NATIONAL MARINE FISHERIES SERVICE REPORT

National Marine Fisheries Service (NMFS) Northwest Region will briefly report on recent regulatory developments relevant to groundfish fisheries and issues of interest to the Council.

NMFS Northwest Fisheries Science Center (NWFSC) will also briefly report on groundfish-related science and research activities. The NWFSC provided a report on the estimated groundfish mortality in the 2011 US west coast fisheries (Agenda Item I.1.b, Attachment 2: *Available on CD and the Pacific Council's Website Only*).

Council Task:

Discussion.

Reference Materials:

1. Agenda Item I.1.b, Attachment 1: *Federal Register* Notices Published Since the Last Council Meeting.
2. Agenda Item I.1.b, Attachment 2: Estimated Discard and Catch of Groundfish Species in the 2011 US West Coast Fisheries (**Available Electronically on CD and the Pacific Council's Briefing Book Website Only**).

Agenda Order:

a. Agenda Item Overview — Kelly Ames
b. Regulatory Activities — Frank Lockhart
c. Fisheries Science Center Activities — John Stein and Michelle McClure
d. Reports and Comments of Advisory Bodies and Management Entities
e. Public Comment
f. Council Discussion

PFMC
10/11/12

Agenda Item I.1.b
Attachment 1
November 2012

Groundfish and Halibut Notices
8/21/12 through 10/12/12

Documents available at NMFS Sustainable Fisheries Groundfish Web Site
http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/index.cfm

77 FR 55153. Fisheries off West Coast States; Pacific Coast Groundfish Fishery; Correction. Action: Final rule; correcting amendment - 9/7/12

77 FR 62235. Environmental Impacts Statements; Notice of Availability. EIS No. 20120322, Final EIS, NOAA, 00, Harvest Specifications and Management Measures for the 2013-2014 Pacific Coast Groundfish Fishery and Amendment 21-2 to the Pacific Coast Fishery Management Plan – 10/12/12

Agenda Item I.1.b
Attachment 2
(Available on Briefing Book CD and Website Only)
November 2012

Science, Service, Stewardship

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Estimated Discard and Catch of Groundfish Species in the 2011 US West Coast Fisheries

Marlene A. Bellman[1]
Alia Al-Humaidhi[2]
Jason Jannot[1]
Janell Majewski[1]

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U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

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NWFSC NORTHWEST FISHERIES SCIENCE CENTER

[1]West Coast Groundfish Observer Program
National Marine Fisheries Service
Northwest Fisheries Science Center
Fishery Resource Analysis and Monitoring Division
2725 Montlake Blvd E
Seattle, WA 98112

[2] Pacific States Marine Fisheries Commission
Northwest Fisheries Science Center
2725 Montlake Blvd E
Seattle, WA 98112

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Executive Summary

The primary objective of this report is to estimate fishing mortality for groundfish species in U.S. west coast fisheries during 2011 and evaluate mortality estimates relative to Annual Catch Limit (ACL), Acceptable Biological Catch (ABC), and Overfishing Limit (OFL) harvest management goals. These management goals are published each year in the federal groundfish regulations for selected groundfish species (50 CFR 660 Subpart G). Based on a recommendation from the Pacific Fishery Management Council's (PFMC) Scientific and Statistical Committee, we present groundfish mortality estimates by species, to the degree possible. Our primary findings include:

- Estimated fishing mortality for all groundfish species or complexes did not exceed 2011 ACL, ABC, or OFL harvest goals.

- Estimated fishing mortality for five species were above 90% of their ACL goals: nearshore complex of minor rockfish - north of 40°10' N. lat. (99.8%), petrale sole (98%), sablefish - north of 36° N. lat. (97%), cabezon – Oregon (96%), sablefish - south of 36° N. lat. (94%).

- Thirty groundfish species or complexes (71%) had fishing mortality estimates which were less than 50% of 2011 ACL harvest goals.

- A majority (55%) of the groundfish species or complexes showed an increase in estimated fishing mortality from 2010 to 2011.

- All flatfish species had decreased estimated fishing mortality in 2011 relative to 2010, with the exception of petrale sole (2% increase) which is under a rebuilding plan.

Summaries of 2011 catch from the following groundfish fishery sectors are included (*****Sectors where observer program data are used):

Commercial -

- Shore-based Individual Fishing Quota (IFQ) Program*
  - Limited entry (LE) trawl permits – fishing bottom trawl gear
  - LE trawl permits – fishing fixed gear
  - LE trawl permits – targeting California halibut with bottom trawl gear
  - LE trawl permits – targeting Pacific whiting (hake) with mid-water trawl gear
- At-sea Whiting Coop Programs*
  - Pacific whiting (hake) catcher-processor (C/P)
  - Pacific whiting (hake) mothership (MS)
  - Pacific whiting (hake) mothership catcher-vessel
- Open access (OA) bottom trawl - targeting California halibut*****
- OA fixed gear nearshore (Oregon/California)*****
- Fixed gear LE sablefish primary season (tier endorsed)*****
- Fixed gear LE non-primary sablefish (non-endorsed and daily trip limit sectors)*****
- Fixed gear OA daily trip limit*****
- Exempted fishing permit (EFP)

Non-commercial –

- Tribal (shoreside fisheries)
- Tribal at-sea Pacific whiting (hake)*
- Recreational (Washington/Oregon/California)

Research

Other non-groundfish fisheries included with incidental catch of groundfish species:

Commercial -

OA shrimp trawl – Washington/Oregon/California*****

OA bottom trawl

Other gear groups - not trawl, shrimp trawl, or fixed-gear

Fixed gear targeting non-groundfish

Data Sources

Data sources used to estimate groundfish fishing mortality include landing receipts (fish tickets), onboard observer data, recreational catch, research catch, and discard mortality rates.

Fleet-wide landing receipts (a.k.a. fish tickets) are the cornerstone of retained catch information for all sectors of the commercial groundfish fishery on the US west coast. Fish tickets are trip-aggregated sales receipts issued to vessels by fish-buyers in each port for each delivery of fish. They are provided to fish-buyers by a state agency and must be returned to the agency for processing. Fish tickets are designed by the individual states. Washington, Oregon, and California each have a slightly different fish ticket format. In addition, each state conducts species-composition sampling for numerous market categories reported on fish tickets. Market categories represent either a single species or a mixture of species. Fish ticket and species-composition data are submitted by state agencies to the Pacific Fisheries Information Network (PacFIN) regional database, which is maintained by the Pacific States Marine Fisheries Commission (PSMFC). For analytical purposes, the percentage of weight of each species, within market categories, obtained from species composition sampling, was applied to the fish ticket data used in our analyses. Landed weights from sampled market categories were distributed to individual species whenever possible.

Fish ticket landings data for the calendar year 2011 were retrieved from the PacFIN database (05-04-2012) and allocated to various sectors of the groundfish fishery as indicated in Figure 1. All additional data processing steps are described in the methods section below.

Discard estimation focused on commercial groundfish fishery sectors with scientific at-sea observations of discards, conducted by the Northwest Fishery Science Center (NWFSC) Fishery Resource Analysis and Monitoring Division (FRAM). The West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP) observe distinct sectors of the groundfish fishery. The WCGOP observes a number of different sectors of the groundfish fishery, including IFQ shore-based sectors, limited entry and open access (OA) fixed gear, and state-permitted nearshore fixed gear sectors. The WCGOP also observes several fisheries that incidentally catch groundfish, including the California halibut trawl and pink shrimp trawl fisheries. WCGOP data from each of these groundfish sectors and fisheries were used for the purposes of discard estimation. Mortality estimates were summarized from the At-Sea Hake Observer Program (A-SHOP) data for the at-sea Pacific hake/whiting fishery, including: catcher-processor, mothership, mothership catcher-vessel, and tribal components.

The NWFSC observer program was established in 2001 by NOAA Fisheries (National Marine Fisheries Service, NMFS) (66 FR 20609). All commercial vessels that land groundfish caught in the United States Exclusive Economic Zone (EEZ) from 3-200 miles offshore are required to carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making also require vessels that fish for groundfish within 3 miles of shore or participate in other state-managed fisheries to carry observers when notified.

