specification process under the current status quo without formalizing them in the FMP. The Council explores these alternatives in the context of Amendment 21.

Comment 93: National Standard 7 speaks to minimizing costs and duplication. Since the DEIS contains no real analysis of the monitoring program and its effects, we will base our comments on reports provided to the Council by enforcement bodies.

Response: The DEIS evaluates the potential impacts of the proposed action and its alternatives on the quality of the human environment. In this context, it includes a broad level discussion of anticipated program costs. A more precise cost assessment is contained in the RIR/IRFA accompanying this FEIS. NMFS will evaluate compliance with National Standard 7 prior to making a decision.

Comment 94: The monitoring program contemplates the use of observers, rather than the existing electronic monitoring, on whiting trawl vessels – at a much higher cost. Fish in both the whiting and nonwhiting fishery will be observed by a federally-trained observer as it is hauled aboard a vessel and again when it is landed on shore in a processing facility, this time by a different federally-trained monitor. Specifics of the fish (weight, species, etc.) will be recorded on a fish ticket and in a production report, both of which will be made available to state and federal enforcement entities. Duplication and costs will run rampant.

Response: National Standard 7 states that “[c]onservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.” The monitoring requirements in the proposed trawl rationalization program are necessary for the effectiveness of the program. Under the IFQ program, the nature of fishing activities will not change, but *incentives* will. There generally will be enhanced incentive to avoid detection of overfished species due to the level of individual accountability. Current electronic monitoring may not be sufficient to detect throwing overboard of infrequently caught constraining bycatch. For catcher vessels in the mothership sector it may be important to have observers on board in case there are any situations in which codends must be bled for fish is otherwise spilled before it is transferred to the mothership. Moreover, it is important for the integrity of the program that fishermen believe that everyone is complying.

At-sea observers would perform different functions from shoreside monitors. The primary role of at-sea observers includes recording fishing effort and estimate total, and discarded catch weight by species. The function of the shoreside monitors includes verifying all shoreside deliveries of catch share species, ensuring that species are sorted to Federal species or species groups, and recording and submitting catch/landing data daily.

With respect to the requirements for both fish tickets and production reports, NMFS acknowledges that there may be some duplication at the beginning of the program. This is due to the need for both the state and the Federal government to have access to the information and the different formats currently in use. However, it is possible that this situation can be improved during the initial phases of the rationalization program in a manner similar to how reporting in the Oregon whiting fishery has been resolved. In the Oregon whiting example, both the state and Federal government required access to information, and through cooperation they were able to develop one reporting instrument that met both needs. Thus, while there may be some duplication at the start of the program, the hope is that this will be reduced as the program develops.

NMFS, the states, and the Council intend to continue working collaboratively on data collection programs to meet both state and Federal purposes without duplication and in the most efficient manner.

NMFS will review the proposed action for compliance with National Standard 7 prior to making a final decision.

Comment 95: National Standard 8 requires minimizing effects on communities. The action alternatives will potentially increase unemployment, remove fishing facilities (vessels and processors) from “at risk” communities, and reduce income from local taxes and purchase of goods and services.

Response: National Standard 8 requires consideration of impacts on communities, but recognizes the higher priority of National Standard 1. Specifically, National Standard 8 states that “Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (1) Provide for the sustained participation of such communities; and (2) To the extent practicable, minimize adverse economic impacts on such communities.”

Chapter 4.14 of the analysis describes anticipated impacts on communities and acknowledges a possibly profound impact on communities that depend on trawling. This is due to the nature of rationalization which results in fewer fishery participants and likely geographic shifts. The goal of attaining a sustainable fishery as a whole requires some impacts to individual communities. However, the Council also recommended measures that should mitigate these impacts.

For example, the program would allow communities to purchase quota or permits to keep some of the fishery in the community. In addition, the AMP is intended for use in ameliorating impacts on communities.

NMFS will review the proposed action for compliance with National Standard 8 prior to making a final decision. See also response to comment 105 below.

Comment 96: National Standard 9, reduction in bycatch, can be met equally well by the status quo alternative as by the action alternative.

Response: Chapter 4.17.2.2 provides information indicating that the proposed trawl rationalization program would be expected to be more effective at reducing bycatch than maintaining the status quo. See also responses to comments on the need for action, and responses to comments in Section 10.2 on the need for action 35.

NMFS will review the proposed action for compliance with National Standard 9 prior to making a final decision.

Comment 97: The proposed Program would elevate fishing efficiency and economic objectives over objectives dealing with environmental stewardship. This approach inverts the priority of the standards adopted by Congress to guide management plans. Under Congress’ scheme, it is the standard on fishing efficiency that must be considered (National Standard 5), while the standard on fisheries conservation (National Standard 1) has primacy.

