West Coast Groundfish Trawl Catch Share Program Five-year Review – Draft

August 2017

Draft—For Public Review

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EXECUTIVE SUMMARY

INTRODUCTION

More than 100 species are monitored or actively managed under the Pacific Coast Groundfish Fishery Management Plan (FMP) and harvested in commercial, recreational, and tribal fisheries off the coasts of Washington, Oregon, and California. The commercial fishery described in this report does not include tribal activities.

In 1994, the Pacific Fisheries Management Council (Council) amended the FMP to cap the number of groundfish permits with limited entry endorsements for trawl, pots, and longlines. The fishery still includes an open access component for pots, longlines, and other non-trawl gears. From 1999 to 2002, nine stocks were declared overfished (Pacific ocean perch [POP], bocaccio, lingcod, canary rockfish, cowcod, darkblotched rockfish, widow rockfish, yelloweye rockfish, and Pacific whiting), and the groundfish fishery was declared a disaster; in 2003, Congress financed a $46-million capacity-reducing buyback loan for permanent removal of 91 vessels (35 percent of permits) from trawl and associated fisheries. A tenth stock, Petrale sole, was declared overfished in 2010.

In 2011, under Amendment 20 to the groundfish FMP the limited entry trawl sector of the commercial fishery transitioned to catch shares management, a type of limited access privilege program under the Magnuson-Stevens Fishery Conservation and Management Act. The catch share program consists of cooperatives for the at-sea mothership and catcher-processor fleets that target and process Pacific whiting at sea, and an individual fishing quota (IFQ) program for the shorebased trawl fleet that targets both Pacific whiting and a wide range of other groundfish species. By law, this type of program must be reviewed five years after implementation. This review will provide managers with information to determine whether outcomes have been consistent with the program goal and objectives (Table ES-1) and expectations outlined in the Final Environmental Impact Statement (FEIS) (Table ES-2). The goal of the program was 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." (Amendment 20 FEIS, page 5)*

Components of the program's goal are not necessarily complementary. For example, the net economic benefit increases from consolidation undermine economic stability of individuals exiting the fishery, a necessary condition of consolidation. Analyses supporting implementation of Amendment 20 predicted outcomes would vary by sector. It was also expected that consolidation would reduce the groundfish catcher-vessel fleet to the most efficient vessels; that under-harvest of target species would increase; increased operational flexibility would confer greater profitability and safety and reduce any race to fish; bycatch and discard rates would decrease; and average crew and captain wages would increase while the number of these positions would decrease.

This executive summary addresses four main topics to assess the program:

1. Changes in the net benefits to the nation
2. Financial outcomes for fishery participants

3. Distribution of cost, revenues, effort, and net benefits among fishery participants
4. Changes in utilization rates of available fish species under the catch share program

Section, table, and figure numbers are provided where information can be found in the full report, which is organized by topic and contains information on a wide range of topics related to program performance not summarized here.

BASELINE AND CATCH SHARE IMPLEMENTATION PERIOD CONTEXT

Ideally, this review would compare outcomes of the program to how the fishery would look without it. However, numerous factors influence the fishery and its value, including changes in world markets, substitute seafood products, production inputs, environmental conditions, changes in stock status and catch limits for target and coincidentally caught species, geopolitics, and incentives created by management of other fisheries. It is difficult to distinguish the direct effects of the catch share program from the many ways in which the trawl fishery has changed over the last five years (Figure ES-1).

One major factor affecting the measurement of changes since the baseline period is the high natural variability in Pacific whiting biomass and its corresponding total allowable catch (TAC). During the Economic Data Collection (EDC) baseline period (2009-2010) and the Pacific Coast Groundfish Fishery Social Survey (PCGFSS) baseline (2010), the average TAC for whiting was about 70 percent of the 1995 to 2015 average. In contrast, average TAC since implementation (2011 to 2015) was about 120 percent of the 1995 to 2015 average, about a two-thirds increase from the baseline. This increase, coupled with the importance of whiting to the overall fishery (on average, 50 percent of all ex-vessel revenue), has a major effect on nearly all analyses. Longer time series of other datasets, such as state fish tickets, are used where possible to construct baseline periods for comparison.

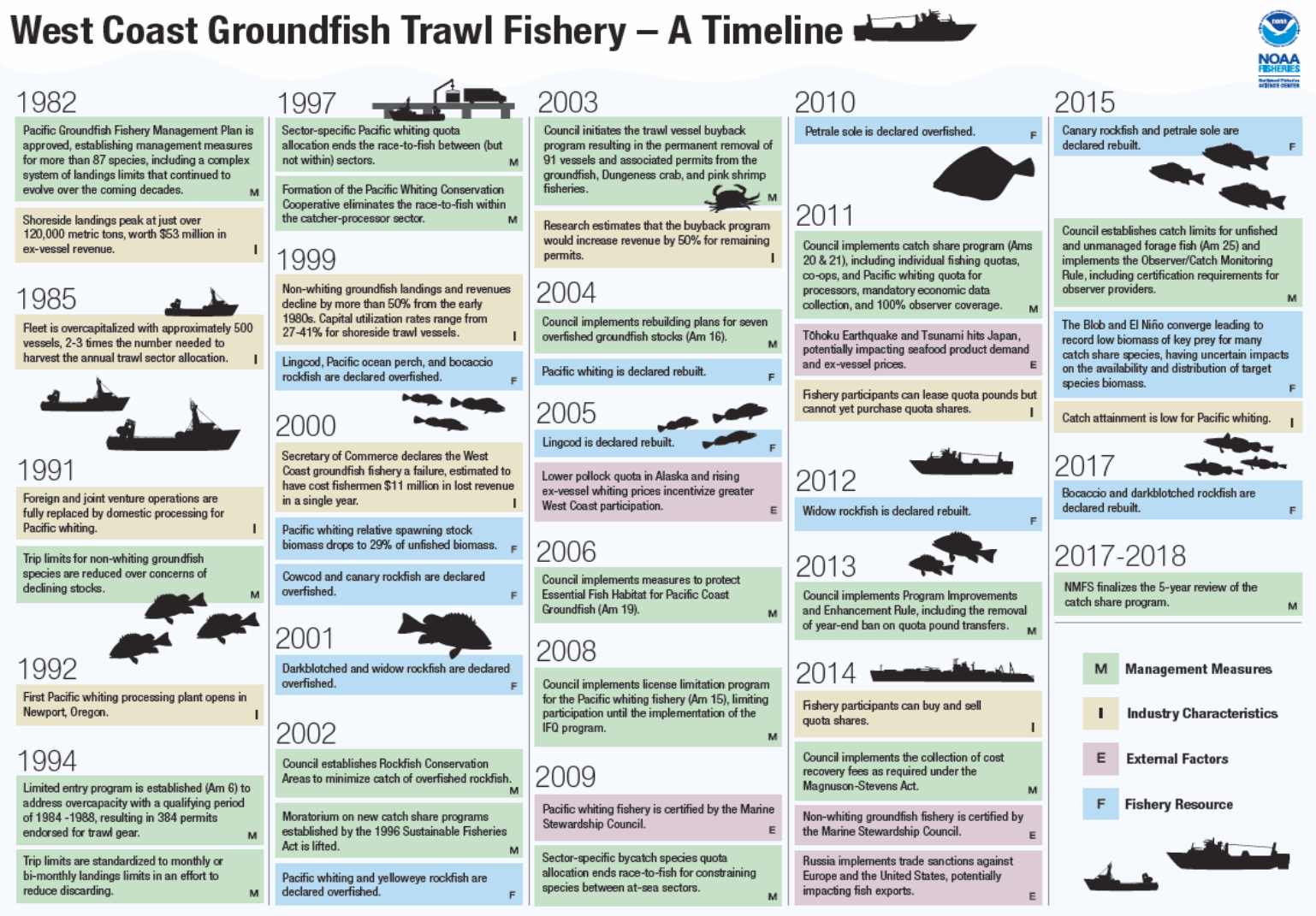

Figure ES-1: Timeline of major events since 1982 in the West Coast Groundfish Trawl Fishery. Source: Warlick, Steiner, and Guldin (under review).

RESULTS

1. HOW DID NET BENEFITS TO THE NATION DERIVED FROM THIS FISHERY CHANGE AFTER IMPLEMENTATION OF THE CATCH SHARE PROGRAM?

The Council anticipated net economic gains from the implementation of Amendment 20, primarily through increases in productivity and efficiency resulting from consolidation and increased flexibility, as well as through higher product volume and prices (3.1.1).

NET BENEFITS

Between 2011 and 2015, annual net benefits to the nation (measured by annual net revenue or revenue minus costs for all sectors of the fishery[1]) was $54 million, more than double the 2009-2010 baseline average of $25 million.[2] Total net benefits across all sectors were highest in 2014, at over $77 million, and lowest in 2015 at $26 million. The largest growth in net benefits came from the catcher vessel sector (shoreside and at-sea vessels, including whiting and non-whiting activities), and the largest contributor to net benefits was the catcher-processor sector (3.1.1(a), Figure ES-2).

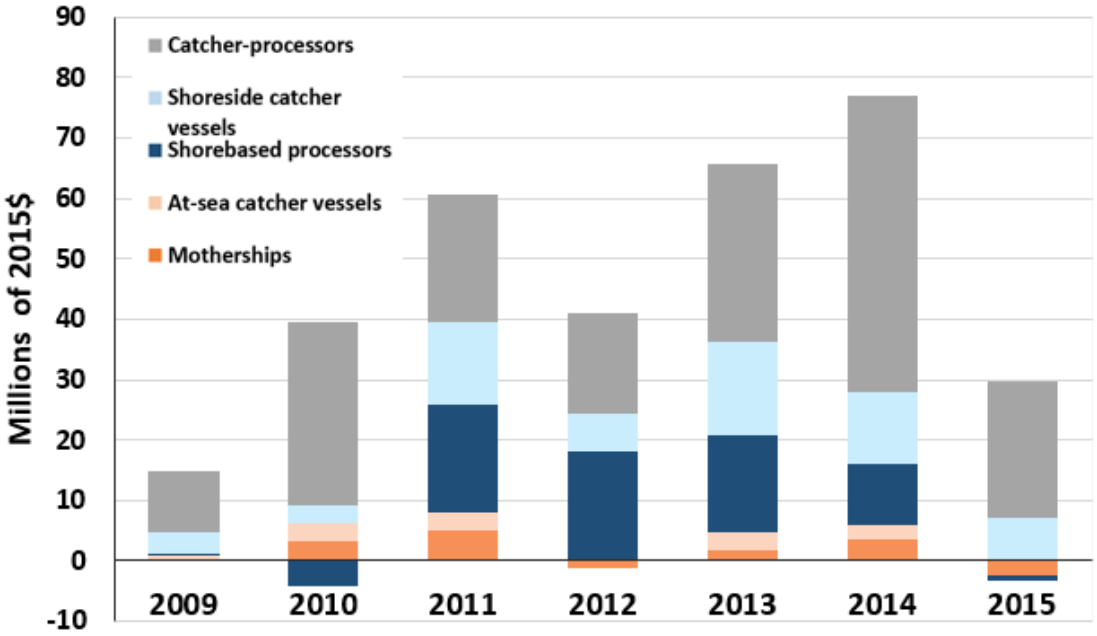

Figure ES-2. Net benefits by sector 2009 to 2015. Source: EDC data (Table 3-1, 3.1.1(a))

[1] Buyback fees are not included as a cost in the calculation of net benefits, but are included in the calculation of financial performance of individual entities. In the calculation of net benefits, buyback fees are economic benefits because they are transfers to taxpayers and, thus, part of the net benefits to the nation that the fishery produces.