The WCGOP's goal is to improve total catch estimates by collecting information on the discarded catch (fish returned overboard at-sea) of west coast groundfish species (for more details see http://www.nwfsc.noaa.gov/research/divisions/fram/observer/). Estimates of observer coverage, observed catch, and a summary of observed fishing depths for each sector can be found at: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/sector_products.cfm. A list of fisheries, in order of coverage priority and detailed information on data collection methods employed in each observed fishery can be found in WCGOP manuals (NWFSC 2011a, NWFSC 2011b; http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observer_manuals.cfm).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. To ensure that recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch recorded by WCGOP observers are reconciled with trip-level fish ticket records. The WCGOP data are linked to fish tickets by fish ticket identification numbers obtained by the observer and are adjusted so that the total trip pounds of retained catch equals the total trip pounds on the fish ticket(s). Adjusting observer retained catch weight to fish ticket weight is done because the fish ticket weight is more accurate and fish tickets are legally binding documents (for more details see: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/data_processing.cfm). Additional data processing steps are described in the methods section below.

The A-SHOP has conducted observations of the west coast at-sea Pacific hake/whiting fishery since 2001. Prior observations were conducted by the North Pacific Groundfish Observer Program. A-SHOP program information and documentation on data collection methods can be found in the observer manual (NWFSC 2011c). The at-sea hake/whiting fishery has mandatory observer coverage, with each vessel over 38 m carrying two observers. Beginning in 2011 under IFQ/Coop Program management, all catcher vessels which deliver catch to motherships are required to carry observers.

Each year, a certain portion of the ACL for groundfish species is harvested through research activities. In 2011, research programs that caught groundfish included the NWFSC's groundfish bottom trawl survey, acoustic survey, a hook and line survey, and the International Pacific Halibut Commission's (IPHC) longline survey, as well as other scientific research permits. In addition, two permits for Pacific hake and Pacific halibut bycatch reduction device (BRD) research reported catch of groundfish in 2011. All groundfish research catch information was provided to NOAA's Northwest Regional Office (NWR). These data were then summarized by the NWR and included in this report.

In addition to these data sources, further information provided by the Groundfish Management Team (GMT) was also used in the total mortality estimation process. The GMT is an advisory body to the PFMC that is comprised of representatives from federal, state, and Tribal agencies and is involved in evaluating management performance and alternatives for groundfish fisheries between the U.S. borders with Canada and Mexico. For the purposes of this analysis, the GMT provided mortality rates, which are assumptions regarding the survival of discards, for sablefish and lingcod in the trawl and fixed gear sectors and for the major species groups reported in the state-permitted fixed gear nearshore sector. In the 2013-2014 groundfish management cycle, the SSC recommended that discard mortality rate assumptions made for stock assessment purposes should also be considered for discard estimates of longnose skate (trawl = 50%, fixed gear = 50%) and spiny dogfish (hook-and-line fixed gear = 50%). However, these rates were not yet applied to 2011 discard estimates in this report.

Methods

Discard Estimation Methods Overview

We used a deterministic approach to estimate discard mortality for all WCGOP observed sectors of the groundfish fishery. Through this approach, observed discard rates for each species were directly expanded to the fleet-wide level. Because of differences in data availability and management structure among sectors of the groundfish fishery, this approach was applied with slight modifications (see methods below).

The stratification scheme used in this analysis is inconsistent with the sampling design employed by the WCGOP. Rather, methods employed here provide estimates that are relevant to the spatial and temporal structure of groundfish management. The validity of stratification in terms of isolating variance in discard has not been rigorously tested. Until more work can be completed to evaluate which strata (area/depth/season) are most appropriate for discard analyses, broader stratification is often warranted to ensure adequate sample size or to meet confidentiality mandates.

Measures of uncertainty are not provided within the context of the WCGOP sampling design, as they would be biased by post-stratification. However, standard errors consistent with Pikitch et al. (1998) are provided for observed discard ratios in the context of the post-stratified analysis. The standard errors are most likely an underestimate of the actual uncertainty, but are the sole measure we can provide at this time.

In all cases where a FMP groundfish species grouping, nearshore species grouping, or unsampled catch category was used to compute discard ratios, any retained weights that were recorded by the observer but that did not appear on fish tickets were excluded from the denominator. This was necessary to prevent double-counting associated with differences in the species codes used by observers and processors. For instance, while observers may record rockfish catch at the species level, various species of rockfish are often grouped, weighed, and recorded together on the fish ticket under a grouped species code (e.g., NUSP = Northern Unspecified Slope Rockfish). By using only the retained groundfish weight from fish tickets in discard ratio denominators, we prevent double-counting of retained weights. When using a single species in the denominator, (e.g., sablefish in the fixed gear fisheries), any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

Species were defined and/or grouped for this report according to the WCGOP Data Processing Appendix (http://www.nwfsc.noaa.gov/research/divisions/fram/observer/xls/Appendix.xlsx). Appendix updates for 2011 include the designation of observer and PacFIN level data to IFQ managed species or complexes. A complete listing of groundfish species is defined in the Groundfish Fishery Management Plan (http://www.pcouncil.org/wp-content/uploads/fmpthru19.pdf). Groundfish species that are currently being managed under rebuilding plans are presented separately from non-rebuilding species.

In all tables, (--) was used when there is no actual numeric value (i.e., the species was not caught). Values appear as 0.0 when a value exists but is smaller than the decimal places allotted. A value of NA represents that the calculation is not applicable for a particular species or stratum, or that the calculation did not produce a result (e.g., very small values might result in NA from a standard error calculation). Grey shading indicates that values include estimates of both discard and retained catch.

Final IFQ Fishery Discard Estimation

The basic components of how the IFQ/Coop managed groundfish fishery operated in 2011 are subdivided below based on gear and target strategy:

Catch was delivered to shore-based processors (IFQ):

- Bottom trawl: Bottom trawl nets were used to catch a variety of groundfish species.
- Mid-water non-hake trawl: Midwater trawl nets were used to target mid-water non-hake species, primarily yellowtail rockfish.
- Pot: Pot gear was used to target groundfish species, primarily sablefish.
- Hook-and-line: Longlines were primarily used to target groundfish species, mainly sablefish.
- LE California halibut trawl: Bottom trawl nets were used to target California halibut by fishers holding a state California halibut permit and a LE federal trawl groundfish permit.
- Shoreside hake trawl: Midwater trawl nets were used to catch Pacific hake.

Catch was processed at-sea (Coop Program):

- At-sea motherships, mothership catcher vessels, and catcher-processors: Midwater trawl nets are used to catch Pacific hake. Catcher vessels deliver unsorted catch to a mothership. The catch is sorted and processed aboard the mothership. Catcher-processors catch and process at-sea.

The implementation of the 2011 IFQ management program resulted in changes to fishing regulations which, in turn, resulted in development of new methods for estimating fishing mortality under the IFQ fishery. For example, under the 2011 IFQ regulations:

- Vessels must carry NMFS observers on all IFQ fishing trips.
- Observer sampling priorities were shifted (e. g. non-IFQ species were only sampled every 3rd haul/set).
- The use of multiple gear types were allowed for fishing under a Federal groundfish trawl-endorsed permit (trawl or fixed gear).
- A limit of one (1) IFQ reporting area could be fished per trip.
- IFQs were established for a subset of groundfish managed under the Fishery Management Plan (FMP).

Shore-based IFQ Sectors

Fleet-wide discard estimates for the shore-based IFQ sectors were derived from WCGOP observer data and fish ticket landings data (Figure 1). Fish tickets associated with the IFQ fishery were defined by analysts through an extensive quality control and review process of all available data sources, including those utilized for inseason management. For a description of the IFQ fishery, associated data sources, and observer data collection, see: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/.