Response: NMFS does not agree that the order of the wording in the stated goal of the proposed program is intended to elevate any parts of the stated goal above others. NMFS notes that the MSA uses

a similar ordering of issues in defining OY as MSY as reduced by any relevant economic, social, or ecological factors. NMFS concurs with the statement that National Standard 1 takes primacy over certain other considerations in the MSA. The analysis contained in Chapter 6 indicates that the proposed program would comply with National Standard 1 by improving the ability of the fishery to achieve OY while preventing overfishing and achieving rebuilding. The MSA also mandates the consideration of economic efficiency, allows allocations to the extent that they are not the sole purpose of a management measure, and specifically authorizes the establishment of limited entry programs and LAPPs.

As discussed in Section 1.2.2 of the EIS, since the initiation of scoping for action, the Council has identified the interrelated issues of bycatch and fleet stability as key problems, and the Council has been committed to increasing accountability for bycatch. Amendment 18, which focused on bycatch, identified IFQ as an appropriate approach for bycatch reduction (pp. 3-4 of EIS).

NMFS will review the proposed action for compliance with the National Standards prior to making a final decision.

Comment 98: The Program’s only concrete contribution to fishery conservation is the proposed full observer and camera coverage at sea and dockside and related reporting.

Response: Amendment 20 is expected to promote achievement of OY, reduce bycatch, and improve information available for use in managing the fishery. The analysis identifies numerous potential benefits, as well as potential adverse impacts, from the proposed action. The Council considered these impacts and concluded that the benefits outweigh potential adverse effects. Section 2.6 of the EIS explains the Council’s rationale for recommending the actions in Amendment 20. NMFS will review the proposed action for compliance with applicable laws prior to making a final decision.

Comment 99: If implemented as planned, this aspect of the Program should yield information useful for improving fisheries management.

Response: The observer coverage and monitoring requirements are intended to yield useful information.

Comment 100: This potential gain is overshadowed, however, by the considerable negative impacts of the Program. The DEIS does not give an adequate accounting of these impacts. Additionally, it contains significant errors in the information and analysis that are provided.

Response: The DEIS evaluates the potential impacts of the proposed action and its alternatives on the quality of the human environment. In this context, it includes a broad level discussion of anticipated program costs. As noted above, in some cases the EIS has been revised to provide a better description of the some of the information and its limits.

After considering potential positive and negative impacts of the proposed program and its alternatives, the Council determined that the proposed approach is the best way to achieve the stated goals as described in Section 2.6 of the analysis.

Additional economic information is provided in RIR/IRFA in this FEIS (see Appendix H). This additional information describes costs along with estimates of the distribution of these costs between the Federal government and the private sector NMFS will evaluate compliance with National Standard 7 prior to making a decision.

Comment 101: The program lacks the incentives needed to encourage harvesting the full optimum yield of higher biomass species while avoiding lower biomass species, thereby not meeting National Standard 1.

Response: Section 4.17.2.2 provides information indicating that the proposed trawl rationalization program would be expected to be more effective at reducing bycatch than would be maintaining the status quo. Section 2.6 explains the Council’s rationale for recommending Amendment 20. See also response to comments in Section 10.2, the need for action.

NMFS will review the proposed action for compliance with National Standards 1 and 9 prior to making a final decision.

Comment 102: The program’s allowance of non-fishing ownership and QS leasing will diminish fishers’ incentive for stewardship, undercutting the ability to meet National Standard 1.

Response: Appendix A-2.2.2.3.b (p.A-225-230) describes alternatives the Council considered, but rejected, that would have modified the eligibility to own requirements. This section of the analysis sets forth costs and benefits of different eligibility requirements. For example, the council considered restricting eligibility to “stakeholders” or limited entry permit holders, but identified concerns about cost and administration of such restrictions. The council also identified benefits of allowing broader eligibility such as encouraging the highest value use of the resource. See also response to comments 25 and 28.

Comment 103: The allocation of 90 percent of the groundfish quota to a nonselective gear with high levels of habitat destruction and bycatch makes the action inconsistent with National Standard 1.

Response: National Standard 1 states that “Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the U.S. fishing industry.” The MSA defines OY as “the amount of fish which (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.”

Thus, National Standard 1 pertains to an amount of fish rather than to a gear type’s impact on habitat. The analysis does discuss the rationale for focusing management measures on trawl gear in Section 2.6.1. Currently, for a number of species (especially flatfish and slope species) trawl gear is the only gear capable of commercially viable harvest in the amounts in which the species are available—see the response above under comment 47 in Section 10.4.2 for more discussion. The fishery is already subject to rebuilding plans that comply with the mandates of National Standard 1.

In addition, it is important to recognize the ongoing nature of fishery management under the MSA. As management needs arise, the Council and NMFS respond to them. Recently, Amendment 19 addressed habitat issues in the fishery, and established extensive habitat protections. Amendment 20 maintains those protections while specifically addressing a separate management need for rationalization as described in the purpose and needs statement. While FMP amendments must comply with the broad array of policy objectives in the MSA’s National Standards and within the FMP, not every FMP amendment will thoroughly address every management need in the fishery simultaneously. NMFS and

the Council will continue to review the best available information regarding habitat needs and develop additional management measures if necessary and appropriate.