[2] Data required to estimate net benefits using consumer surplus, as outlined NMFS' Economic Guidelines for conducting cost-benefit analyses (NMFS' Economic Guidelines for conducting cost-benefit analyses) are not available.

CONSOLIDATION

The Council expected that consolidation would be a driver of increases in net benefits.

The number of catcher vessels (whiting and non-whiting) active in the fishery has decreased from the baseline to the present, ranging from 134 vessels in 2009 to 97 in 2015. The number of vessels delivering to California has decreased slightly more than those delivering to Oregon (28 percent and 26 percent fewer vessels since 2009, respectively). Washington historically has had the smallest number of delivering vessels and has consolidated the least (13 percent). The shoreside Pacific whiting fleet has consolidated slightly more (29 percent) than the non-whiting catcher vessel fleet (24 percent). The number of at-sea catcher vessels fishing for Pacific whiting has remained relatively constant, as has the number of motherships, which is capped by the number of mothership limited entry permits (3.1.1(b)(1)).

In the catch share program, a first receiver site license is required to receive shoreside catch share deliveries. The number of shorebased processing companies purchasing Pacific whiting decreased from an average of twelve in 2009 to 2010 to eight from 2011 to 2015. The number of shorebased processing companies purchasing non-whiting species exclusively remained relatively constant (3.1.1(b)(1)). Public comment and social surveys indicate that this level participation reflects an increased rate of consolidation in ownership and concentration of control of quota share, fishing businesses, processing capacity, and support infrastructure (3.2.2(g)(4)(c)). However, the number of buyers, representing both individual processing and non-processing entities across states, has been decreasing since the 1990s (Figure ES-3).

To restrict consolidation in the shoreside catch share program and mothership co-ops, the Council limited the percentage of quota share (the long-term harvest privilege) that entities in those sectors may control. Additionally, the amount of annually issued quota pounds that a shoreside vessel may use and hold, the annual amounts that a mothership catcher vessel may deliver, and the annual amounts that a mothership may process were limited. Most vessel account and quota share owners do not currently appear constrained by these limits (3.1.1(b)(1)(A)). A moratorium on transfers of quota shares during the first three years of the program may have delayed some anticipated consolidation of ownership. No limits were placed on catcher-processor consolidation.

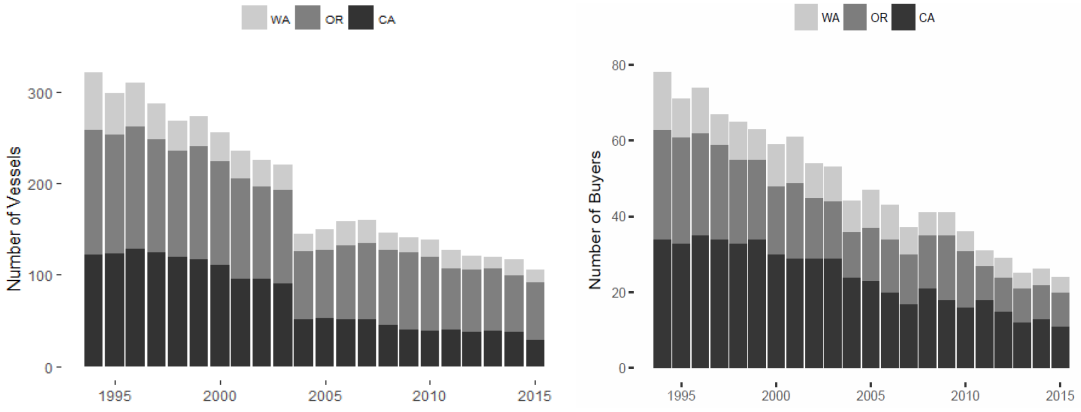

Figure ES-3. Number of groundfish trawl vessels by state of delivery location (left) and number of buyers by state (right), 1994-2015. Buyers include both processing and non-processing entities, represented by the number of site-licenses, and therefore is different than the number of EDC processing companies. Source: Fish tickets (Figure 3-3, Section, 3.1.1(b)(1); Figure 3-63, 3.2.2(b)(4)).

FLEXIBILITY

The Council expected that the catch share program would increase participants' flexibility in many aspects of the fishery. There is substantial evidence that participants are taking advantage of increases in flexibility. Harvesters and processors have adjusted to the catch share program by altering their participation in non-catch share fisheries (3.1.2(d)(1), (3.2.2(g)(5)), days at sea (3.1.2(d)(1)), the timing of landings (3.1.2(d)(2)), the number and size of fishing trips (3.1.2(d)(2)), the location of landings (3.2.2(b)), participation in cooperatives and risk pools (3.2.2(g)(2)), diversification (3.1.2(d)(5), gear switching (3.1.2(d)(6), 3.2.2(g)(4)(a)), carryover of quota (3.1.2(d)(7)), and exiting the fishery (3.2.3(d)).

PRODUCTIVITY AND EFFICIENCY

WHITING

Efficiency (calculated as net revenue as a percentage of total revenue) among shoreside and at-sea whiting catcher vessels increased from the baseline period until 2015 (3.1.1(b)(2) Figure ES-4). For whiting processors, efficiency has increased substantially since the beginning of the catch share program, with the exception of 2015. Efficiency for all whiting sectors decreased in 2015 due to difficult fishing conditions and low attainment of their whiting allocation. Catcher-processors have the highest level of efficiency; this has not changed since the catch share program began. There is no clear trend in efficiency for motherships.

NON-WHITING

Non-whiting vessels experienced a substantial increase from the baseline period to the catch shares period (from 8 to 18 percent efficiency, with a high of 23 percent in 2015) (3.1.1(b)(2), Figure ES-4). For non-whiting processors, there has been a downward trend in processing efficiency, due in part to increasing labor expenses and other costs.

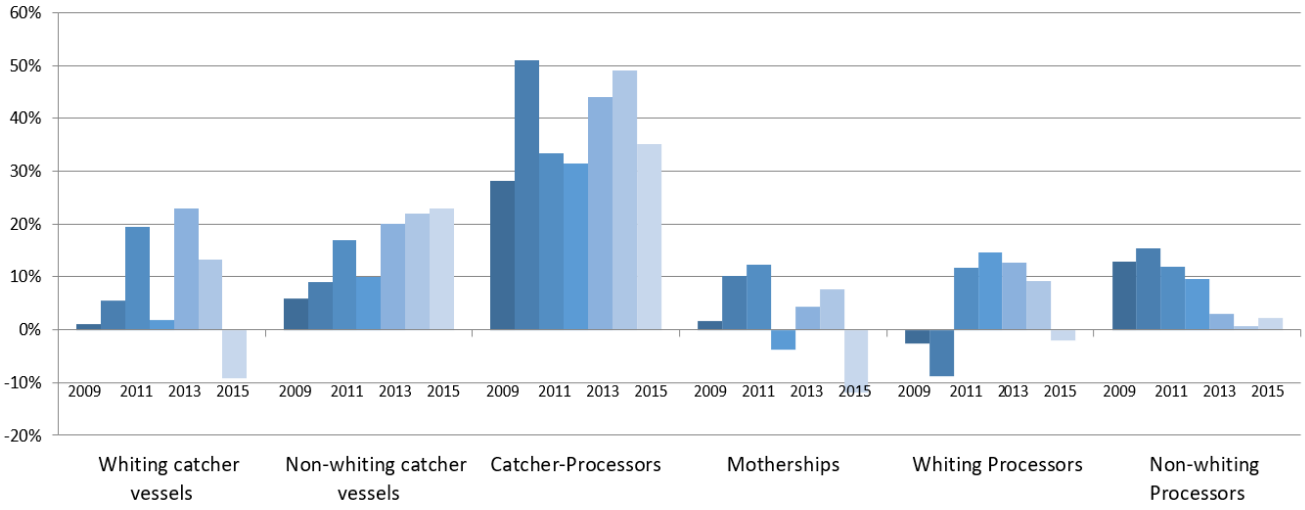

Figure ES-4. Efficiency (net revenue as a percentage of revenue) by sector and over time. Source: EDC Data. (Table 3-14, Section 3.1.1(b)(2))

PRODUCT VALUE

The FEIS predicted that elements of the catch share program might contribute to improvements in product quality and prices. The average value of at-sea whiting production per metric ton (mt) declined from the 2009-2010 period to the 2011 to 2015 period by about 15 percent in the mothership sector and 8 percent in the catcher-processor sector. Production value per pound in the Pacific whiting shoreside sector echoes this trend. However, most other species experienced slight to moderate increases in average production value per pound in the shoreside sector, including in the economically significant frozen sablefish (particularly with high prices in 2011) and fresh Dover sole product categories (3.1.1(b)(3)).

Seafood certification and labeling programs help inform consumers. The West Coast groundfish limited entry trawl fishery was certified as a sustainable fishery by the Marine Stewardship Council in 2014 (the Pacific whiting fishery was certified in 2010). The Monterey Bay Aquarium's Seafood Watch Program promoted several major species from "avoid" to either "best choices" or "good alternatives." Both designating entities indicated that their findings had been based on management changes in the groundfish fisheries, including the catch share program and its stringent monitoring requirements. These designations may lead to increased consumer awareness and preference for West Coast groundfish in the future (3.1.1(b)(3)).