LE bottom trawl vessels can hold a California halibut bottom trawl permit and participate in the state-permitted California halibut fishery. California halibut tows can occur on the same trip as tows targeting IFQ groundfish and were identified based on the following criteria: 1) the tow target was California halibut or 2) the tow target was nearshore mix, sand sole, or other flatfish, and the tow took place in less than 30 fathoms and south of 40°10' N. latitude. All tows in the IFQ observer data that met at least one of the above requirements were included under the LE California halibut fishery and analyzed using methods for IFQ discard estimation. Tow targets are typically determined by the vessel captain.

Observer data from the IFQ fishery were stratified by sector, gear type, and management area (Table 1). If applicable and sample size permitted, we further stratified by season and depth. Records were separated into two groundfish management areas, north and south of 40° 10' N. latitude. Each management area was divided into three depth strata (0-125, 126-250, >250 fathoms). The depth strata used in the present analysis highlight the areas shoreward and seaward of RCA closures relevant in the fishery management framework and provide consistency when evaluating discard or bycatch over time, as depth-based spatial closures change. Two-month cumulative trip limit periods were combined to form two seasonal strata: winter (November-April) and summer (May-October). Due to a limited number of observations, IFQ vessels fishing hook-and-line gear south of 40° 10' N. latitude were not stratified by season or depth. Lastly, observations from IFQ vessels fishing mid-water trawl gear targeting Pacific hake or other mid-water target species, and tows fished in the LE California halibut fishery were not post-stratified.

Despite the 100% observer coverage mandate in 2011, there were some rare occasions (e.g., observer illness) when tows or sets were either not sampled or only partially sampled. We used ratio estimators to apportion unsampled weight to specific species within each stratum. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the 2011 IFQ fishery are presented in Tables 2a & b. Discard ratios and expansion factors are presented by season and depth. Winter season is January-April and November-December and summer season is May-October. Strata with no unsampled discard weight associated with them are not shown.

To obtain the estimated weight of a species (W) when the entire haul or set was unsampled, the unsampled weight, summed across unsampled hauls within the stratum, was multiplied by the ratio of the weight of the species (summed across fully sampled hauls within a stratum) divided by the total weight of all species in all fully sampled hauls within a stratum:

$$W_{p,s} = \sum_{p} x_{p,s} \times \frac{\sum_f w_{f,s}}{\sum_f x_{f,s}}$$

where, for each stratum:
s = stratum, which could include, area, depth, gear, and sector
p = unsampled haul
f = fully sampled haul
x = weight of catch
W = estimated weight of the species
w = sampled weight of the species

The unsampled weight of partially sampled hauls or sets was categorized into weight of non-IFQ species (NIFQ) or IFQ species. Unsampled IFQ species weight was further categorized into IFQ flatfish (IFQFF), IFQ rockfish (IFQRF), IFQ roundfish (IFQRD) and IFQ mixed species (IFQM). IFQM included all 2011 IFQ managed species (see 76 FR 27508 for a listing of IFQ species in 2011). NIFQ included all species encountered that were not designated as an IFQ species in 2011 management.

Three WCGOP unsampled catch categories and associated species used in 2011 data only:

IFQFF
- Arrowtooth Flounder
- Butter Sole
- Curlfin Turbot
- Dover Sole
- English Sole
- Flatfish Unid
- Flathead Sole
- Pacific Halibut

IFQRF
- Aurora Rockfish
- Bank Rockfish
- Blackgill Rockfish
- Bocaccio Rockfish
- Canary Rockfish
- Chilipepper Rockfish
- Cowcod Rockfish
- Darkblotched Rockfish

	Pacific Sanddab	Flag Rockfish
	Petrale Sole	Greenspotted Rockfish
	Rex Sole	Greenstriped Rockfish
	Rock Sole	Halfbanded Rockfish
	Sand Sole	Harlequin Rockfish
	Sanddab Unid	Longspine Thornyhead
	Starry Flounder	Pacific Ocean Perch
IFQRD		Pygmy Rockfish
	Lingcod	Redbanded Rockfish
	Pacific Cod	Redstripe Rockfish
	Pacific Hake	Rockfish Unid
	Sablefish	Rosethorn Rockfish
		Rosy Rockfish
		Rougheye Rockfish
		Sharpchin Rockfish
		Shortraker Rockfish
		Shortspine Thornyhead
		Silvergray Rockfish
		Splitnose Rockfish
		Spotted Rockfish Unid
		Squarespot Rockfish
		Starry Rockfish
		Stripetail Rockfish
		Widow Rockfish
		Yelloweye Rockfish
		Yellowmouth Rockfish
		Yellowtail Rockfish

To obtain the estimated weight of a species (W) in partially sampled hauls or sets, the unsampled weight, summed across partially sampled hauls within the stratum, was multiplied by the ratio of the weight of the species (summed across fully sampled hauls within a stratum) divided by the weight of all species occurring within a category (NIFQ, IFQFF, IFQRF, IFQRD, IFQM) in all fully sampled hauls within a stratum. Estimated weight of the species was summed across unsampled categories and then added to the weight of the species that was sampled in the partially sampled hauls:

$$W_{p,s} = \sum_{y}\left(\sum_{p} x_{p,y,s} \times \frac{\sum_f w_{f,s}}{\sum_f x_{f,y,s}}\right) + \sum_{p} w_{p,s}$$

where, for each stratum:
s = stratum, which could include, area, depth, gear, and sector
y = unsampled category (either NIFQ, IFQFF, IFQRF, IFQRD, or IFQM)
p = partially sampled haul
f = fully sampled haul
x = weight of catch
W = estimated weight of the species
w = sampled weight of the species

Expanded weights of a particular species obtained using the equations above for unsampled or partially sampled hauls were then added to the sampled weight of that species (from fully sampled hauls) within each stratum to obtain the total species-specific weight per stratum.

Coast-wide landings, sampled discard weight, estimated discard weight, and estimated fishing mortality in the 2011 shore-based non-hake IFQ sectors and the LE California halibut fishery are reported in Table 3a. We apply a 50% mortality rate to discarded sablefish and lingcod weight caught by IFQ bottom trawl and LE California halibut trawl sectors. These rates are historical legacy and assumptions from the GMT, previously used in the LE groundfish bottom trawl sector. We apply a 20% mortality rate to discarded sablefish caught by IFQ hook-and-line and pot gear. This rate is an assumption by the GMT, previously used in non-nearshore groundfish fixed gear sectors.

At-Sea Hake Coop Sectors

The mid-water trawl fishery for Pacific hake/whiting is comprised of three at-sea processing fleets: catcher-processors, motherships (with non-tribal catcher boats), and a tribal fleet delivering to motherships. The objective of A-SHOP is to produce estimates of total catch (discard + retained) in the at-sea Pacific hake fishery. Discard and retained are not sampled separately; however, observers provide visual estimates of the proportions of catch that are discarded. These proportions form the basis of the retained and discarded catch amounts for the two at-sea hake sectors summarized in Table 3b.

Coast-wide landings or retained catch, sampled discard weight, estimated discard weight, and estimated fishing mortality in all 2011 Pacific hake IFQ/Coop Program sectors (shore-based and at-sea) are reported in Table 3b. The 2011 Pacific hake fleet which delivers to shore-based processors was observed by WCGOP under the IFQ fishery and discard was estimated in the same manner as described for the Shore-based IFQ Sectors (above). Prior to 2011, this fishery was conducted under an Exempted Fishing Permit (EFP).

California Halibut Bottom Trawl Fishery

For a description of the California halibut bottom trawl fishery, vessel selection, observer coverage, vessel waivers, and prior California halibut bottom trawl reports, see http://www.nwfsc.noaa.gov/research/divisions /fram/observer/halibut_trawl.cfm.

Fleet-wide discard estimates in the California halibut bottom trawl fishery were derived from WCGOP observer data and fish ticket landings data. All California halibut vessels are permitted by the state of California. However, limited entry (LE) vessels also have a federal limited entry groundfish permit, whereas open access (OA) vessels do not. The WCGOP provides observer coverage for the LE California halibut fishery under the shore-based IFQ fishery and isolates data for the LE California halibut fishery based on criteria listed in the previous section. The WCGOP randomly samples the OA California halibut fishery separately. Thus the two components (LE and OA) now have different sampling priorities, protocols, and selection design and therefore are analyzed separately.