The goal of Amendment 20 is to “[c]reate and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.” Within the context of achieving this goal, the EIS acknowledges impacts caused by trawl gear. For example, the impacts of trawl gear are discussed in a section on eco-labeling in Chapter 3 (p.100). While Amendment 20 is not focused on habitat remediation, as discussed in responses to comments in Section 10.4.3, Amendment 20 may allow for an increase from the status quo in the use of nontrawl gear in the trawl fishery. See also Section 2.6.1 of the EIS. Also, as noted in response to comment 47., the allocations in Amendment 21 would limit the trawl share of harvest to a slightly lower level than status quo. NMFS will review the proposed action’s compliance with all National Standards prior to making a final decision.

Comment 104: Although the intersector allocation process has been deferred to Amendment 21 (improperly, as discussed in our comments above on segmentation), the intended allocation to the trawl sector is clear on the record of Amendment 20. The preferred alternative has ignored available studies and reports showing the adverse effects of trawl gear on bottom habitat and overfished stocks, thus not addressing National Standard 2.

Response: The commenter’s position regarding segmentation of Amendment 21 and 20 are addressed below. And, as noted in response to other comments, no allocation or management scheme is “permanent.” the MSA requires periodic review of actions and the Council recommends modifications frequently. To the extent that the comments address the allocation scheme of Amendment 21, those comments are beyond the scope of this action.

The focus of Amendment 20 is rationalizing the trawl fishery and reducing bycatch. As discussed in responses above to comments addressing habitat concerns, especially the response to comment [5.2.4], Amendment 19 developed a suite of habitat protections that would continue under the Amendment 20 regime. The DEIS for Amendment 20 recognizes the impacts of trawl gear (for example, see page 100) and incorporates by reference information from the Amendment 19 EIS (see Section 4.20.3.3, p. 603). Amendment 20 would not modify the protections implemented pursuant to Amendment 19. We do not agree that relevant information has been ignored.

NMFS will review the proposed action for compliance with National Standard 2 prior to making a final decision.

Comment 105: The proposed Program fails to meet the National Standard 4 standards for allocation fairness and equitability in several ways. The Program’s failure to provide for fishing community participation is especially troubling in light of the statutory provisions for inclusion of communities in initial allocations and a record of Congressional concern over this issue. Senate Report 109-229 on Senator Stevens’ original limited access privilege bill, S 2012 in 2006 which, with changes not relevant here, was enacted into law. The report specified that allocation of harvesting privileges to fishing communities was to be allowed and that small vessel and entry-level participants as well as communities were to be included in any plan to rationalize a fishery.

Response: The cited legislation does not require initial allocations to communities or any other community specific provisions but does require that effects on communities be considered and taken into account. As stated in Section 2.5 of the EIS, the Council considered initial allocation alternatives,

including to communities but heard from local governments that they were not interested in the cost and burdens of administering a community quota program.

Appendix A provides additional discussion of the Council's consideration of communities at Section A-2.1.1.a, and lists alternative means by which Amendment 20 addresses community needs, including:

- Maintenance of a split between the at-sea and shoreside trawl sectors.
- Broad eligibility for ownership.
- A temporary moratorium on the transfer of QS to ease the adjustment period and allow for adaptive response.
- Specification of vessel and control limits to spread QS among more owners and potentially more communities.
- Inclusion of a community advisory committee as a formal part of the program performance review process.
- The Adaptive Management set-aside.

While initial allocations of quota would be limited based on qualifying criteria, after the first two years, the proposed program would allow both ownership of privileges by communities and acquisition by entry level participants. In addition, parties, including communities, desiring to receive initial issuance would be able to purchase limited entry permits such as The Nature Conservancy has done and receive initial issuance. Appendix A Sections A-2.2.2.d and A-2.2.3 describe entry level opportunities and transfer provisions.

NMFS will review the proposed action for compliance with National Standard 4 prior to making a final decision. See, in addition, response to comment below.

Comment 106: Given evidence that QS programs result in consolidation of fishing power in relatively large operations, the NS 4 (C) prohibition on acquisition of excessive shares under National Standard 4 may be violated along with National Standard requirements.

Response: National Standard 4 requires that allocations be “reasonably calculated to promote conservation,” and that they be “carried out in such a way that no particular individual, corporation or other entity acquires an excessive share.”

Chapter 4, particularly 4.17, describes the anticipated effects of the proposed program, and the expected conservation benefits for fish stocks, including increased speed of management information, elimination of the race for the fish, and reduction in bycatch and rate of bycatch. Section 2.6 sets forth the Council's rationale for recommending Amendment 20.

Limitations on accumulation and use are included in the program to prevent accumulation of excessive shares or excessive consolidation. These protections would include potential divestiture at the initial issuance stage.

Additional information on accumulation and use limits is provided in the response to comments 28 and 29.

NMFS will review the proposed action for compliance with National Standard 4 prior to making a final decision.

Comment 107: Congress intended that communities and small vessels be allocated harvest privileges (see, for example, Senate Report 109-229 on Senator Stevens' original limited access privilege bill).