CONSERVATION BENEFITS

One of the primary intentions of Amendment 20 was to reduce bycatch and discard mortality for all species (3.3.2). The vessel-level accountability provided by catch shares has resulted in significant reductions in the catch and discards of overfished species, exceeding Council goals for overfished species (3.3.2(a)). When Amendment 20 was implemented, of the ten previously mentioned overfished species only lingcod and Pacific whiting had been rebuilt.

Discards of six of the seven historically overfished rockfish species dropped at least 90 percent after implementation of Amendment 20 (3.3.2(a), Figure ES-5). For each, bottom trawl gear accounted for 90 percent or more of the discards prior to 2011. With the implementation of the catch share program, total fishing mortality decreased for darkblotched rockfish, POP, and cowcod rockfish, largely due to the drastic decline in discards. Widow rockfish was declared rebuilt in 2012, although the Council elected to continue precautionary low harvest levels through 2016. Discards of widow rockfish did not decline as drastically, as widow rockfish are more pelagic than the other overfished rockfish species and are commonly caught in the midwater trawl and directed whiting fishery.

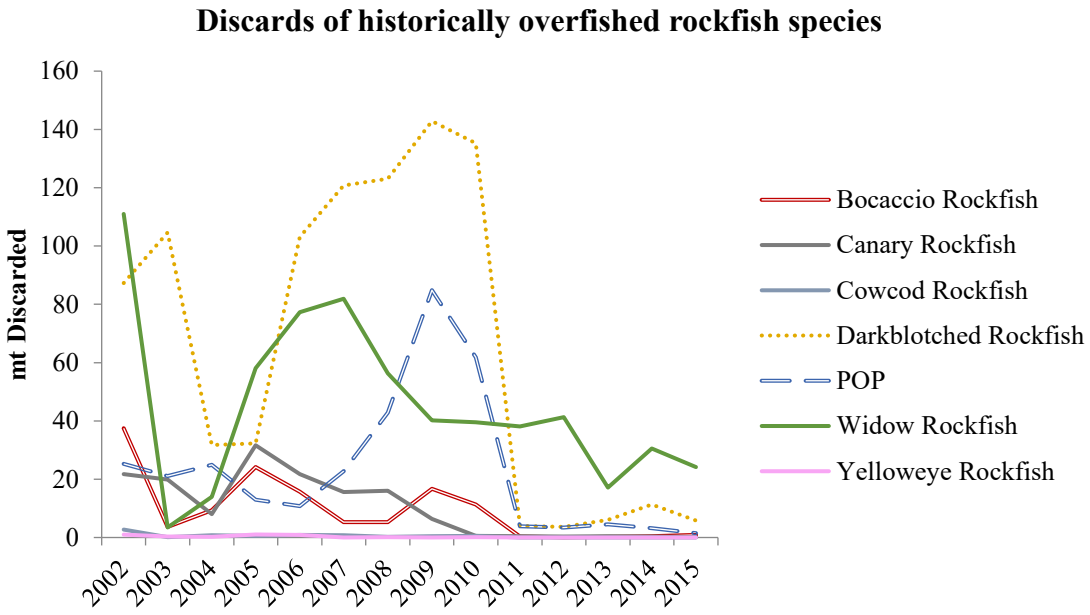

Figure ES-5. Discards of historically overfished rockfish species 2002-2015. Source: WCGOP (3.3.2(a) Figure 3-88.

There can be a tradeoff between bycatch of constraining rockfish species and bycatch of Chinook salmon, the highest bycatch salmonid in West Coast groundfish fisheries. Most Chinook bycatch is from midwater trawls in the whiting sectors. Approaching chinook thresholds may result in a variety of management responses. The whiting fishery risks closure if overfished rockfish limits are exceeded. Some participants have reported prioritizing rockfish avoidance over salmon. Catch within whiting sectors has increased, from an average of 5,727 Chinook (2002 to 2010) to 6,958 (2011 to 2016) after implementation of the catch share program. These increases may be correlated with both increased whiting TAC and the post-catch share shift of shoreside and mothership sector effort towards the fall (3.1.3(a)(2) Table 3-83); Chinook bycatch rates are highest from September through December.

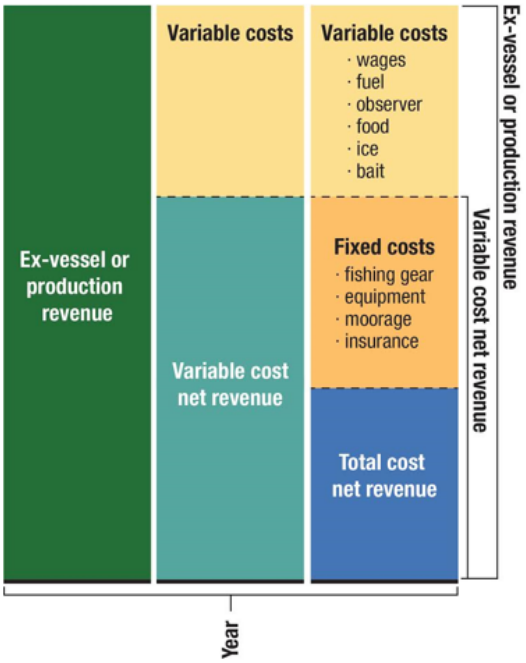

Figure ES-6. Financial outcome measures used in the report and costs included in each measure. Source: Steiner et al 2016a. (3.1.1(a))

2. HOW DID FINANCIAL OUTCOMES FOR PARTICIPANTS IN THE FISHERY CHANGE FOLLOWING CATCH SHARE PROGRAM IMPLEMENTATION?

Financial outcomes for participating vessels and processors are measured using variable cost net revenue, a representation of operating profits that accounts for only the costs of production that vary with the level of activity

(e.g., fuel, crew, ice), and total cost net revenue, a representation of cash-flow profitability that considers variable costs as well as fixed costs (e.g., purchase of a new engine or processing machinery) (3.1.2(a)(1), Figure ES-6). Summary statistics describing profitability such as means, medians, and percentiles are used to represent the performance of vessels or processors.

Financial outcomes improved on average for some sectors within the groundfish catch share program, and declined for others. Median variable cost net revenue, as well as 25th and 75th percentile outcomes, are shown in Figure ES-7. In summary, financial outcomes (as measured by variable cost net revenue) increased from the 2009-2010 base period for the average non-whiting trawl vessel, whiting processor, shoreside and at-sea whiting vessel, and mothership. Financial outcomes (as measured by variable cost net revenue) decreased for the median non-whiting processor. Variable cost net revenue of whiting entities varies largely depends on whiting TAC. While the median at-sea whiting catcher vessel, shoreside whiting processor, and mothership had an increase in variable cost net revenue from 2009-2010 to 2011-2015, each had a decrease in median variable cost net revenue per metric ton of output (Table ES-3). Conversely, the median shoreside whiting vessel had an increase in variable cost net revenue per ton in the catch share period, indicating overall increases in profitability.

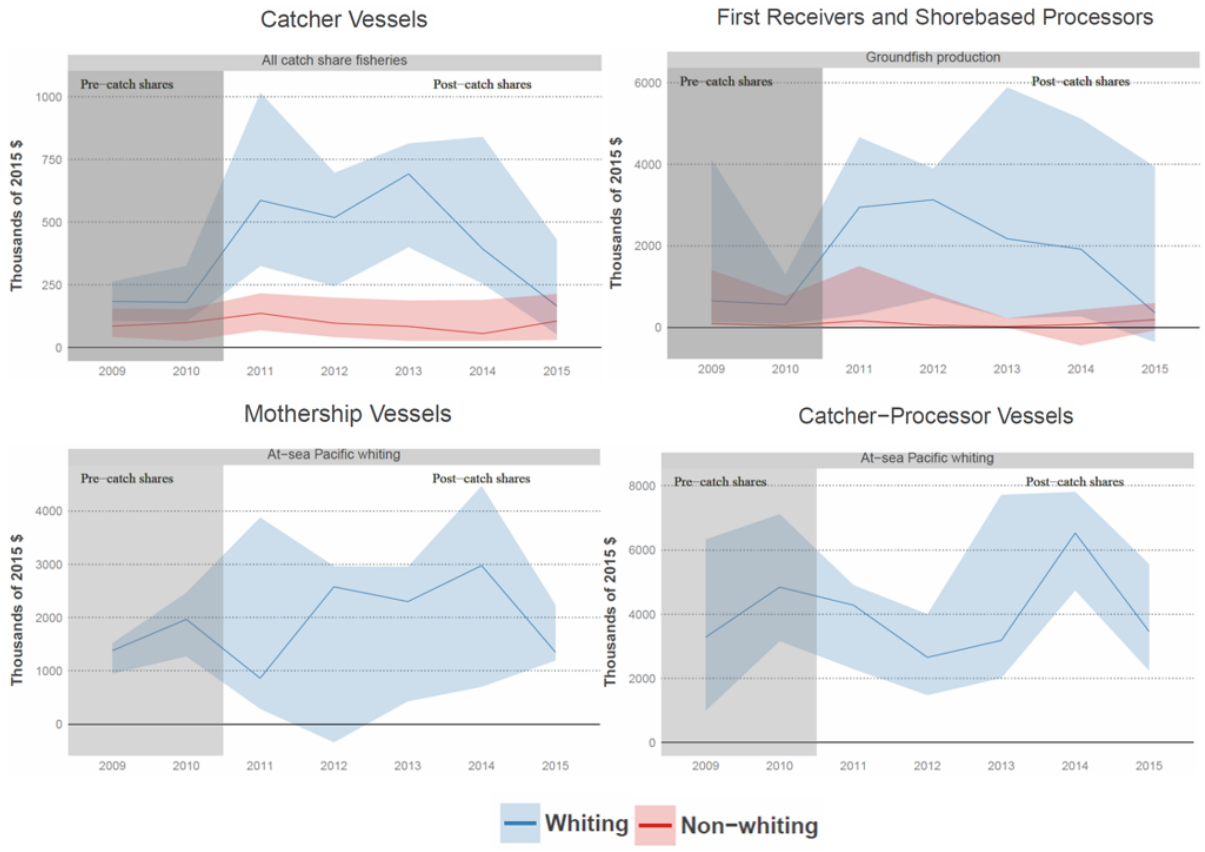

Figure ES-7. Median variable cost net revenue, 25th, and 75th percentile outcomes for each sector in the trawl fishery (3.1.2(a)(1) Figures Figure 3-13Figure 3-17Figure 3-18Figure 3-19).