Discard ratios were computed for the OA observed data using the retained weight of California halibut in the denominator. The fleet landed weight of California halibut was then used as a multiplier to expand observed discard ratios to the fleet (Table 4). Fleet-wide landings were compiled from OA trawl fish tickets (see Figure 1) for those vessels that had a state-issued California halibut bottom trawl permit.

Discard estimates were computed based on the following equation:

$$\hat{D}_s = \frac{\sum_t d_{st}}{\sum_t r_t} \times F$$

where:

s: species or species group
t: observed tows
d: observed discard weight of species *s*
r: observed retained weight of California halibut
F: weight of retained California halibut recorded on fish tickets
$\hat{D}_s$: discard estimate for species *s*

Table 4 presents estimated fishing mortalities of groundfish species caught in the 2011 OA California halibut trawl fishery. A 50% mortality rate was applied for discarded lingcod and sablefish, which is a historical legacy and assumption from the GMT in the LE bottom trawl sector.

Pink Shrimp Trawl Fishery

Fleet-wide discard estimates for the pink shrimp trawl fishery were derived from WCGOP observer data and fish ticket landings data (Figure 1). For a description of the pink shrimp trawl fishery, vessel selection, observer coverage, vessel waivers, and prior pink shrimp trawl reports, see: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/shrimp_trawl.cfm.

Discard ratios for each state pink shrimp fishery were calculated by dividing the observed discard weight of each species or complex by the observed retained weight of pink shrimp (Table 5). The fleet landed weight of pink shrimp was used as a multiplier to expand observed discard ratios to the fleet. Table 5 presents landings, final discard estimates, and total fishing mortality in the 2011 individual state pink shrimp trawl fisheries.

Discard estimates for each state were computed based on the following equation:

$$\hat{D}_s = \frac{\sum_t d_{st}}{\sum_t r_t} \times F$$

where:

s: species or species group
t: observed tows
d: observed discard weight of species *s*
r: observed retained weight of pink shrimp
F: weight of retained pink shrimp recorded on fish tickets
$\hat{D}_s$: discard estimate for species *s*

In prior reports, pink shrimp fish tickets in the area north of 40°10' N. latitude were compiled for a single discard expansion factor, and south of 40°10' N. latitude landings were summarized as part of the remaining incidental fisheries. Previously, observer data from all state pink shrimp fleets in the north were combined to calculate discard rates. However, WCGOP coverage of the Washington pink shrimp fleet began in 2010 and coverage of all state fisheries in 2011 was sufficient to further stratify the analysis by state.

Non-Nearshore Fixed Gear Sector

Fleet-wide discard estimates for the LE and OA non-nearshore fixed gear sector of the groundfish fishery were derived from WCGOP observer data and fish ticket landings data. For a description of the fixed gear sectors, vessel selection, observer coverage, vessel waivers, and prior fixed gear sector reports, see: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/fixed_gear.cfm.

Fish tickets for fixed gear that did not have recorded sablefish or nearshore species were included in the non-nearshore fixed gear sector only if groundfish landings were greater than non-groundfish landings based on a unique vessel and landing date (Figure 1). If non-groundfish landings were greater than groundfish landings, those fixed gear fish tickets (which also did not have recorded sablefish or nearshore species) were summarized in Table 14 incidental landings. The commercial fixed gear fish tickets with recorded nearshore species weight were not used in this portion of the analysis, regardless of whether they included recorded weights for sablefish. These fish tickets were instead included in the nearshore fixed gear groundfish sector (see next section). Fish tickets associated with the Pacific halibut directed commercial fishery were isolated and removed from our analyses based on landed catch of Pacific halibut recorded on the fish ticket on the day of the opening or within two subsequent days.

Fish tickets were partitioned into three commercial fixed gear subsectors: LE sablefish endorsed primary season, LE non-sablefish endorsed, and OA fixed gear groundfish. Commercial fixed gear fish tickets were first divided out by whether the vessel had a federal groundfish permit (LE) or no federal groundfish permit (OA). Open access fish tickets were placed in the OA fixed gear groundfish subsector. Next, LE fish tickets were separated based on whether the vessel's federal groundfish permit(s) had a sablefish endorsement with tier quota for the primary season or whether it was not endorsed (also referred to as '0' tier permits). Fish tickets for all LE vessels with tier sablefish endorsements operating during the sablefish primary season (April – October) and within their allotted tier quota were placed in the LE sablefish endorsed primary subsector. If LE sablefish-endorsed vessels fished outside of the primary season (November-March) or made trips within the season after they had reached their cumulative tier quota, the fish tickets were placed in the LE non-sablefish endorsed subsector. Fish tickets from non-sablefish endorsed LE vessels were also placed in this subsector.

Data used in our analyses were collected by WCGOP from the following fixed gear subsectors in order of priority: LE sablefish endorsed primary season fixed gear, LE '0' tier (non-endorsed), and OA fixed gear (non-nearshore). LE sablefish endorsed vessels that were fishing outside of the primary season or that had reached their cumulative tier quota in the primary season were not observed.

Observer data were stratified by subsector, area, and gear type (where applicable) (Tables 6-8). Area strata (north and south of 36° N. latitude) are based on PFMC area management for sablefish trip limits. Gear type was defined as longline gear or pot/trap gear. If landings were made by a fixed gear subsector for which there were no or very few WCGOP observations, the most appropriate observed discard ratios were selected and applied to these landings based on similarities in the fishery management structure, fishing and discard behavior, and the gear fished. For example, the LE non-sablefish endorsed fixed gear subsector landed 25.6 mt of groundfish with pot gear in 2011 (Table 7). Given similarities in gear type and catch composition, OA fixed gear pot data were selected as the most appropriate source of information to compute a discard ratio, which was then multiplied by the LE non-sablefish endorsed fixed gear pot landings to generate estimated discard.

Explicit depth stratification of fixed gear fishing effort is not possible because there are no fleet-wide estimates of fishing depths. However, management restricted fixed gear fishing to depths greater than 100 fathoms in the area north of 40° 10' N. latitude and to depths greater than 150 fathoms in the area south of 40° 10' N. latitude.

The number of observed vessels, trips, and sets are summarized for each subsector in Tables 6-8, along with sablefish and FMP groundfish fleet landings (excluding Pacific hake) used as a measure for expanding discard from observed trips to the entire fleet. Retained groundfish was used as the denominator rather than sablefish weight alone because generally fixed gear fisheries south of 36° N. latitude have a wider range of target species. A broader denominator was therefore necessary to effectively capture fishing effort south of 36° N. latitude or in coast-wide calculations. Stratum estimated discard for all subsectors were then summed for each area and summed coast-wide.

Coast-wide landings, final discard estimates, and estimated fishing mortality are reported in Table 9 for 2011 LE and OA non-nearshore groundfish fixed gear. A 20% mortality rate is applied for discarded sablefish, as assumed by the GMT.

Nearshore Fixed Gear Sector

Fleet-wide discard estimates for the commercial nearshore fixed gear sector of the groundfish fishery were derived from WCGOP observer data, fish ticket landings data (Figure 1), and mortality rates provided by the GMT. For a description of the nearshore fixed gear sector, vessel selection, observer coverage, vessel waivers, and prior nearshore fixed gear sector reports, see: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/.

The WCGOP provides coverage for the commercial nearshore fisheries in California and Oregon based on a selection process of state-issued nearshore permits/licenses. Although California and Oregon nearshore fisheries are sampled separately for observer coverage, fleet-wide discard estimates are provided for the areas north and south of the groundfish management line at 40° 10' N. latitude, in accordance with 2010 federal groundfish management specifications.