Response: While initial allocations of quota would be limited based on qualifying criteria, after the first two years, the proposed program would allow both ownership of privileges by communities and acquisition by entry level participants. See response in Section 10.1.5.

Comment 108: The proposal runs counter to decisions of Congress in 1996 to strengthen laws promoting sustainable fishing and weaken National Standard 5 by replacing "shall promote" with the present "shall consider" efficiency.

Response: As stated above in response to comment 91 above, National Standard 5 does prohibit measures that have economic allocation as their sole purpose. The trawl rationalization program is not such a prohibited measure. The need for trawl rationalization arises from a complex set of challenges relating to biological, social, and economic concerns. This action addresses the challenge of addressing bycatch in a complex multi-species fishery in which management requirements for several overfished stocks are constraining the ability of the fishery to achieve OY on other stocks. By giving individual participants more flexibility, accompanied by greater individual accountability, the action is expected to better allow for achieving OY while rebuilding overfished stocks.

The stated purpose for the action reflects the range of biological, social, and economic concerns:

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

NMFS notes that Sections 303(b)(b) and 303A of the MSA specifically authorize the establishment of limited entry and LAPPs.

NMFS will review the proposed action to determine its consistency with National Standard 5 prior to making a final decision.

Comment 109: In elevating economic objectives over statutory standards that provide for the sustained participation of fishing communities, the DEIS misconstrues the relationships among the standards and fails to exhibit consistency with NS 8.

Response: We reiterate the multi-purpose goal of Amendment 20 which is to "[c]reate and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch."

Economic considerations are an important component of a rationalization program and redistributive impacts are unavoidable. As discussed in the responses in Sections 10.1.5 and 10.4.5, the DEIS fully considers impacts on communities and Amendment 20 includes provisions to mitigate these impacts to the extent practicable.

NMFS will review the proposed action for compliance with the MSA and its National Standards prior to making a final decision.

Comment 110: Nothing in the DEIS indicates that the Program will actually minimize bycatch to the extent practicable, as called for by NS 9.

Response: Section 4.17.2.2 provides information indicating that the proposed trawl rationalization program would be expected to be more effective at reducing bycatch than would be maintaining the status quo. See also comment responses in Section 10.2, especially the response to the first comment.

As discussed above in response to comment 114, Amendment 20 does not allocate between the trawl and nontrawl fleets. The decision on that allocation will be made pursuant to Amendment 21. See response to comment 101.

NMFS will review the proposed action for compliance with all National Standards prior to making a final decision.

Comment 111: The claim of increased safety is unsubstantiated and contrary to reported results from other IFQ fisheries.

Response: This comment relies on one example and refers back to the leasing argument as the driver for that impact. The proposed Pacific program is structured differently than the BC program. The degree of quota divisibility in the Pacific program alters the effect of leasing by allowing new entrants to purchase small amounts over time while also serving as crew. This is a different mechanical structure than BC where huge chunks of quota must be purchased to “enter,” so the new entrant has leasing as the only viable option.

Second, Pacific trawl vessels are currently in a relatively poor state as a result of the economics of the fishery. They also currently have a large incentive to fish in the winter due to the fishing opportunities present there via the trip limit regime. The proposed rationalization program would eliminate or reduce that structure and that corresponding incentive to fish in the winter.

Third, with regard to the whiting fishery, this program replaces the interim Amendment 15 provisions that restricted participation in the shoreside and at-sea sectors to vessels that met the specific eligibility criteria. Amendment 15, which was approved by the agency in 2008 and implemented in 2009 (see the final rule published March 10, 2009, 74 Federal Register 10139), contained no provisions for replacement vessels. Under the rationalization program, participation is no longer tied to a vessel but to a permit with a whiting endorsement. Permits can be transferred to different vessels, with some restrictions. This increases safety significantly over the Amendment 15 vessel limitation where aging vessels could not be replaced.

Last, most fisheries under IQs have shown an improvement in safety at sea. This is supported by the findings of the NRC.

NMFS will review the proposed action for compliance with the MSA and its National Standards prior to making a final decision.

Comment 112: Can you say, “Who’s your Banker?” Catch shares also allowed investors who’ve never been in the business to control large quantities of our nation’s fish resource. Some people would rather worship fish than eat them.

Response: Under Amendment 20, entities who are not currently fishermen would be able to acquire QS. The Council's rationale for this recommendation is set forth in Appendix A-2.2.3.a. See also response to comment above.

With respect to large quantities of quota, there would be accumulation limits in place.

The Council considered adding a use-or-lose requirement, but the tracking and monitoring requirements would have been untenable. The Council did add measures to try and ensure that quota is transferred to fishermen, including the requirement that all QP be transferred to quota account within a year, and the requirement that QP can only be transferred to a vessel. The 5-year review will allow NMFS and the Council to revisit this issue and determine whether additional management action is warranted.

10.5.3 Groundfish FMP Goals and Objectives

Commenters: Ecotrust, West Coast Seafood Processors Association

Comment 113: We believe the action alternatives are flawed and, in fact, do not meet the Groundfish FMP goals and objectives and specifically Goal 2, maximize the value of the groundfish resource as a whole, and Goal 3, promote the year-round availability of seafood to the consumer among other things.