Table ES-3. Comparison of variable cost net revenue metrics before and after catch-shares (2009-2010 to 2011-2015) 2015$. Outcomes per ton (mt) are shown for harvesting sectors that target whiting to account for the large variation in whiting TAC between years. Outcomes per day are shown for non-whiting harvesting activities to account for varying levels of effort by participants (3.1.2(a)(1) Table 3-26Table 3-33, Table 3-36Table 3-43).

Sector/Activity	Metric	Pre-catch shares avg.	Catch shares avg.
Shoreside whiting	Median per vessel	79,471	367,146
	Median per mt	51	114
At-sea whiting	Median per vessel	138,523	200,804
	Median per mt	85	83
Non-whiting trawl	Median per vessel	102,334	108,919
	Median per day	1,446	2,812
Fixed Gear**	Median per vessel	68,646	70,421
	Median per day	1,441	2,225
Motherships	Median per vessel	1,674,316	2,013,623
	Median per mt	978	452
Catcher Processors	Median per vessel	4,062,040	4,020,961
	Median per mt	1,604	1,407
Whiting Processors	Median per processor	598,923	2,103,438
	Median per mt	452	298
Non-whiting Processors	Median per processor	64,392	97,358
	Median per mt	413	527

**Some vessels fished with fixed gear prior to 2011 under an EFP, and are not comparable to the vessels fishing with fixed gear after 2011.

CATCHER VESSELS

Median total cost net revenue and variable cost net revenue increased on average for shoreside whiting and at-sea whiting activities, as did total cost net revenue and variable cost net revenue per ton, except for 2015 (3.1.2(a), Table ES-3). Difficult fishing conditions and low attainment for whiting in 2015 affected the profitability of all whiting sectors. Median total cost net revenue and variable cost net revenue have also increased for non-whiting trawl activities. For non-whiting trawl gear operations, mean and median total cost net revenue, as well as mean and median total cost net revenue per day, have more than doubled (on average) since 2009 and 2010. The percentage of catcher vessels with negative total cost net revenue has decreased from an average of 35 percent prior to the catch share program to 27 percent (for non-whiting catcher vessels) and 24 percent (for whiting catcher vessels) after (3.1.2(a)).

Costs per fishing day have increased on average across the catcher vessel fleet. Wages and fuel make up 75 percent of variable costs, and average costs on crew and captains' wages per fishing day have increased in most ports. Fuel costs per day have increased as well, although they have risen most

dramatically in ports with a high proportion of whiting vessels due to higher catch limits and higher fuel prices in 2011-2012 (3.1.2(a)).

Observer costs were not paid by the fleet prior to the catch share program. As part of the program implementation, observer coverage was increased to 100 percent, and the costs related to putting observers on the vessel are paid by the industry. To ease the transition to 100 percent coverage, a federal subsidy was implemented in 2011 ($328 per day), which decreased each subsequent year (ending at $108 per day in 2015). Starting in 2016, vessel operators began paying the full cost for their monitoring. The average monitoring cost (observer costs and electronic monitoring) was $402 per day in 2015, which was about 4 percent of the revenue in 2015 (3.1.2(a)).

The shoreside whiting fishery began using electronic monitoring of incidental catch as part of an exempted fishing permit beginning in 2004; this permit ended with the implementation of the catch share program. On-the-water electronic monitoring was subsequently reintroduced as an alternative to observer coverage for catch shares. Thirty-four percent of vessels started using electronic monitoring under an exempted fishing permit in 2015, this number increased to 42 percent in 2016 (3.1.2(a)(1)).

Net revenue with quota costs included is analyzed as a "lower bound" of net revenue (Figure ES-8). For non-whiting catcher vessels, the percent difference between variable cost net revenue with and without quota costs included varied by year, from a low in 2012 (mean variable cost net revenue was 0.5 percent lower with quota costs included) to a high in 2015 (mean variable cost net revenue was 25 percent lower with quota costs included). In 2015, the median non-whiting vessel spent 7 percent of revenue on quota. For whiting catcher vessels, the percent difference between variable cost net revenue with and without quota included ranged from 4 percent in 2012 to 10 percent in 2015. In 2015, the median whiting vessel spent 3.2 percent of revenue on quota (3.1.2(a)(2)).

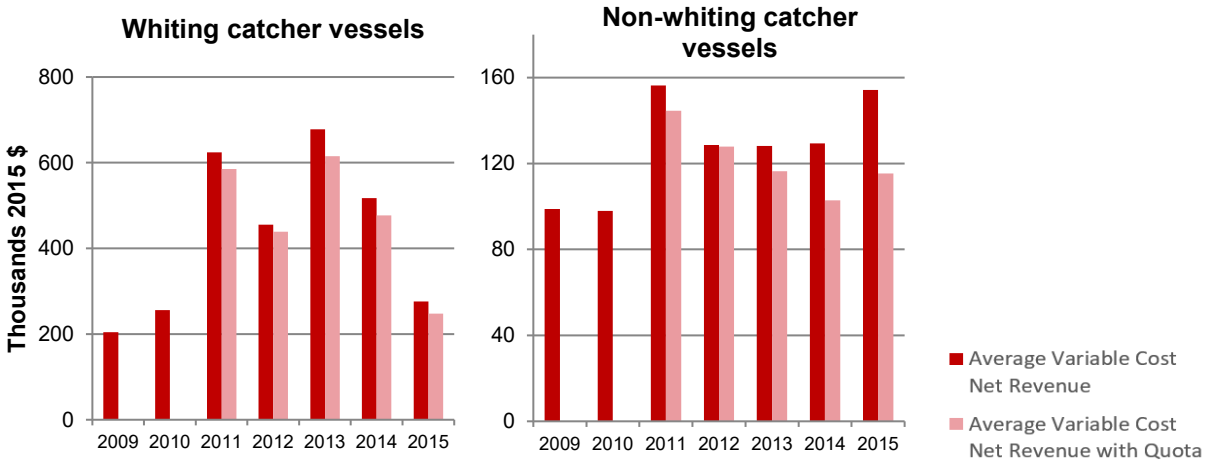

Figure ES-8. Average variable cost net revenue without (dark red) and with quota costs and revenue included (light red), for whiting catcher vessels (left) and non-whiting catcher vessels (right) (3.1.2(a)(2), Table 3-45, Table 3-46).

MOTHERSHIPS

Median variable cost net revenue increased in the catch share period compared to the baseline (3.1.2(a)(1), Table ES-3). Median variable cost net revenue per mt was positive for each year, but lower than the pre-catch share period. Both mean and median total cost net revenue per mt decreased overall and was negative in 2012 and 2015 for motherships. Some mothership vessels and catcher vessels that deliver to motherships have common ownership. This means that the earnings from the catcher vessels may be shared by motherships; therefore, in some cases, net revenue for motherships alone may not be the most precise representation of profitability.

CATCHER-PROCESSORS

Profitability of individual catcher-processors has fluctuated across years, with little change in the overall average, comparing 2009-2010 to the catch share period (2011 to 2015, Figure ES-7, Table ES-3). Median variable cost net revenue and total cost net revenue per vessel were highest in 2010 and 2014 (3.1.2(a)(1).

SHORESIDE PROCESSORS (WHITING AND NON-WHITING)

For the processing sector, financial outcomes differed dramatically depending on whether the company purchased and processed Pacific whiting in addition to non-whiting groundfish species. For whiting processors, average total cost net revenue and average variable cost net revenue increased dramatically beginning in 2011, with the exception of 2015 (3.1.2(a)(1). While annual catch limits, thus volume, of Pacific whiting were higher compared to 2009 and 2010, total cost net revenue per ton of Pacific whiting was still higher in the catch share period, although this was partially due to high fixed cost expenditures (e.g., equipment) in the pre-catch share period. Variable cost net revenue per mt of production has decreased for whiting processors.

For processors that do not handle Pacific whiting, which tend to be smaller, average total cost net revenue and average variable cost net revenue has decreased steadily since 2012, with lows in 2014 (3.1.2(a)(1)). The average total revenue and the variable cost net revenue earned per non-whiting processor have decreased (50 percent and 34 percent, respectively) since catch share implementation, despite potential increased harvest made possible by rebuilding stocks, moderate increases in average product prices for most species, and enhanced public perception of the fishery. Processors report that their profits have been affected by difficulties keeping workers steadily employed due to the instability of groundfish landings, which makes it more difficult for the processors to provide a steady supply of groundfish to retailers (3.2.2(g)).

While there is little evidence that the coastwide timing of non-whiting landings has changed, the total number of trips and the number of days an individual processor receives deliveries have decreased, and the average delivery size has increased (3.1.2(d)(2)). There was an expectation that catch shares would give processors an opportunity to work with harvesters to respond to economic factors, taking into account needs for stability and reliability of product flow. However, some PCGFSS respondents view the catch share program as having exacerbated problems related to stability and reliability, particularly in communities that have experienced a decline in landings (3.2.2(g)).

CREW AND PRODUCTION WORKERS

Since implementation of catch shares, full-time employment in the groundfish fishery has decreased, part-time employment in the groundfish fishery has slightly increased, and full-time employment in other (non-groundfish) fisheries has increased among crew participating in the catch share program (3.2.2(f)). In general, participants perceived a tight link between the catch share program and changes in the availability, stability, and compensation of jobs in the groundfish trawl fishery. While there was general agreement that the number of employment opportunities tied to the groundfish trawl fishery have decreased, there were varied perspectives on impacts to job stability and compensation (3.2.2(f)).

Compensation for individual crewmembers on whiting vessels increased relative to 2009-2010 (while fishing in the catch share fishery), with the exception of 2015. Average daily wages have increased 83 percent, and average annual wages have increased 118 percent since 2011. Average daily and annual compensation for individual crewmembers on non-whiting vessels has increased modestly (63 percent and 24 percent, respectively). Since 2010, fewer crewmembers rated compensation amount as "poor" and more rated it as "excellent", although the perspective of crew who have exited the fishery is likely underrepresented in social survey samples and not represented by EDC data (3.1.2(a)(3).

Annual wages paid to processing and non-processing crew on motherships were higher in all catch share years compared to 2009 and 2010. Increases in annual wages reflected the increase in catch limits and days at sea, while daily wages paid to mothership crewmembers have, for the most part, decreased slightly. Average and daily wages for processing crew on catcher-processors have decreased by 23 percent and 20 percent, respectively, since the implementation of catch shares, but average annual and daily wages for non-processing crew have increased considerably (3.1.2(a)(3)).