Mortality rates provided by the GMT differ for each species according to depth. In December 2007, the GMT provided a slightly revised suite of depth-specific discard survival assumptions for nearshore species. It was therefore necessary to generate discard estimates in each of the three depth intervals employed by the GMT (0-10, 11-20, > 20 fathoms). The percentage of catch for each species or complex by depth was calculated based on summarized observer data from 2003-2011 (Table 10). Fleet landings of each nearshore species or complex in 2011 were then distributed among depth intervals using the percentages computed in the previous step. Finally, the total distributed landed weight of all nearshore groundfish species within each depth stratum was used to expand observed discard to the fleet level.

Prior to the calculation of discard ratios in this sector, WCGOP observer data were stratified by area and depth (Table 11). In the area north of 40° 10' N. latitude, data were combined in the two deepest depth strata (11-20 and > 20 fathoms) to ensure an adequate sample size and that confidentiality requirements were met (i.e., number of vessels per stratum $\geq$ 3). Discard ratios were calculated by dividing the stratum discard weight of each species or complex by the retained weight of nearshore species.

Observed discard ratios were multiplied by the allocated landed weight of all nearshore groundfish species within each depth stratum (Table 11). These fleet-level estimates of gross discard within each stratum were then multiplied by depth-specific discard mortality rates (provided by the GMT) to generate estimates of discard mortality in each stratum (Table 12a & b). If provided, a species-specific discard mortality rate was applied in preference to a complex or group rate. Final discard estimates for each area were obtained by summing estimates of discard mortality across depth strata. Gross discard estimates, discard mortality rates, estimated discard mortality, and fishing mortality estimates in the 2011 nearshore fixed gear sectors north and south of 40° 10' N. latitude are reported in Tables 12a & b.

Other Commercial Data Summaries

Landings of groundfish species from the WA tribal shore-based fisheries are summarized in Table 15. The WA tribal summary is based exclusively on fish ticket data. Discard estimates for WA tribal shore-based fisheries were not available. Tribal directed groundfish fisheries employ full retention requirements. In addition, full retention is monitored by a target tribal observation rate of 15% for Makah trawl fisheries. Discard mortality of fixed gear sablefish is accounted for in tribal management by reducing the tribal allocation to account for discard mortality. For more information on discard and retention in tribal sablefish fisheries and Makah trawl observations, see Appendix B of the 2011-2012 groundfish harvest specifications (PFMC and NMFS 2011). The at-sea hake tribal sector must operate within defined boundaries in waters off northwest Washington. The catch can be delivered to a contracted mothership by catcher vessels for processing or be caught and processed by a contracted catcher-processor. Washington at-sea tribal data in Table 15 were summarized from the A-SHOP.

Groundfish species catch from the recreational fisheries are summarized in Table 15, based exclusively on data provided by the Washington Department of Fish and Wildlife, the Oregon Department of Fish and Wildlife, and the California Department of Fish and Game. State agencies provide catch weight (discarded + retained) estimates with PFMC-approved depth dependent mortality rates applied to account for discard mortality.

Research catch of groundfish species is summarized in Table 15, based on data provided by the NOAA Northwest Regional Office. Catch weight (discarded + retained) was summarized from reporting of scientific research permits that directly or indirectly caught groundfish off the U.S. west coast. Catch varies by research permit, including but not limited to: catch from permits with only retained catch, tagging study catch where all fish were released alive, and combined discarded and retained catch. Research catch was summarized for all gear types employed.

Landings of groundfish species from other non-groundfish fisheries operating under federal open access landing limits, which are mostly state-managed and incidentally catch groundfish, are also summarized in Table 15 as 'Incidental fisheries'. A more detailed breakdown of incidental landings by PacFIN gear group is provided in Table 14. Catch summaries of incidental fisheries were based exclusively on fish ticket data.

Bycatch estimation and summaries for several additional fish species observed by the WCGOP and A-SHOP are available in separate reports; Pacific halibut is provided in Jannot et al. 2012, salmon species are provided in Al-Humaidhi et al. 2012a, and green sturgeon and Pacific eulachon are provided in Al-Humaidhi et al. 2012b.

Results

In Table 16, fishing mortality estimates are evaluated in terms of 2011 ACL, ABC, and OFL harvest specifications from federal groundfish regulations (50 CFR 660 Subpart G). This was the first year of newly defined harvest specifications, which deviated from the prior use of Optimum Yield (OY), etc. The newly set 2011 ACL, ABC, or OFL harvest goals for all groundfish species or complexes were not exceeded by fishing mortality estimates presented in this report. However, the estimated fishing mortality for five species were above 90% of their 2011 ACL goals: nearshore complex of minor rockfish - north of 40°10' N. lat. (99.8%), petrale sole (98%), sablefish - north of 36° N. lat. (97%), cabezon – Oregon (96%), sablefish - south of 36° N. lat. (94%). In contrast, the majority of groundfish species or complexes (71%) had fishing mortality estimates which were less than 50% of 2011 ACL harvest goals.

Although all were below harvest goals, a majority (55%) of the groundfish species or complexes showed an increase in estimated fishing mortality in 2011 relative to 2010. This is the opposite trend demonstrated in 2010 groundfish fishing mortality estimates relative to 2009, where 57% decreased (Bellman et al. 2011).

The nearshore complex of minor rockfish north of 40°10' N. latitude represented the closest attainment of an ACL goal in 2011 (99.8%). In 2011 relative to 2010, this complex demonstrated an increase in landings, both in the nearshore fixed gear sector and in the Oregon and California recreational catch, which resulted in a higher estimated fishing mortality. This increase was not the result of higher discard of these species in the nearshore fixed gear fishery.

However, all flatfish species had decreased estimated fishing mortality in 2011 relative to 2010. The exception was a 2% increase in the estimated mortality of petrale sole (953 vs 936 mt), which is under a rebuilding plan. The largest contribution of petrale sole fishing mortality was landed catch weight from the shore-based non-hake IFQ sector fishing bottom trawl gear.

Also, many slope rockfish species and the slope rockfish complex north of 40°10' N. lat. demonstrated decreased fishing mortality in 2011 relative to 2010 (-61%). Slope species with decreased mortality included darkblotched rockfish (-40%) and Pacific Ocean Perch (-39%) which are under rebuilding plans. This was the first time in the last three years that darkblotched rockfish did not exceed its harvest goal (over 1% in 2010, 6% in 2009; Bellman et al. 2011, Bellman et al. 2010). Longspine and shortspine thornyheads in the area north of 34°27' N. latitude had a marked decrease as well (-56% and -63% respectively). This was also the first time in the last three years that longnose skate did not exceed its harvest goal (over 3% in 2010, 8% in 2009; Bellman et al. 2011, Bellman et al. 2010).

For the past three years, sablefish mortality north of 36° N. latitude continues the trend of decreasing, and in contrast, sablefish mortality south of 36° N. latitude continues to increase. In both areas, sablefish mortality continues to be estimated very close to the harvest goal each year. For example, if GMT discard mortality rates were not applied, sablefish fishing mortality estimates would have exceeded the ACL north of 36° N. latitude in 2011.

As with all point estimates, mortality values presented in Tables 15 and 16 should be considered with caution. It should be noted that multiple sources of uncertainty were not accounted for in this analysis and might influence mortality estimates. Sources of uncertainty include, but are not limited to: species composition sampling of landed catch, observed retained weights, and discard mortality rates. However, standard errors have been provided for observed discard ratios.