Response: It is important to note that none of the FMP goals and objectives, nor any of the MSA National Standards, should be viewed in isolation. Both the FMP and the MSA contain a variety of competing policy objectives which must be considered and balanced whenever developing fishery management measures. In both the FMP and the MSA, some of the policies take priority over the others, such as the National Standard 1 mandate to achieve OY while preventing overfishing. As discussed in Chapter 6, the FMP contains three broad goals and 17 objectives to promote achievement of the goals. The three goals are enumerated in order of priority and the FMP specifies that they must be considered in conjunction with the MSA's National Standards. The first goal, and first priority, for the FMP is to "[p]revent Overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources."

Thus goals 2 and 3 are secondary to the FMP's primary management goal.

Goal 2 of the FMP is to "[m]aximize the value of the groundfish resource as a whole." The concept of maximizing value does not pertain to bestowing value on any particular group or groups, but rather on maximizing value as a whole consistent with National Standard 1. Nevertheless, the analysis does extensively consider potential effects on processors and harvesters. See, for example, Chapter 4.6, describing impacts on harvesters, 4.9 addressing impacts on processors, and 4.14 addressing impacts on communities. The analysis identifies a variety of potential impacts on processors that would include both positive and negative potential impacts. Chapter 2.6 of the EIS explains the reasons for and considerations underlying the Council's recommendation. In addition, Appendix A contains detailed information on these considerations.

With respect to goal number 3, the FMP states that:

Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

As stated in the EIS, the goal of trawl rationalization is to:

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

Underlying this goal is the need to address management of bycatch in a complex multi-species fishery in which management requirements for several overfished stocks are constraining the ability of the fishery to achieve OY on other stocks. By giving individual participants more flexibility, accompanied by greater individual accountability, the action is expected to better allow for achieving OY while rebuilding overfished stocks. The Council and NMFS analyzed alternative approaches for meeting this management objective in context of the FMP's broader goals and objectives as well as the MSA's National standards.

In this context, the FMP's objective of a year-round fishing season is of lower priority than preventing overfishing, rebuilding, allowing for appropriate harvest levels, and preventing to the extent practicable, any net loss of habitat. The proposed measures in Amendment 20 would affect both whiting and nonwhiting fisheries. While the shoreside nonwhiting sector currently operates on a year-round basis, the whiting sectors do not. The reference in the analysis to extending the fishing season pertains to eliminating the "race for the fish" in the whiting sectors. By replacing regulatory seasons with greater individual catch accountability, the different sectors of the fishery will be able to operate according to the schedule that makes the most sense to them. For example, one reason for maintaining year-round fishery for groundfish is that it holds the fishery together between seasons for other species, such as crab. It provides flexibility to keep operations going/provides year-round fishing activity in coastal communities and for processing plants. The IFQ system will provide greater flexibility to maintain year-round operations. Thus a key reason for this objective is to maintain year-round "fishing" activity, not just year-round "groundfish" activity. There is an underlying concern for stable employment in the fishing community.

Comment 114: The Program with its 90 percent allocation to the habitat—damaging trawl sector would undermine FMP goal 1, net loss of marine habitat is to be prevented to the extent practicable.

Response: Amendment 20 would not allocate between the trawl and nontrawl fleets; the decision on that allocation will be made pursuant to Amendment 21. The allocations in Amendment 20 pertain only to allocating within the Limited Entry trawl fishery. With respect to the shoreside IFQ sector, the proposed program would initially allocate the shoreside whiting trawl quota as follows: 80 percent to limited entry trawl permits and 20 percent to processors. It would initially allocate the nonwhiting shoreside trawl species covered by the program as follows: 90 percent to limited entry trawl permits and 10 percent to an adaptive management program.

While Amendment 20 is not focused on habitat remediation, as discussed in responses to comments 1.8.1, 1.8.2, and 4.2.5, Amendment 20 may allow for an increase from the status quo in the use of nontrawl gear in the trawl fishery. See also Chapter 2.6.1 of the EIS. Also, as noted in response to comment 4.2.5, the allocations in Amendment 21 would constrain trawl harvests to a slightly lower level than status quo.

It is important to recognize the ongoing nature of fishery management under the MSA and that not every amendment will address every management need in the fishery simultaneously. As management

needs arise, the Council and NMFS respond to them. Amendment 19 established extensive protections for habitat. Amendment 20 maintains those protections while specifically addressing a separate management need for rationalization as described in the purpose and needs statement. While FMP amendments must comply with the broad array of policy objectives in the MSA's National Standards and within the FMP, not every FMP amendment will thoroughly address every management need in the fishery simultaneously. NMFS and the Council will continue to review the best available information regarding habitat needs and develop additional management measures if necessary and appropriate.

Comment 115: The Program does not comply with FMP objectives 14 through 17 with respect to impacts on small entities. The AMP cannot be relied upon in evaluating the impacts of the preferred alternative.