For shorebased processors (whiting and non-whiting), employment has become more evenly distributed throughout the year, with fewer employees during former peak months, and more during the rest of the year. Average hourly compensation of non-production employees, including non-groundfish, has increased. Average hourly compensation for production workers decreased in 2011 and 2012, but then increased from 2013 to 2015 to levels higher than before the catch share program (3.1.2(a)(3)).

3. DID THE DISTRIBUTION OF COST, REVENUES, EFFORT, AND NET BENEFITS AMONG FISHERY PARTICIPANTS (INCLUDING COMMUNITIES AND USER GROUPS) CHANGE?

Outcomes including increased net benefits, consolidation, and efficiency, as illustrated by average outcomes for both individuals and for sectors, have been consistent with expectations of the program. However, tradeoffs exist between maximizing economic benefits and avoiding negative consequences, such as the impacts of consolidation on fishery-dependent communities. Such consequences can be seen through changes in the distribution of costs, revenues, effort, and net benefits across fishery participants.

BY USER GROUP

CATCHER VESSELS

Individual economic performance varies widely among participants. Of the catcher vessels that participated in the limited entry trawl groundfish fishery in 2009 and 2010 and continued to participate in the IFQ program, 53 percent experienced an increase in mean annual variable cost net revenue (3.1.2(a)(1) Table 3-34). The average vessel experienced a 60 percent increase in variable cost net revenue, while the median vessel experienced a 10 percent increase. By activity, 88 percent of shoreside

whiting vessels observed increases, while 56 percent and 44 percent of at-sea and non-whiting catcher vessels observed increases, respectively.

The concentration of harvesting-related revenue in the non-whiting sector increased during the 2011 to 2015 period. This indicates a smaller number of vessels account for an increasing share of fleet revenue. Among all whiting catcher (shoreside and mothership) vessels, revenue concentration has roughly stayed the same level and is less than among non-whiting catcher vessels (3.1.1(b)(1)).

GEAR SWITCHING

When the Council implemented the shorebased IFQ program, it included a provision allowing participants with a trawl-endorsed limited entry permit to fish their quota pounds with trawl or any other legal groundfish gear, referred to as "gear switching." In practice, most vessels that have taken advantage of this provision are those that employed fixed gear (pots and longlines) prior to 2011 and that typically have targeted sablefish. Sablefish commands a higher ex-vessel price when caught with fixed gear (Section, 3.1.2(d)(6), Table 3-67). The gear-switching provision was intended to allow more flexibility for each vessel to choose its most profitable fishing strategy. The provision was also provided for environmental reasons, as fixed gear was thought to have fewer habitat impacts and minimal bycatch.

Sablefish, although a single coastwide stock, is managed with separate annual catch limits north and south of 36° N. latitude. Quota shares were allocated separately for northern and southern sablefish. The total quota issued each year, participation, and quota pound utilization in the northern sablefish fishery are higher than in the southern fishery. From 2011 to 2014, the average utilization for northern sablefish was 93 percent, but for the southern quota, it was only 43 percent (3.1.2(d)(6)).

In the years since implementation, an average of 16 vessels has taken advantage of the gear-switching provision each year (3.1.2(d)(6)). An average of six vessels switched from using trawl to using fixed gear at least part of the year (termed "switchers"). The number of switchers has decreased since 2011 from eight (2012) to five (2013 to 2015). An additional ten vessels, on average, that had not previously fished in the limited entry trawl fishery, termed "enterers," purchased or leased trawl permits and quota to fish with fixed gear in the IFQ program from 2011 to 2015. On average, switchers caught 7 percent of the total northern sablefish quota, enterers caught 21 percent, and trawl gear used 64 percent (Figure ES-9, 3.1.2(d)(6)).

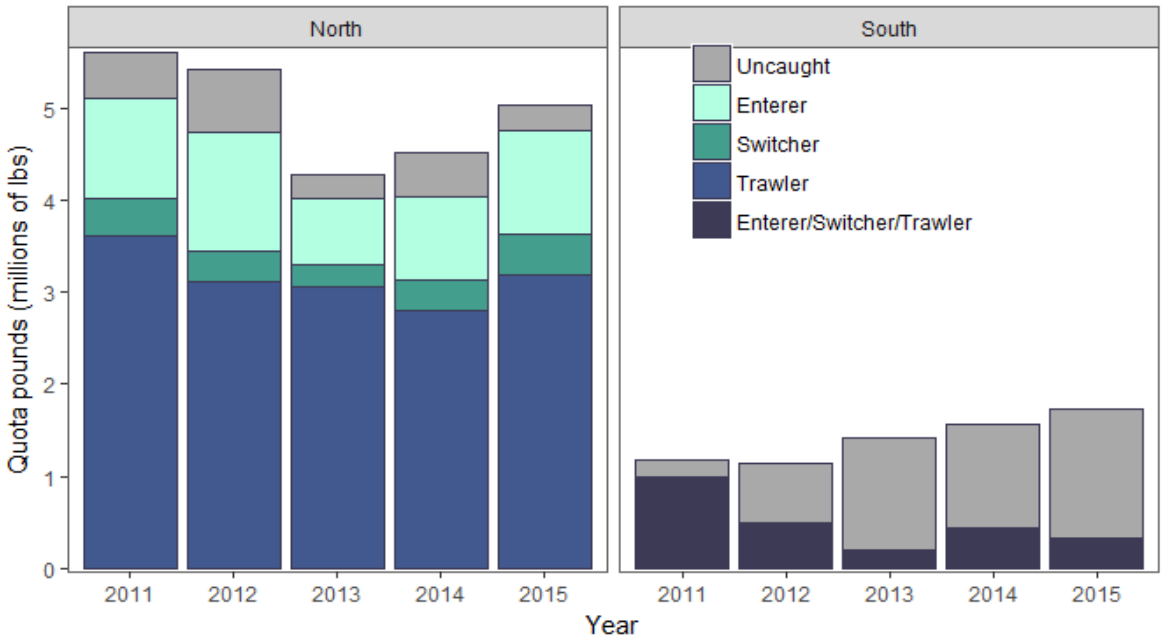

Figure ES-9. Utilization of northern and southern sablefish quota by vessel category. To protect confidential data, the landings of southern sablefish quota are not separated by type. Source: Fish ticket and EDC data (3.1.2(d)(6) Figure 3-38).

In the southern sablefish fishery, participants in the IFQ pot and non-IFQ hook-and-line fisheries have reported conflicts in southern California. Non-IFQ fishermen have reported increased pressure in their local fishing grounds from vessels that have not traditionally fished south of 36° (3.2.2(g)(5)). There is evidence to support this for the area between Point Lopez and Point Conception, where spatial analysis indicates IFQ pot locations covered 65 percent of the partially observed non-IFQ hook-and-line locations. In comparison, south of Point Conception (34°27' N. latitude), less than 1 percent of observed non-IFQ hauls directly overlapped with the location of IFQ hauls over the same periods, although observer coverage of the non-IFQ fleets is low (3.3.4(b)).

SHOREBASED PROCESSORS

WHITING

Median net revenue for whiting processors was higher than baseline in all years except for 2015. A similar trend was observed for the 75th and 25th percentiles, trends at least partially influenced by the loss of smaller processors. On average, revenues are shared more equally among remaining whiting processors compared to before the catch share program. This was related to both the non-participation of smaller processors and a redistribution of revenues among remaining processors. Per mt, average variable costs declined likely due to high processing volumes following increased whiting TAC (3.1.2(a)(1).

NON-WHITING

Overall, while median net revenue outcomes for shoreside non-whiting processors have not varied substantially over time, the 75th and 25th percentiles have both decreased over time. This indicates that the 25% of processors with the highest net revenue may be earning less than the highest earning processors in 2009 and 2010. This is also true for the lowest earners, where the 25th percentile of net revenue earners

has become increasingly negative since 2011 (See Figure ES-7 and 3.1.1(b)(1)). On average, the concentration of net revenue among non-whiting processors has not changed substantially since catch share implementation (3.1.1(b)(1), (3.1.2(a)(1)).

QUOTA SHARE LESSEES AND OWNERS

The catch share program created a new type of fishery participant: a quota share owner. Quota share owners have the option to lease their annual quota pound allocations to other participants (3.1.2(d)(3)). This type of fishery participant earns income from the fishery, while avoiding some of the risks and costs of direct participation. While some benefit from this new arrangement, other vessel operators dependent on acquiring quota pound through annual leases have reported this indirect participation as destabilizing (3.1.2(d)(3), 3.2.2(f)).

In an IFQ program, as consolidation increases, the vessels that remain in the fishery will likely spend a larger portion of their revenue on quota share purchases and/or leases of quota pounds from quota share owners who have exited or who fish less in the catch share program. The data suggest that this is occurring for both whiting and non-whiting vessels, but for non-whiting vessels to a greater extent (3.1.2(a)(2)), coinciding with general increases in revenue.

As part of the catch share program, 20 percent of the initial shoreside Pacific whiting quota allocation was given to eligible shorebased processors. Some companies also received share allocations for other species through affiliated ownership of trawl permits. At the start of 2014, NMFS lifted the moratorium on quota share ownership transfers and required divestiture of shares in excess of caps toward the end of 2015 (for all species except widow rockfish, which is in the process of being reallocated). Since quota share trading started, whiting quota share ownership by processors originally allocated whiting quota has increased from 20 percent to 23 percent in 2016. These processors currently own quota shares for non-whiting species as well. There is evidence that shorebased processors use their quota to support bargaining relationships with vessels to secure deliveries (3.1.2(a)(2)). For the catcher-processor and mothership sectors, trading and leasing of harvest rights occur through private formal or informal contractual lease arrangements, are not disclosed to NMFS, and are, therefore, not analyzed in this report.

BY COMMUNITY

The Council expected disparate participation impacts along the coast following implementation of Amendment 20 (3.1.1). Of ports with active non-whiting fleets after catch share implementation, Newport, Crescent City, and Eureka show the largest absolute declines in non-whiting vessels making landings (3.2.2(b)(3), Table 3-103). No IFQ trawl vessels made landings in the north Washington coast and Tillamook post-implementation. Conversely, Morro Bay saw a large increase in vessels landing there. After catch share implementation, whiting vessels ceased making deliveries to Crescent City and Eureka, and the number of active whiting vessels declined substantially on the south and central Washington coast and Coos Bay while remaining stable in Astoria and Tillamook (3.2.2(b)(3)). Participants felt that ports in Oregon had adapted most successfully to the catch share program compared to those in other states. Newport, Oregon, appears to be adapting well to the catch share program, in part because the diversity of its fisheries and its robust infrastructure supporting adaptability to a range of management or environmental changes (3.2.2(g)).