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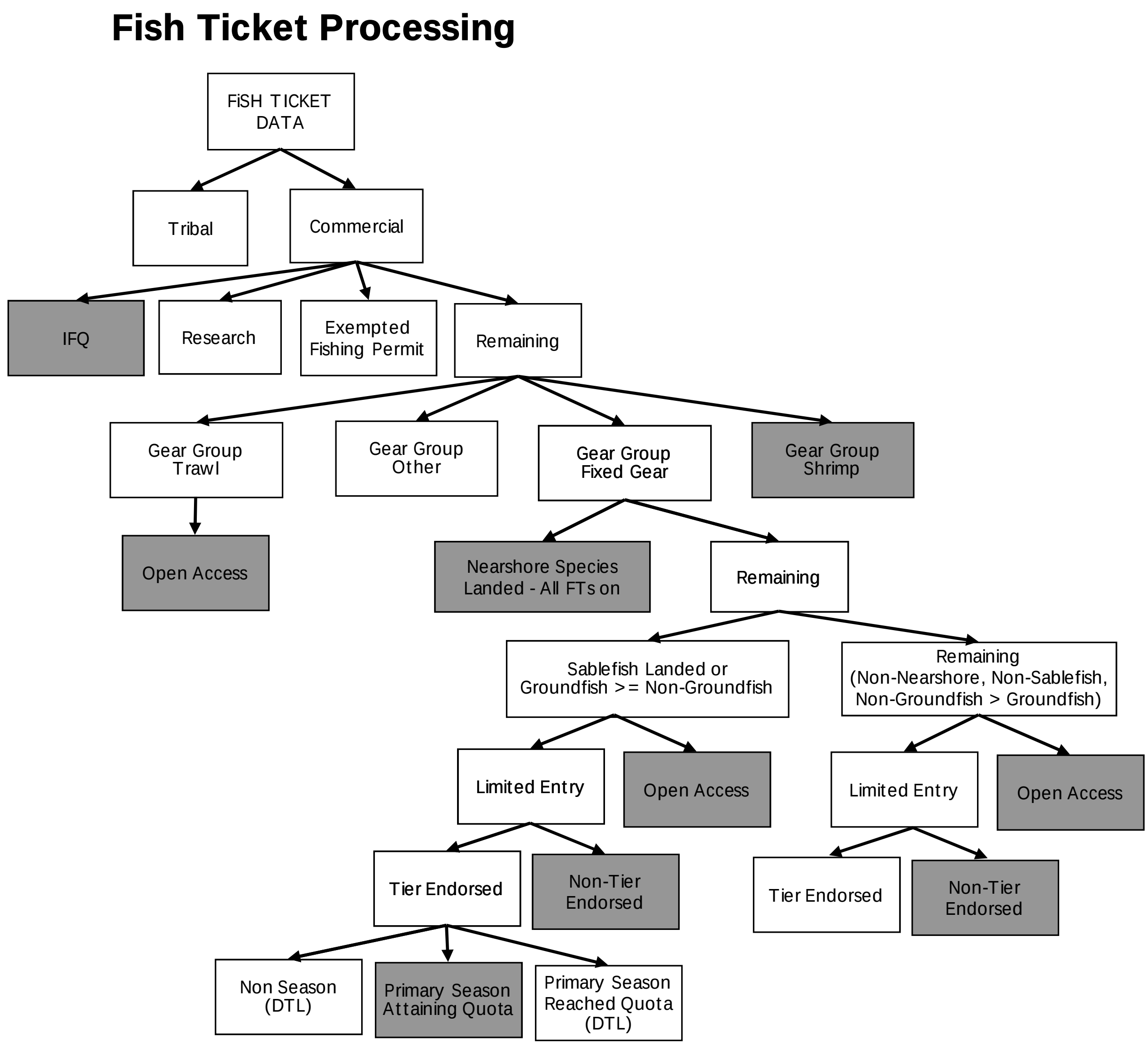
Figures

Figure 1. Fish ticket data processing for division into groundfish fishery sectors after retrieval of a full calendar year data set from the Pacific Coast Fisheries Information Network (PacFIN) database (query date 05-04-2012). Grey highlight indicates sectors for which federal observer data are available.



Tables

Note: In all tables, (--) was used when there is no actual numeric value (i.e. the species was neither caught nor discarded). Values appear as 0.0 when a value exists but is smaller than the decimal places allotted. A value of NA represents that the calculation is not applicable for a particular species or strata, or that the calculation did not produce a result (e.g. very small values might result in NA from a standard error calculation).

Table 1. Number of vessels, trips and hauls from WCGOP observer data for the 2011 IFQ fishery by gear, latitudinal management area, season and depth. Data are combined as needed to ensure confidentiality requirements and a reasonable number of observations. Winter season is January-April and November-December and summer season is May-October.

Gear	Area	Season	Depth	Num. of observed vessels	Num. of observed trips	Num. of observed hauls	Num. of sampled hauls	% of hauls sampled	Num. of unsampled hauls with Category: IFQ Flatfish	IFQ Roundfish	IFQ Rockfish	IFQ Mixed	Non-IFQ Species	All Species
Trawl - Bottom + Midwater	North of 40°10' N	Winter	0-125	6	28	232	222	95.7%	0	0	0	0	10	0
			126-250	44	261	961	847	88.1%	1	0	4	4	100	11
			> 250	48	383	2,177	2,040	93.7%	1	1	3	11	124	11
		Summer	0-125	22	173	1,981	1,857	93.7%	18	0	2	8	88	25
			126-250	36	236	980	949	96.8%	1	0	3	6	27	4
			> 250	36	280	1,371	1,323	96.5%	1	0	2	0	42	6
	South of 40°10' N	Winter	0-125	5	10	23	22	95.7%	1	0	0	0	1	0
			126-250	8	37	108	105	97.2%	0	0	1	0	3	0
			> 250	8	51	191	187	97.9%	0	0	0	0	4	0
		Summer	0-125	8	83	393	381	96.9%	5	0	0	0	8	0
			126-250	12	81	190	185	97.4%	0	0	2	0	4	1
			> 250	13	127	537	520	96.8%	0	0	1	0	15	2
Hook and Line	North of 40°10' N	Annual	0-250	6	18	271	262	96.7%	0	0	8	0	0	1
			> 250	4	13	140	140	100.0%	0	0	0	0	0	0
	South of 40°10' N	Annual	All depths	6	71	212	211	99.5%	0	0	0	0	1	0
Pot	North of 40°10' N	Annual	0-250	6	49	425	422	99.3%	0	0	1	0	0	2
			> 250	7	55	354	353	99.7%	0	0	0	0	1	0
	South of 40°10' N	Annual	0-250	3	21	80	80	100.0%	0	0	0	0	0	0
			> 250	11	137	658	656	99.7%	0	0	0	0	2	0
LE CA halibut	South of 40°10' N	Annual	All depths	3	63	157	155	98.7%	0	0	0	0	2	0
Shoreside Hake	North of 40°10' N	Annual	All depths	26	913	1,701	1,699	99.9%	0	0	0	0	2	0

Table 2a. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the 2011 IFQ fishery using bottom trawl gear north of 40°10' N latitude. Discard ratios and expansion factors are presented by season and depth. Winter season is January-April and November-December and summer season is May-October. Strata with no unsampled discard weight associated with them are not shown. Unsampled catch weight could be assigned to the categories: IFQ flatfish species (IFQFF), IFQ rockfish species (IFQRF), IFQ roundfish species (IFQRD), IFQ mixed species (IFQM), non-IFQ species (NIFQ), or all species (IFQ & non-IFQ). See text for a list of species included in each unsampled category.