Response: As stated in response to the first comment in this section, the FMP's goals and objectives should not be considered in isolation, but as components of a complex framework of competing considerations.

Objectives 14 – 16 read as follows:

Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Objective 15. Avoid unnecessary adverse impacts on small entities.

Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Chapter 2.6 of the EIS explains the reasons for and considerations underlying the Council's recommendation. In addition, Appendix A contains detailed information on the Council's rationale for each of the alternatives recommended. Factors considered include degree of disruption, impacts on small entities, and impacts to communities. The analysis does recognize potential negative impacts on harvesters not receiving sufficient initial allocations of quota. See for example Table A-12 setting forth considerations for allocating to processors. See also, Table A-15 describing potential impacts on harvesting and processing sectors, Section A-2.1.3.a setting forth considerations for allocation formulas, Section A-2.1.1.a discussing the initial split of QS and particularly the discussion of impacts on communities, and Section A-2.2.3.b describing considerations on transferability and eligibility to own.

With respect to FMP objective of considering communities, the analysis documents the Council's consideration of communities and efforts to minimize economic impacts to the extent practicable. Due to the nature of the allocation program, it is not possible to control how participants will consolidate or what geographic shifts may take place. See response to comment 5.2.1 above as well as additional responses to comments regarding communities throughout this chapter for more discussion of measures recommended to address impacts on communities.

Amendment 20 contains a 10 percent set-aside of the nonwhiting shoreside trawl quota for AMP, to begin in the third year of the program. Prior to that time, the Council will develop the infrastructure and

program components for use with the AMP through adaptive management, NMFS and the Council will be able to develop appropriate response measures as the program is implemented and actual impacts begin to be manifested.

10.5.4 Segmentation of a Major Federal Action

Commenters: Crab Boat Owners Association; Daspit, William; Ecotrust, Food and Water Watch; West Coast Seafood Processors Association

Comment 116: As acknowledged in the DEIS, this action (Groundfish Amendment 20) and Groundfish FMP Amendment 21, which establishes under the FMP allocations between the groundfish trawl sector and other sectors of the groundfish fishery, are closely related actions. Commenters argue that NMFS and the Council impermissibly segmented what they claim is in fact a single major Federal action by producing separate EISs for Amendment 20 and Amendment 21. Two commenters additionally argue that Groundfish FMP Amendment 22 should also be considered part of this action. Amendment 22 establishes a new vessel registration requirement for vessels targeting groundfish but not registered to a Federal groundfish limited access permit.

Response: CEQ regulations at 40 CFR 1508.25(a)(1) describe connected actions, which “are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

- (i) Automatically trigger other actions which may require environmental impact statements.
- (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
- (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.”

Furthermore “[p]roposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement” (40 CFR 1502.4(a)).

We do not agree with the commenters’ view that these actions are connected such that they should have been evaluated in one EIS. As described below, the Council made reasonable judgments about what should be analyzed separately.

Does either amendment “automatically trigger” implementation of the other amendment? Nowhere in either proposal is there a mechanism that triggers implementation of the other action.

Would it be impossible to implement either amendment if the other were not implemented (one cannot proceed without the other)? If Amendment 21 were not implemented, the trawl fishery could still be managed with IFQs and co-ops under Amendment 20. While an allocation is required to determine the conversion of QS to QP, such allocations could be determined and implemented through the Council’s biennial groundfish harvest specification process. Although pre-established allocations such as the trawl allocation in Amendment 21 could simplify the biennial process, it is not accurate that Amendment 20 cannot be implemented without them. Likewise, Amendment 21 can be implemented without implementing Amendment 20. If that were the case, the Council would continue to manage the groundfish trawl fishery with status quo measures (cumulative trip limits and whiting quotas/seasons). Furthermore, as mentioned previously, the biennial harvest specifications process benefits in any event from the allocations established in Amendment 21, because the amount of decision-making required is reduced.

Are the two actions so interdependent as to rely on each other for their justification? The rationale for Amendment 20 does not flow from the fact that allocations are established and similarly trawl rationalization is not justified by the allocations adopted under Amendment 21. Conversely, Amendment 21 is justified independent of Amendment 20, because, as stated above, it will help to simplify the biennial harvest specifications process no matter what measures are used to manage the groundfish trawl fishery. The Council has made allocation decisions in the past that are not tied to trawl rationalization and Amendment 21 is another step in establishing allocations under the Groundfish FMP. The Groundfish FMP Section 6.3 lays out a framework for establishing allocations in reference to criteria described in Section 6.2.3 and FMP goals and objectives. The purpose and need for Amendment 21, as described in that EIS, identifies support of trawl rationalization as one of three purposes for establishing the allocation scheme, the other two being to streamline the biennial harvest specifications process and to address bycatch of Pacific halibut. These purposes are consistent with the Groundfish FMP.