DISTRIBUTION OF REVENUE AND BUYERS AMONG PORTS

Since the 1990s, the number of groundfish (whiting and non-whiting) buyers has declined on the West Coast. Overall, the greatest decline in the number of buyers occurred in California ports (Figure ES-10, 3.2.2(b)).

Two additional indicators of changes across ports since catch share implementation are distribution of volume and the ex-vessel revenue of groundfish landed. With the increases in whiting total allowable catch since catch shares were implemented, ports in the south and central Washington coastal areas (Ilwaco and Westport), Astoria, and Newport show higher volumes of landings, driving corresponding higher ex-vessel revenue (Figure ES-11). Historically lower-volume port areas continued to experience declines, and four low-volume port areas (Bodega Bay, north Washington Coast, other Washington ports, and Tillamook) that had historically purchased limited entry trawl groundfish no longer did so in the catch share period. Notable increases in non-whiting ex-vessel revenue was observed in the Morro Bay and Monterey areas between 2011 and 2015, some of which is driven by vessels operating under the gear-switching provision to harvest southern sablefish (Figure ES-11, 3.2.2(b)).

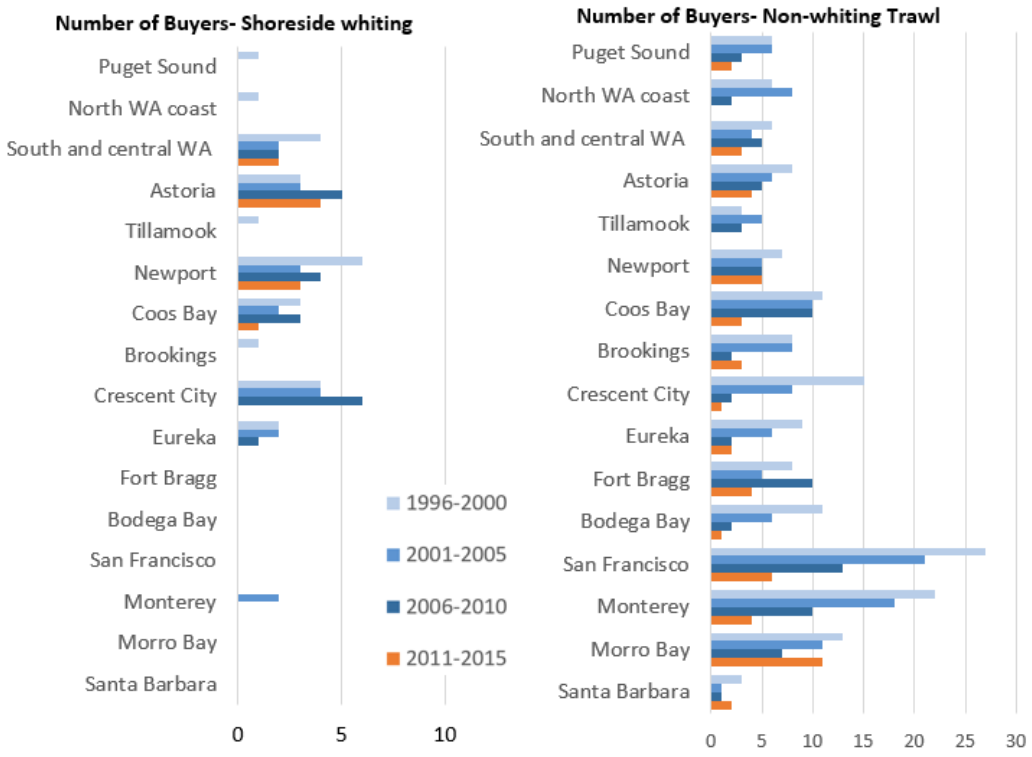

Figure ES-10. Number of buyers by port area for those buying exclusively whiting (left) or whiting and non-whiting species (right) over time. Source: Fish Tickets (3.2.2(b), Table 3-94).

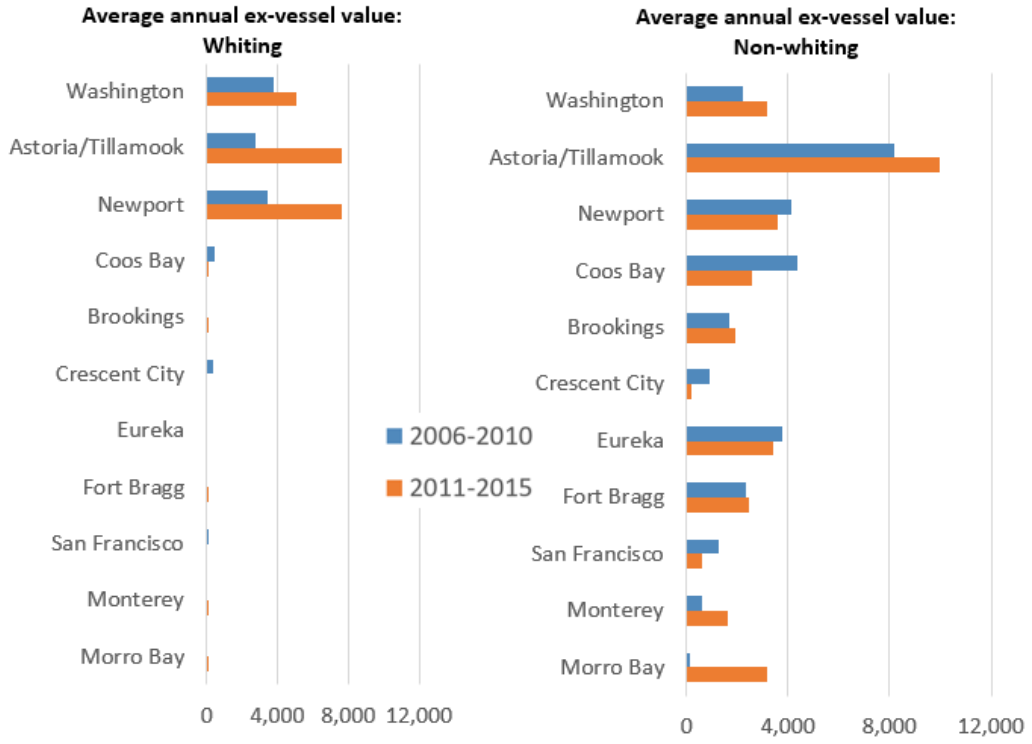

Figure ES-11. Average ex-vessel value by port area for whiting (left) or non-whiting (right). Source: Fish tickets (3.2.2(b) Table 3-90).

ENGAGEMENT

Engagement is a measure of the level of fishery participation (commercial fish landings, permit holdings, and vessel ownership) in a community, relative to the coastwide participation in that fishery. From a baseline three years prior to implementation, to the first three years of the program, engagement levels stayed constant in most communities. Exceptions were Crescent City and Coos Bay, which had the largest percentage decrease in groundfish engagement relative to other ports, and Ilwaco, which increased by a larger percentage than other communities (3.2.2(e)).

INFRASTRUCTURE

A functioning fishing industry requires adequate infrastructure (e.g., harbor facilities, dredging, fishing gear and maintenance suppliers, and access to ice and bait, buyers, and processors). To the extent that participation consolidates around fewer centers of activity, shorebased resources may concentrate in fewer locations. In many ports, infrastructure loss began with overfished species declarations and subsequent buyback (see Section 2.0, History of the West Coast Groundfish Trawl Fishery). Washington respondents reported few infrastructure losses in the catch share period, but they identified a reduction in the number of processors. Oregon respondents identified losses that occurred after implementation, with consolidation and centralization of fish activity in Newport and Astoria. Participants noted that California's trawl infrastructure appears to be shrinking, with significant losses along the southern and central coast of California (3.2.2(c)).

THE DISTRIBUTIONAL IMPACTS OF PROGRAM COSTS

Participants in the groundfish trawl catch share fishery believe that the cost recovery fee and the costs of 100 percent on-the-water and offload monitoring can reduce profitability, and they may even discourage investments in capital repair or improvement (3.2.2(g)(5)). Cost recovery fees amounted to 3 percent of revenue in 2014-2015 for shoreside catcher vessels (Figure ES-12, 3.1.2(a)(1)). Some fishermen reported that the monitoring requirement and associated costs disadvantage smaller vessels, whose monitoring costs are a higher proportion of their revenue (3.2.2(g)(5)). The cost of observers was seen by many fixed-gear and small-vessel fishermen as a significant barrier to profitable participation in the fishery. With the sunset of government reimbursements, the cost of observer coverage has increased from 1 percent of revenue (in 2011) to 4 percent of revenue (in 2015) for non-whiting operations, and from less than 1 percent of revenue (in 2011) to 2 percent of revenue (in 2015) for whiting operations (Figure ES-12, 3.1.2(a)(1)).

Participants in California and southern Oregon have indicated that, with the decrease in vessels fishing, expenses (including travel reimbursements) for monitoring have increased. Observer companies cannot profitably maintain enough observers in each port to accommodate multiple trawl vessels that may want to fish a few days a month during good weather windows. Both vessels and processors in these areas have noted that electronic monitoring exacerbates both costs and scarcity of catch monitors and observers. As vessels switch to (currently subsidized) electronic monitoring, the number of observer days that remaining vessels require decreases, which results in higher prices for those vessels and lower observer availability. All IFQ shoreside offloading activities must have catch monitors, and the observer on a trip often serves as the catch monitor for the offload. Since the vessel's observer is no longer available to act as a shoreside catch monitor for trips monitored with electronic monitoring, processors in lower volume ports pay more for catch monitors.