IFQ Fishery - Bottom Trawl		IFQFF			IFQRF			IFQRD	IFQM			NIFQ			All Species		
North of 40°10' N Lat.		Depth (fm)			Depth (fm)			Depth (fm)	Depth (fm)			Depth (fm)			Depth (fm)		
		0-125	126-250	≥ 250	0-125	126-250	≥ 250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250
Expansion Factor (mt)	summer	2.2101	0.6804	0.0093	7.8150	0.3215			0.4627	0.0068	0.0454	9.6152	1.7678	3.0808	8.3174	5.6883	0.6781
	winter		0.0136	0.0272		0.8165	3.6735	0.0009		0.0993	0.0064	1.1872	17.9307	9.1149		3.1760	2.4681
		Discard ratio			Discard ratio			Discard ratio	Discard ratio			Discard ratio			Discard ratio		
Rebuilding species	**Season**																
Canary rockfish	summer	--	--	--	0.0005	0.0000	--	--	0.0504	0.0008	--	--	--	--	0.0002	0.0000	--
Darkblotched rockfish	summer	--	--	--	0.0022	0.0036	--	--	0.2311	0.0887	0.0075	--	--	--	0.0010	0.0019	0.0004
	winter	--	--	--	--	0.0034	0.0007	--	--	0.0751	0.0052	--	--	--	--	0.0010	0.0002
Pacific Ocean Perch (North of 40°10' N. lat.)	summer	--	--	--	0.0001	0.0006	--	--	0.0116	0.0155	0.0009	--	--	--	0.0001	0.0003	0.0001
	winter	--	--	--	--	0.0024	0.0001	--	--	0.0541	0.0011	--	--	--	--	0.0007	0.0000
Petrale sole	summer	0.0487	0.0001	0.0020	0.0380	0.0001	--	--	--	--	--	--	--	--	0.0177	0.0000	0.0002
	winter	--	0.0034	0.0044	--	0.0018	0.0024	--	--	--	--	--	--	--	--	0.0005	0.0006
Yelloweye rockfish	summer	--	--	--	0.0000	--	--	--	0.0020	--	--	--	--	--	0.0000	--	--
Other groundfish species	**Season**																
Arrowtooth flounder	summer	0.3978	0.8083	0.2516	0.3099	0.4861	--	--	--	--	--	--	--	--	0.1443	0.2473	0.0236
	winter	--	0.6906	0.6536	--	0.3544	0.3583	--	--	--	--	--	--	--	--	0.1086	0.0942
Black rockfish (South of 46°16' N. lat.)	winter	--	--	--	--	--	--	--	--	--	--	--	0.0001	--	--	0.0000	--
Dover sole	summer	0.0338	0.0257	0.6660	0.0264	0.0155	--	--	--	--	--	--	--	--	0.0123	0.0079	0.0626
	winter	--	0.0350	0.1970	0.0000	0.0179	0.1080	--	--	--	--	--	--	--	--	0.0055	0.0284
English sole	summer	0.0835	0.0001	0.0003	0.0650	0.0000	--	--	--	--	--	--	--	--	0.0303	0.0000	0.0000
	winter	--	0.0012	0.0004	--	0.0006	0.0002	--	--	--	--	--	--	--	--	0.0002	0.0001
Lingcod (North of 42° N. lat.)	summer	--	--	--	0.1185	0.0066	--	--	--	--	--	--	--	--	0.0552	0.0034	0.0005
	winter	--	--	--	--	0.0019	0.0001	0.0002	--	--	--	--	--	--	--	0.0006	0.0000
Lingcod (South of 42° N. lat.)	summer	--	--	--	0.0009	--	--	--	--	--	--	--	--	--	0.0004	--	--
	winter	--	--	--	--	0.0000	--	--	--	--	--	--	--	--	--	0.0000	--
Longnose skate	summer	--	--	--	--	--	--	--	--	--	--	0.0306	0.1462	0.0436	0.0163	0.0718	0.0344
	winter	--	--	--	--	--	--	--	--	--	--	0.0113	0.0544	0.0462	--	0.0378	0.0341
Longspine thornyhead (North of 34°27' N. lat.)	summer	--	--	--	--	0.0028	--	--	--	0.0692	0.8716	--	--	--	--	0.0014	0.0481
	winter	--	--	--	--	0.0015	0.1089	--	--	0.0336	0.8386	--	--	--	--	0.0005	0.0286
Minor nearshore rockfish (North of 40°10' N. lat.)																	
Quillback Rockfish	summer	--	--	--	--	--	--	--	--	--	--	0.0001	--	--	0.0000	--	--
Minor shelf rockfish (North of 40°10' N. lat.)																	
Chilipepper Rockfish	summer	--	--	--	--	--	--	--	--	--	0.0000	--	--	--	--	--	0.0000
	winter	--	--	--	--	--	0.0010	--	--	--	0.0078	--	--	--	--	--	0.0003
Flag Rockfish	summer	--	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--
	winter	--	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--
Greenspotted Rockfish	summer	--	--	--	0.0000	0.0000	--	--	0.0015	0.0001	--	--	--	--	0.0000	0.0000	--
	summer	--	--	--	0.0045	0.0003	--	--	0.4803	0.0083	0.0000	--	--	--	0.0021	0.0002	0.0000
Greenstriped Rockfish	winter	--	--	--	--	0.0004	0.0001	--	--	0.0082	0.0004	--	--	--	--	0.0001	0.0000
Harlequin Rockfish	summer	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--	--
Redstripe Rockfish	summer	--	--	--	0.0000	0.0000	--	--	0.0013	0.0000	--	--	--	--	0.0000	0.0000	--
	winter	--	--	--	--	0.0002	0.0000	--	--	0.0046	0.0002	--	--	--	--	0.0001	0.0000
Rockfish Unid	summer	--	--	--	0.0000	--	--	--	0.0003	--	--	--	--	--	0.0000	--	--
Rosethorn Rockfish	summer	--	--	--	0.0000	0.0010	--	--	0.0051	0.0248	0.0009	--	--	--	0.0000	0.0005	0.0000
	winter	--	--	--	--	0.0032	0.0002	--	--	0.0721	0.0013	--	--	--	--	0.0010	0.0000
Rosy Rockfish	summer	--	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--
	winter	--	--	--	--	0.0001	0.0000	--	--	0.0033	0.0001	--	--	--	--	0.0000	0.0000
Silvergray Rockfish	summer	--	--	--	0.0000	0.0000	--	--	0.0006	0.0004	--	--	--	--	0.0000	0.0000	--
Starry Rockfish	summer	--	--	--	0.0000	--	--	--	0.0006	--	--	--	--	--	0.0000	--	--
Stripetail Rockfish	summer	--	--	--	0.0002	--	--	--	0.0263	--	--	--	--	--	0.0001	--	--
	winter	--	--	--	--	0.0000	0.0000	--	--	0.0000	0.0000	--	--	--	--	0.0000	0.0000

Table 2a (continued).