Commenters assert that segmenting these two actions into separate EISs masks the adverse habitat impacts stemming from continuing to allow a large proportion of the catch to be made by trawl vessels and prevents the public from fully understanding that a large proportion of fishing opportunity will be directed to the groundfish trawl sector in the form of harvest privileges. The goal of Amendment 20 is to “[c]reate and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.” Within the context of achieving this goal, the EIS acknowledges impacts caused by trawl gear in Section 4.20. As discussed in responses to comments in Section 10.3 and comment 114, the proposed trawl rationalization program may allow for an increase from the status quo in the use of nontrawl gear in the trawl fishery. Also, as noted in response to comment 114, the allocations in Amendment 21 would constrain trawl harvests to a slightly lower level than status quo. Not every amendment will address every management need in the fishery simultaneously. The Council recently addressed habitat issues in Amendment 19, and will continue to review relevant information and recommend additional management measures if necessary and appropriate.

Commenters further assert that segmenting the action “deprived some people and communities of their ability to participate in a process of importance to them” and masked the extent of a plan that the public would have otherwise found “very unappealing to a public weary of both industrial-scale trawl fishing and corporate welfare.” However, as the commenters themselves point out, the DEIS discloses the linkages between these two actions and in the impact analysis Amendment 21 is considered an external action contributing to the cumulative effects of trawl rationalization. Both of these actions were developed in the same decision-making forum—the Pacific Council—allowing the public to track the development of both in a fairly straightforward way and comment on them in the same venue. Given the common setting for the two actions, it is not the case that nontrawl groundfish fishery participants were burdened (noting their participation in the Council process through the Groundfish Advisory Subpanel, for example), nor did it “thwart public comprehension.”

The original proposal upon which Amendment 22 was based outlined various options for creating a limited access framework for the “open access” (i.e., not Federal license limited) fishery targeting groundfish. However, the Council action only established a vessel registration requirement. The Council has not submitted the Amendment to NMFS for consideration and possible implementation. Commenters imply a linkage between the two actions, because of the effects of trawl rationalization on nontrawl fishery participants in the open access fishery. However, the fact that the open access fishery may be affected (as disclosed and discussed in the DEIS) does not create a necessary connection between the two actions. As noted elsewhere, the trawl rationalization proposed action focuses squarely on the groundfish trawl fishery and the Amendment 22 proposed action is well outside its scope.

Comment 117: Amendments 20 and 21 should be reconsidered as a single amendment and a 90-day comment period should be allowed for the related DEIS, because 45 days offers insufficient time to obtain the documents, read through them, and draft comments.

Response: For the reasons discussed above, the Council and NMFS did not combine Amendment 20 and 21 into a single action. The DEIS was available on the Council’s website when completed (and somewhat in advance of publication of the NOA initiating the 45-day public comment period). Furthermore, because of the nature of the Council process, earlier drafts of the document were made available to the public for review. For example, a “decision document,” substantially similar to the DEIS in form and content, was made available in October 2008 in support of the Council’s choice of a preferred alternative in November 2008. CEQ Regulations require a 45-day comment period on a DEIS (40 CFR 1506.1(c)). The comment period on the DEIS was consistent with the CEQ regulations.

10.5.5 Commitment of Financial and Staff Resources by NMFS

Comment 118: For the last several years, NMFS has provided substantial financial and staff resources to the Council for the sole purpose of developing a trawl individual quota plan. It is clear that NMFS has committed those resources with a particular intent in mind, which calls into question the validity of the comment process in which we are engaged. The commenter notes that regulations at 40 CFR 1502.2(f) prohibit an agency from committing resources prejudicing selection of alternatives before making a final decision.

Response: NMFS has committed staff to the analysis of the development of a trawl rationalization program and to the drafting of the proposed regulations to implement the program. These are statutory requirements of the MSA. However, NMFS has not selected or implemented a final alternative. In addition, per 40 CFR 1503.2(f), NMFS has not committed resources that would prejudice the selection of alternatives prior to making a final decision on implementation of the trawl rationalization program.

10.6 Other Comments

Commenters: Bean, Brandon; Campbell, Bruce; Jensen, Charlie

Comment 119: Three comments not related to the proposed action were received. They discussed issues related to commercial whaling, collapse of the ocean food chain in the Pacific, and use of materials containing toxic materials.

Response: These comments do not relate to the proposed action or its effects.

10.7 Implementation Recommendations

Commenters: Department of Interior, Environmental Defense Fund, Tommy’s Marine Service

Comment 120: The following comments were made related to implementation of the trawl rationalization program:

- **Prioritize available funds for program implementation according to recommendations made by Environmental Defense Fund and others in a joint comment letter.**
- **Provide funds for transition assistance at the outset of the program.**
- **Develop an electronic, web-based IFQ transfer and tracking tool based on the principle that this automated tool should result in cost savings.**
- **The Department of Interior recommends that the U.S. Fish and Wildlife Service's trust anadromous species be reported to the Service if they are caught as bycatch.**

Response: The comments do not relate directly to the description of the proposed action and the evaluation of impacts contained in the EIS. NMFS has taken these comments into consideration as part of the rulemaking and program implementation process.

Comment 121: One commenter cannot support moving forward toward the January 1, 2011, implementation date.