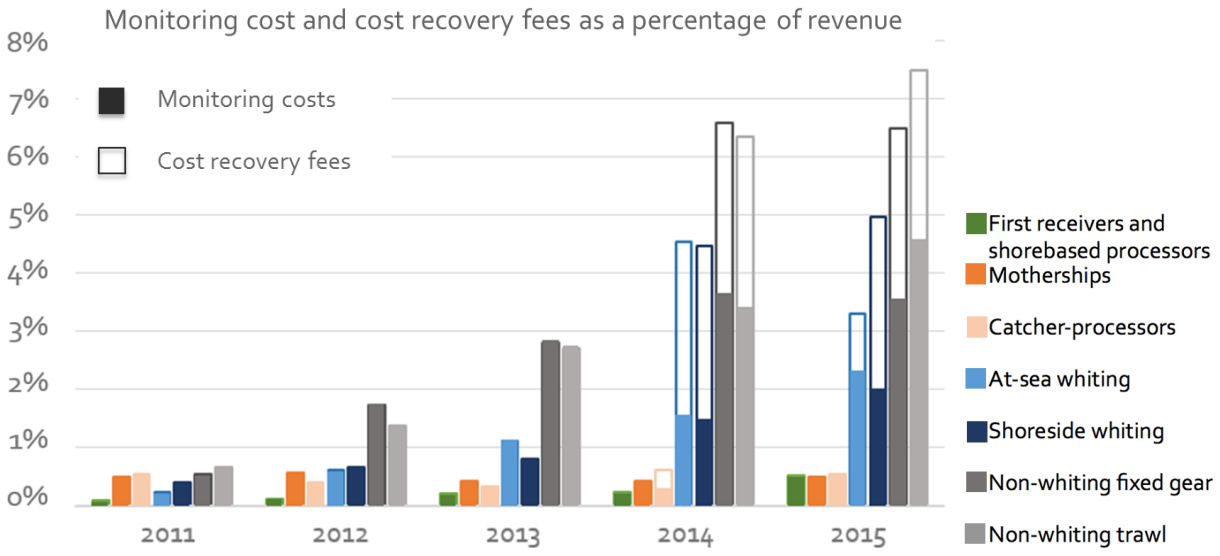

Figure ES-12. Monitoring cost (shaded bars) and cost recovery fees (outlines) as a percentage by sector over time. Source: EDC data (Section 3.4.1)

4. DID UTILIZATION RATES FOR SPECIFIC SPECIES CHANGE FOLLOWING CATCH SHARE PROGRAM IMPLEMENTATION?

One of the goals of Amendment 20 is to "provide for full utilization of the trawl sector allocation." For many species in the program, this goal is not being met (Figure ES-13, 3.1.3(a)(1), Appendix B).

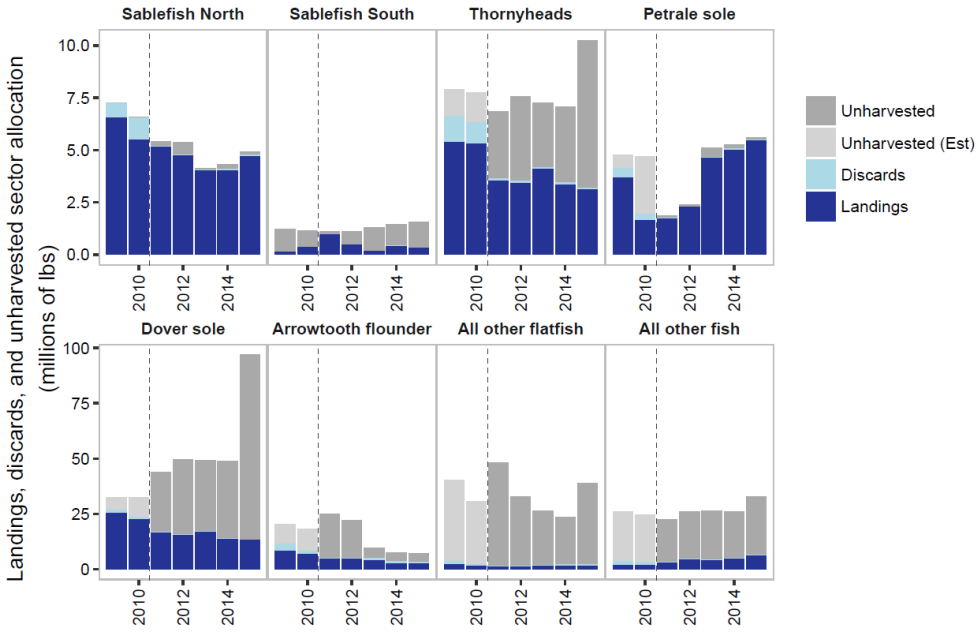

Figure ES-13. Landings (dark blue), discards (light blue), and unharvested (grey) trawl sector allocation of non-whiting groundfish species (millions of lbs). If carryover was made available for a specific quota category, the total weight was deducted from the original year and added to the following year. Except for southern sablefish, there was no trawl-specific quota in 2009 and 2010; for context, Unharvested (Est) (light grey) was calculated for 2009 and 2010 as the annual OY * (2011 Trawl Sector Allocation)/(2011 ACL) by stock or complex. Source: Somers et al. 2016, IFQ Program Database 9 (3.1.3(a)(1), Figure 3-39).

NON-WHITING TARGET SPECIES

The non-whiting trawl fleet has landed less than 50 percent of its Dover sole allocation since the implementation of catch shares, and this decreased to only 13.5 percent in 2015 with the doubling of the Dover sole annual catch limit (3.1.3(a)(1)). Utilization of allocations for many species of rockfish, roundfish, and flatfish is also far less than 50 percent. Petrale sole and northern sablefish are nearly fully utilized, while the southern allocation of sablefish is not (Figure ES-13). It is difficult to evaluate changes in utilization rates strictly, as there were no formal, species-level, non-whiting allocations to the trawl sector, with the exception of sablefish north of 36°N. latitude, prior to the catch share program.

Numerous economic and social factors contribute to the current and ongoing underutilization of trawl allocation for many species included in the non-whiting sector of the trawl fishery. Figure ES-14 illustrates how processors, catcher vessels, and markets are connected in a cycle that includes low utilization of groundfish stocks. Low utilization contributes to a smaller and/or inconsistent supply to processors. Without a predictable supply, processors have a difficult time securing premium markets (fresh, for example) and, instead, may have to rely on less discriminating protein markets that offer lower

prices. Increased flexibility for vessels and limited communication between vessels and processors about production plans can contribute to inconsistent supply to processors, making it difficult to employ a labor force ready to process groundfish year-round. Some processors impose trip limits on vessels that deliver to them to limit deliveries of species for which they lack processing or marketing capacity. Low demand and corresponding lower prices from processors, in turn, make fishing less profitable and result in fewer trips, lower landings, and ultimately, low utilization. It is difficult to quantify the effect of individual factors on utilization, as they are all related in an endogenous (cyclical) way (Figure ES-14) and are influenced by external factors as well (3.1.3(a), Figure 3-40).

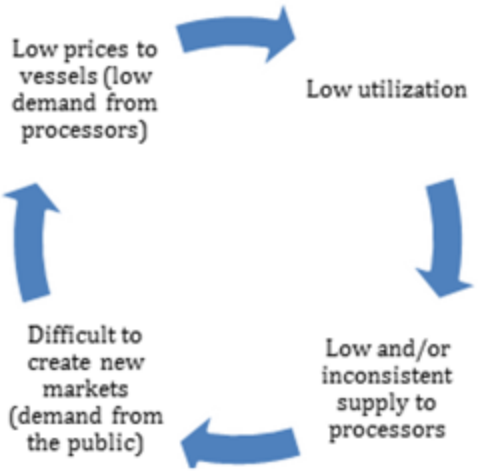

Figure ES 14. Illustration of cycle of low demand and low utilization. Source: Section 3.1.3(a).

One aspect of the multispecies IFQ market that may affect utilization is the challenge of predicting how much of a particular species' quota pounds a vessel will need throughout the year. Vessel operators can likely predict how much target species quota they will require throughout the year, but they may not feel confident in their ability to predict take of bycatch and constraining species. Vessels planning to fish at the end of a year often retain quota in case they need it, rather than risking not being able to acquire it should the need arise. The uncertainty of being able to attain quota of overfished species, coupled with the cost of a high-bycatch event for one of these species, makes vessels risk-averse (3.3.3(c-d)). Fishing to avoid constraining species is likely to decrease the attainment of target species. Various quota risk pools were formed between groups of fishermen to reduce the risk that any individual would be shut down due to an unexpected catch event (3.2.2(g)(2)).

Despite concerns that the gear-switching provision prevents full utilization of species in the Dover sole, thornyhead, and sablefish (DTS) target fishery, the elimination of the gear-switching provision would not result in full attainment of Dover sole or thornyheads. Northern sablefish quota is the principal constraint on DTS trawl fishing because it is the only target stock in that fishery that approaches full utilization. Using an estimation method involving catch ratios of sablefish with Dover sole and thornyheads, catching all the sablefish allocated to the trawl sector with trawl gear (i.e., the gear-switching provision were completely eliminated) could result in an increase in Dover sole utilization from 13 percent utilized (which was the figure in 2015) to 16 percent. This would be an increase in longspine thornyhead utilization from 23 percent to 32 percent and an increase in shortspine thornyhead utilization from 42 percent to 49 percent (using 2015 quotas). These estimates are lower bounds as they take into account the changes in fishing practices that have occurred due to the scarcity of sablefish quota, which includes implementing practices that increase the amount of other species caught per pound of sablefish. Thus, while utilization of sablefish by the fixed gear fishery has contributed to the decrease in attainment of Dover sole and thornyheads by vessels fishing with trawl gear, the analysis in this review shows that, even without any participation by fixed gear vessels in the trawl sector, utilization rates for these species are not likely to be close to full attainment, especially when the higher quotas starting in 2015 for Dover sole and thornyheads are considered (3.1.3(a)).

Analyses suggest that annual vessel-use quota pound limits do not significantly and directly contribute to low attainment (3.1.3(a)). However, these analyses do not assess whether vessel limits lead to conservative fishing practices to avoid constraining species that result in decreased attainment, prevent the development of boutique target fisheries, or discourage harvesters from investing in larger scale operations. Fear of an unanticipated high bycatch event, or "lightning strike," may change behavior and decrease attainment rates because the consequences are so high. For example, if a lightning strike were to occur, vessel limits may force that vessel out of the groundfish fishery for many years.

WHITING

Attainment of Pacific whiting was somewhat below the 2014 TAC, and it was far below the 2015 TAC. Many contributing factors are not attributable to implementation of catch shares. For example, for the at-sea sectors, limited availability of overfished species allocations, combined with increased encounters with rebuilding populations, may have made overfished species increasingly constraining. In addition, low catch per unit effort for whiting may have been due to anomalous oceanographic conditions ("the Blob"), and geopolitics has influenced uncertainty in the whiting export market. The flexibility that the catch share program provides allows vessels to apportion their effort strategically between West Coast Pacific whiting and Alaska pollock fisheries to maximize returns. This flexibility can benefit vessels by allowing them to minimize effort in a location experiencing unfavorable conditions, such as the high bycatch or low catch per unit of effort (CPUE) conditions of 2014 and 2015. However, the at-sea catcher vessels depend on motherships that purchase and process their catch at-sea, and the decision for fewer motherships to return to the West Coast late in 2015 may have been detrimental to the utilization of Pacific whiting allocation. Negative impacts on the catcher vessels may have been mitigated by diversification into non-whiting fisheries, because the number of endorsed mothership and catcher vessels targeting yellowtail rockfish and widow rockfish with mid-water trawl gear from October to November increased from 2014 to 2015 (3.1.3(b)).