Response: The Council and NMFS note the commenter's recommendation but have decided that implementing the program at the earliest practicable date best serves the public interest. The commenter states that "problems [cannot] be solved through 'trailing amendments' or on the fly after the program starts." We disagree that delay is necessary. Although a broad range of issues have been anticipated and addressed in program design, inevitably there will be unforeseen effects and the program may not perform as expected. Beyond the future implementation of the AMP, which will allow the allocation of 10 percent of QP per year to address unforeseen and unintended effects, the Council and NMFS recognize that the program as a whole may need to be adapted to changing circumstances over time; for this reason, a 5-year review is part of the program. Modifications will be accomplished through future Council actions, related FMP amendments, and regulatory adjustments.

10.8 Environmental Protection Agency Comments

EPA assigned a rating of "LO" (Lack of Objection) to the Pacific Coast Groundfish DEIS, Amendment 20. They did, however, offer some suggestions for the FEIS.

Suggestion: EPA recommends a comprehensive monitoring and mitigation program that incorporates adaptive management to the extent possible in order to address community impacts, impacts on tribes, and potential increases in bycatch of protected and overfished species. These actions should be identified in advance of the implementation of the action, and preferably be identified in the FEIS.

Response: NMFS appreciates the suggestions brought forward by EPA. Regarding an AMP, as suggested by EPA, the DEIS describes the Council designed AMP that sets aside 10 percent of the shoreside nonwhiting individual fishing quota two years after initial program implementation. This quota set aside will be used to address unforeseen impacts on coastal communities, consistent with EPA recommendations. During the first two years of the program, the Council, working with NMFS and the states, will develop the infrastructure and program components necessary to effectively administer this mitigation program in the future.

Regarding bycatch of protected and overfished species, the DEIS describes one of the most important components of this IFQ program. The IFQ program will implement a 100 percent observer requirement as a prerequisite to participation in the program, which means all catch will be observed. The responsibilities of the observers include catch monitoring and enumeration of target as well as overfished species. NMFS fully expects this IFQ program to facilitate the rebuilding of overfished

species in the west coast groundfish fisheries. A secondary responsibility of these onboard observers is to identify and record incidental interactions with protected species. NMFS fully expects that potential impacts or interactions with protected species, which is currently minimal, will decrease under the new IFQ program.

Suggestion: Tribes may be represented on the Council, but DEIS is unclear if NOAA has actually consulted in accordance with the requirements of *Executive Order 13175, Consultation and Coordination with Indian Tribal Governments*. If consultation has taken place, describe in EIS. If not, NOAA should initiate consultation and include information as appropriate in the final EIS.

Response: Tribal participation in the development of this rationalization program for west coast groundfish fisheries through the Council process has been significant, and will continue to be a priority of the agency. For *EO 13175*, NOAA is currently developing internal procedures and requirements to be followed nationwide, thereby ensuring compliance. Although not specifically related to the trawl rationalization program, NMFS has recently restated their offer of government to government consultation on fishery management issues, including groundfish, on the west coast.

CHAPTER 11 AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS STATEMENT WERE SENT

The Council makes both the DEIS and FEIS available on its website, so anyone with computer access may download an electronic copy. Electronic copies on CD-ROM and paper copies are made available upon request. The Council distributes a notice of availability for the DEIS and FEIS through its electronic mailing list, which include state and Federal agencies, tribes, and individuals. Copies of the FEIS are sent to anyone who comments on the DEIS. In addition, NMFS distributes copies of the FEIS to the following agencies:

Willie R. Taylor
Office of Environmental Affairs
Department of Interior
1849 "C" Street, N.W.
Washington, D.C. 20520
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William Gibbons-Fly, Director
Office of Marine Conservation
Department of State
2201 "C" Street, N.W.
Washington, D.C. 20520
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Timothy Ragan, PhD, Acting Executive Director
Marine Mammal Commission
4340 East-West Highway
Bethesda, MD 20814
(1 CD)

Pacific States Marine Fisheries Commission
205 SE Spokane Street, Suite 100
Portland, OR 97202
(1 CD)

Angela Somma
F/PR3; Endangered Species Division
Angela.Somma@noaa.gov
(Send documents electronically and/or inform of website location)

Dale Jones
F/EN; Enforcement Division
Dale.Jones@noaa.gov
(Send documents electronically and/or inform of website location)

Galen Tromble
F/SF3; Domestic Fisheries Division
Galen.Tromble@noaa.gov
(Send documents electronically and/or inform of website location)

Mr. Gordon White, Program Manager
Shorelands and Environmental Assistance
Program
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600
(1 CD)

Mr. Bob Bailey
Ocean and Coastal Program Manager
Department of Land Conservation and
Development
635 Capitol Street NE
Salem, Oregon 97301
(1 CD)

Ms. Anne McMahon
Acting Federal Programs Manager
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, California 94105-2219
(1 CD)

Mr. Will Travis, Executive Director
San Francisco Bay Conservation and
Development Commission
50 California Street, Suite 2600
San Francisco, California 94111-4704
(1 CD)

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