PROGRAM MANAGEMENT AND UTILIZATION

Stakeholders expressed concerns about the lag between the Council's final action on modifications to the catch share program and subsequent implementation into regulations. New, non-routine rules for the groundfish trawl program have taken, on average, slightly more than two years from final Council action to implementation, for ten non-routine program rules from 2011 to 2017 (3.3.3(a)). Public comment references anticipation of increased flexibility in gear use and configuration (on which the Council took final action in March 2016) and increased access to fishing grounds through changes in spatial management such as the rockfish conservation area closures (scheduled for final Council action in September 2017) as regulatory changes that would provide an avenue to increased utilization.

OTHER CONSIDERATIONS

SAFETY

The non-whiting portion of the shoreside fishery was previously managed with a variety of landing limits that did not incentivize fishing in dangerous conditions. In the shoreside and at-sea whiting fisheries (with

the exception of the catcher-processor sector, which was already operating as a cooperative), safety improvements related to easing the race for fish (for whiting) were expected with implementation of catch shares. For whiting, effort in both the at-sea and shoreside fisheries has shifted to later in the year. A similar trend was observed for catcher-processors when it moved to cooperative management in 1997. Approximately 52 percent of whiting fishermen and 41.2 percent of non-whiting fishermen report that safety has improved because of the catch share program. Interview data suggest that this can be attributed to eliminating the race for fish and pre-trip safety checks by observers (3.1.3(d)).

Observer providers charge in 24-hour blocks starting at midnight. As the proportion of the observer costs borne by the vessel has increased, with a decrease in the government's observer reimbursement, the percentage of trips starting directly after midnight has increased to nearly 25 percent as vessels seek to minimize observer costs. Participants have expressed concerns that this may affect fishing safety. However, no change in incidents or accidents reported to the United States Coast Guard has been observed so far (3.1.3(d)).

Table ES-1. Goals, objectives, and policies addressed in Five-year Review. "x" stands for fully addressed in that section while "p" stands for partially addressed.

Goal/Objective/Standard/Key Design Component	Primarily in Chapter(s)			
	Econ. Perf. (3.1)	Comm. Perf. (3.2)	Envl. Perf. (3.3)	Prog. Mgmt. (3.4)
Amendment 20 Goal: Create and implement a capacity reduction program that achieves the following:				
Increases net economic benefits.	x			
Creates individual economic stability.	x			
Provides for full utilization of the trawl sector allocation.	x			
Considers environmental impacts.			x	
Achieves individual accountability of catch and bycatch.				x
Amendment 20 Objectives:				
1. Provide a mechanism for total catch accounting.				x
2. Provide for a viable, profitable, and efficient groundfish fishery.	x			
3. Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.			x	
4. Increase operational flexibility.	p			p
5. Minimize adverse effects from an individual fishing quota (IFQ) program on fishing communities and other fisheries to the extent practical.	p	p		
6. Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.	p	p		
7. Provide quality product for the consumer.	x			
8. Increase safety in the fishery.	p	p		
Amendment 20 Constraints and Guiding Principles				
1. Take into account the biological structure of the stocks including, but not limited to, populations and genetics.				x
2. Take into account the need to ensure that the total optimum yields (OYs) and allowable biological catch (ABC) are not exceeded.			x	
3. Minimize negative impacts resulting from localized concentrations of fishing effort.	p	p	p	
4. Account for total groundfish mortality.			x	
5. Avoid provisions where the primary intent is a change in marketing power balance between harvesting and processing sectors.				p
6. Avoid excessive quota concentration.	p	p		
7. Provide efficient and effective monitoring and enforcement.				x

Goal/Objective/Standard/Key Design Component	Primarily in Chapter(s)			
	Econ. Perf.	Comm. Perf.	Envl. Perf.	Program Mgmt.
	(3.1)	(3.2)	(3.3)	(3.4)
Amendment 20 Constraints and Guiding Principles (cont.)				
8. Design a responsive mechanism for program review, evaluation, and modification.				x
9. Take into account the management and administrative costs of implementing and overseeing the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and Federal resources available.				x
Magnuson-Stevens Act (MSA): National Standards				
1. Achieve OY and prevent overfishing.			x	
2. Use best available scientific information.				x
3. Manage stocks as a unit.				x
4. Ensure that allocations are fair and equitable, promote conservation, and prevent excessive shares.	x			
5. Consider efficiency in utilization; do not have economic allocation as sole purpose.	p			
6. Allow for variations and contingencies.				x
7. Minimize costs; avoid duplication.				x
8. Consider fishing communities to provide for their sustained participation and to minimize adverse economic impacts.		x		
9. Minimize bycatch, and bycatch mortality.			x	
10. Promote safety of human life at-sea.	x			
Catch Share Review Policy: Key design components included in MSA 303A				
Allocations				x
Eligibility		p		p
Transferability		p		p
Annual catch limits (ACLs) and accountability measures			x	
Accumulation limits/caps	x			
Cost recovery				x
Data collection/reporting, monitoring, and enforcement	p			x
Duration				x
New entrants		x		
Auctions and royalties				x

Table ES-2: Summary of FEIS expectations by sector. Source: Pages xviii-xix of the FEIS.

Sector/Fleet	General	Crew and Captain	Consolidation	Costs	Profits	Safety	Timing and Location of harvest
General	Bycatch of nontarget species could change. Bycatch most likely will decrease due to IBQs, but could increase as previously under-utilized target species catch increases	Decrease in the number of captain and crew jobs, while those who remain in these jobs are expected to receive higher wages.	Consolidation may push excess vessels into the pink shrimp, Dungeness crab, or other fisheries that are operationally similar.				Resource, grounds, and market competition could increase due to greater operational flexibility and gear switching.
LE Trawl Groundfish Harvesters	*Whiting sectors*: less motivation to "race for fish," optimizes revenue and improves product quality		Fleet size will shrink to the most efficient vessels remaining	Consolidation will lead to decrease in the cost of harvesting. Harvesters not receiving an initial allocation (or one of sufficient size) will have to buy the quota necessary to participate in the fishery, increasing costs.	Harvest of under-utilized target species would increase, leading to higher gross revenue per vessel and per-vessel profits.	Increased profits and greater flexibility would improve safety conditions on board trawl vessels.	Changes expected to the timing and location of harvest due to: bycatch avoidance, ease in transferring harvest privileges, and the use of nontrawl gear.
Shoreside Processors			Consolidation could occur among shoreside whiting processors, reducing total capital costs while changing asset values.	Increased raw fish prices could occur when harvesters hold QSs. *Non-whiting sector:* Cost of production may decrease following increased harvest and more utilization of processing capital. Compliance costs may increase if first receivers must pay for the cost of shoreside catch monitors.	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. *Whiting sector:* Increased season length may reduce cost of production.

Motherships	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		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.		
Catcher-Processors	Minor impacts expected relative to status quo.						

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ACRONYMS AND ABBREVIATIONS

ABC	Acceptable biological catch
ACL	Annual catch limit
Acts	The Coast Guard Authorization Act of 2010 and the Coast Guard and Maritime Transportation Act of 2012
AFA	American Fisheries Act
AMP	Adaptive Management Program
B_{msy}	Maximum sustained yield biomass
CAB	Community Advisory Board
CDC	Center for Disease Control
Council	Pacific Fishery Management Council
CFA	Community fishing association
CGC	California Groundfish Collective
CHA	Catch history assignment
COD	Certificate of Documentation
CPUE	Catch per unit of effort
CQF	Community quota fund
CRC	Cost Recovery Committee
CSVI	Community Social Vulnerability Indicator
CV	Coefficient of variation
DAS	Days at sea
DPC	Direct program costs
DTL	Daily trip limit
DTS	Dover sole, thornyhead, and sablefish
EA	Environmental assessment
EDC	Economic Data Collection Program
EFH	Essential fish habitat
EFP	Exempted fishing permit
EIS	Environmental impact statement
EM	Electronic monitoring
EPIRBs	Emergency Position Indicating Radio Beacons
ESA	Endangered Species Act
FEIS	Final EIS
FISHEye	The Fisheries Economic Explorer
FLSF	Fisheries Leadership and Sustainability Forum
FMP	Fishery management plan
FR	First receiver
GMT	Groundfish Management Team
HG	Headed and gutted
HHI	Herfindahl-Hirschman Index
IBQ	Individual bycatch quota
IFQ	Individual fishing quota
IFMC	Ilwaco Fishermen's Marketing Cooperative
I/O	Input/Output Model
IO-PAC	Input-output model for Pacific Coast Fisheries
LAPP	Limited access privilege program
lb	Pound
Lowe Index	Lowe Multifactor Productivity Index
MFP	Multi-factor productivity
mt	Metric tons

MSA	Magnuson-Stevens Act
MSC	Marine Stewardship Council
MSY	Maximum Sustained Yield
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NIOSH	National Institute of Occupational Health and Safety
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA GC	NOAA General Counsel
NPFMC	North Pacific Fishery Management Council
NRPM	Notice of Proposed Rulemaking
NWFSC	Northwest Fisheries Science Center
OA	Open access
ODFW	Oregon Department of Fish and Wildlife
OLE	Office of Law Enforcement
OMB	Office of Management and Budget
OY	Optimum yield
PCGFSS	Pacific Coast Groundfish Social Survey
PFD	Personal flotation device
POP	Pacific Ocean perch
PWCC	Pacific Whiting Conservation Cooperative
QP	Quota pound
QPVL	Quota Pound Vessel Limit
QS	Quota share
RCA	Rockfish Conservation Area
Review Guidance	Draft Guidance for Conducting Reviews of Catch Share Programs (NMFS)
SS	Shoreside
SSC	Scientific and Statistical Committee
STD	Standard deviation
SWC	Shorebased Whiting Cooperative
TAC	Total allowable catch
TCE	Tail conditional expectation
TNC	The Nature Conservancy
USC	United States Code
USCG	United States Coast Guard
VCNR	Variable cost net revenue
VMS	Vessel monitoring system
USFWS	United States Fish and Wildlife Service
WCGOP	West Coast Groundfish Observer Program
WCR	West Coast Region
WCRO	West Coast Regional Office
WDFG	Washington Department of Fish & Wildlife