IFQ Fishery - Bottom Trawl North of 40°10' N Lat.		IFQFF			IFQRF			IFQRD	IFQM			NIFQ			All Species		
		Depth (fm)			Depth (fm)			Depth (fm)	Depth (fm)			Depth (fm)			Depth (fm)		
		0-125	126-250	≥ 250	0-125	126-250	≥ 250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250
Expansion Factor (mt)	summer	2.2101	0.6804	0.0093	7.8150	0.3215			0.4627	0.0068	0.0454	9.6152	1.7678	3.0808	8.3174	5.6883	0.6781
	winter		0.0136	0.0272		0.8165	3.6735	0.0009		0.0993	0.0064	1.1872	17.9307	9.1149		3.1760	2.4681
		Discard ratio			Discard ratio			Discard ratio	Discard ratio			Discard ratio			Discard ratio		
Minor slope rockfish (North of 40°10' N. lat.)																	
Aurora Rockfish	summer	--	--	--	0.0001	0.0086	--	--	0.0061	0.2102	0.0115	--	--	--	0.0000	0.0044	0.0006
	winter	--	--	--	--	0.0057	0.0024	--	--	0.1257	0.0188	--	--	--	--	0.0017	0.0006
Bank Rockfish	winter	--	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--
Blackgill Rockfish	summer	--	--	--	--	0.0000	--	--	--	0.0010	0.0000	--	--	--	--	0.0000	0.0000
	winter	--	--	--	--	0.0001	0.0001	--	--	0.0016	0.0004	--	--	--	--	0.0000	0.0000
Redbanded Rockfish	summer	--	--	--	0.0001	0.0011	--	--	0.0100	0.0256	0.0005	--	--	--	0.0000	0.0005	0.0000
	winter	--	--	--	--	0.0010	0.0001	--	--	0.0222	0.0005	--	--	--	--	0.0003	0.0000
Rockfish Unid	summer	--	--	--	--	0.0013	--	--	--	0.0325	0.0000	--	--	--	--	0.0007	0.0000
	winter	--	--	--	--	0.0017	--	--	--	0.0382	--	--	--	--	--	0.0005	--
Rougheye Rockfish	summer	--	--	--	0.0000	0.0000	--	--	0.0012	0.0007	0.0009	--	--	--	0.0000	0.0000	0.0001
	winter	--	--	--	--	0.0001	0.0000	--	--	0.0025	0.0002	--	--	--	--	0.0000	0.0000
Sharpchin Rockfish	summer	--	--	--	0.0001	0.0004	--	--	0.0061	0.0103	0.0007	--	--	--	0.0000	0.0002	0.0000
	winter	--	--	--	--	0.0016	0.0000	--	--	0.0365	0.0001	--	--	--	--	0.0005	0.0000
Shortraker Rockfish	summer	--	--	--	--	0.0001	--	--	--	0.0017	0.0002	--	--	--	--	0.0000	0.0000
	winter	--	--	--	--	--	0.0001	--	--	--	0.0011	--	--	--	--	--	0.0000
Shortraker/Rougheye Rockfish	winter	--	--	--	--	0.0000	--	--	--	0.0001	--	--	--	--	--	0.0000	--
Splitnose Rockfish	summer	--	--	--	0.0013	0.0123	--	--	0.1389	0.3000	0.0027	--	--	--	0.0006	0.0063	0.0001
	winter	--	--	--	--	0.0145	0.0007	--	--	0.3224	0.0052	--	--	--	--	0.0044	0.0002
Yellowmouth Rockfish	winter	--	--	--	--	0.0000	--	--	--	0.0006	--	--	--	--	--	0.0000	--
Mixed thornyheads																	
Shortspine/ Longspine Thornyhead	summer	--	--	--	--	0.0022	--	--	--	0.0539	0.0460	--	--	--	--	0.0011	0.0025
	winter	--	--	--	--	0.0016	0.0103	--	--	0.0351	0.0791	--	--	--	--	0.0005	0.0027
Other flatfish																	
Butter Sole	summer	0.0033	--	--	0.0026	--	--	--	--	--	--	--	--	--	0.0012	--	--
	winter	--	0.0000	--	--	0.0000	--	--	--	--	--	--	--	--	--	0.0000	--
Curlfin Turbot	summer	0.0003	--	--	0.0002	--	--	--	--	--	--	--	--	--	0.0001	--	--
Flatfish Unid	summer	0.0010	0.0001	0.0006	0.0008	0.0001	--	--	--	--	--	--	--	--	0.0004	0.0000	0.0001
	winter	--	--	0.0011	--	--	0.0006	--	--	--	--	--	--	--	--	--	0.0002
Flathead Sole	summer	0.0111	0.0000	0.0001	0.0087	0.0000	--	--	--	--	--	--	--	--	0.0040	0.0000	0.0000
	winter	--	0.0001	0.0000	--	0.0001	0.0000	--	--	--	--	--	--	--	--	0.0000	0.0000
Pacific Sanddab	summer	0.2291	0.0000	0.0001	0.1785	0.0000	--	--	--	--	--	--	--	--	0.0831	0.0000	0.0000
	winter	--	0.0000	0.0000	--	0.0000	0.0000	--	--	--	--	--	--	--	--	0.0000	0.0000
Rex Sole	summer	0.0756	0.0066	0.0091	0.0589	0.0040	--	--	--	--	--	--	--	--	0.0274	0.0020	0.0009
	winter	--	0.0037	0.0015	--	0.0019	0.0008	--	--	--	--	--	--	--	--	0.0006	0.0002
Rock Sole	summer	0.0005	--	--	0.0004	--	--	--	--	--	--	--	--	--	0.0002	--	--
Sanddab Unid	summer	0.0010	--	--	0.0008	--	--	--	--	--	--	--	--	--	0.0004	--	--
Sand Sole	summer	0.0010	--	--	0.0008	--	--	--	--	--	--	--	--	--	0.0004	--	--
Other groundfish																	
Big Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0716	0.0001	0.0001	0.0383	0.0001	0.0000
	winter	--	--	--	--	--	--	--	--	--	--	0.1499	0.0007	0.0001	--	0.0005	0.0001
Cabezon	summer	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000	--	--
California Skate	summer	--	--	--	--	--	--	--	--	--	--	--	0.0001	0.0000	--	0.0000	0.0000
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0005	0.0002	--	0.0004	0.0002
Kelp Greenling	summer	--	--	--	--	--	--	--	--	--	--	0.0001	--	--	0.0001	--	--
	winter	--	--	--	--	--	--	--	--	--	--	0.0003	--	--	--	--	--
Pacific Flatnose	summer	--	--	--	--	--	--	--	--	--	--	--	0.0001	0.0041	--	0.0000	0.0032
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0000	0.0040	--	0.0000	0.0029
Pacific Grenadier	summer	--	--	--	--	--	--	--	--	--	--	--	0.0014	0.0844	--	0.0007	0.0665
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0003	0.0405	--	0.0002	0.0298
Roundfish Unid	summer	--	--	--	--	--	--	--	--	--	--	0.0000	--	0.0000	0.0000	--	0.0000
	winter	--	--	--	--	--	--	--	--	--	--	0.0000	--	0.0000	--	--	0.0000
Soupfin Shark	winter	--	--	--	--	--	--	--	--	--	--	0.0004	--	0.0000	--	--	0.0000
Spotted Ratfish	summer	--	--	--	--	--	--	--	--	--	--	0.0858	0.1129	0.0059	0.0459	0.0555	0.0047
	winter	--	--	--	--	--	--	--	--	--	--	0.1153	0.0345	0.0040	--	0.0239	0.0029
Unspecified Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0128	0.0033	0.0013	0.0069	0.0016	0.0010
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0002	0.0043	--	0.0001	0.0032

Table 2a (continued).

IFQ Fishery - Bottom Trawl North of 40°10' N Lat.		IFQFF			IFQRF			IFQRD	IFQM			NIFQ			All Species		
		Depth (fm)			Depth (fm)			Depth (fm)	Depth (fm)			Depth (fm)			Depth (fm)		
		0-125	126-250	≥ 250	0-125	126-250	≥ 250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250	0-125	126-250	≥ 250
Expansion Factor (mt)	summer	2.2101	0.6804	0.0093	7.8150	0.3215			0.4627	0.0068	0.0454	9.6152	1.7678	3.0808	8.3174	5.6883	0.6781
	winter		0.0136	0.0272		0.8165	3.6735	0.0009		0.0993	0.0064	1.1872	17.9307	9.1149		3.1760	2.4681
		Discard ratio			Discard ratio			Discard ratio	Discard ratio			Discard ratio			Discard ratio		
Pacific cod	summer	--	--	--	0.0000	--	--	--	--	--	--	--	--	--	0.0000	--	--
	winter	--	--	--	--	0.0000	--	--	--	--	--	--	--	--	--	0.0000	--
Pacific hake	summer	--	--	--	0.0818	0.3478	--	--	--	--	--	--	--	--	0.0381	0.1769	0.0600
	winter	--	--	--	--	0.4373	0.3134	0.9734	--	--	--	--	--	--	--	0.1340	0.0824
Sablefish (North of 36° N. lat.)	summer	--	--	--	0.0103	0.0030	--	--	--	--	--	--	--	--	0.0048	0.0016	0.0024
	winter	--	--	--	--	0.0027	0.0085	0.0264	--	--	--	--	--	--	--	0.0008	0.0022
Shortspine thornyhead (North of 34°27' N. lat.)	summer	--	--	--	0.0001	0.0064	--	--	0.0148	0.1552	0.0561	--	--	--	0.0001	0.0032	0.0031
	winter	--	--	--	--	0.0072	0.0049	--	--	0.1609	0.0381	--	--	--	--	0.0022	0.0013
Spiny dogfish	summer	--	--	--	--	--	--	--	--	--	--	0.2451	0.1657	0.0042	0.1310	0.0814	0.0033
	winter	--	--	--	--	--	--	--	--	--	--	0.1527	0.6861	0.0968	--	0.4759	0.0713
Starry flounder	summer	0.0022	0.0001	--	0.0017	0.0001	--	--	--	--	--	--	--	--	0.0008	0.0000	--
	winter	--	0.0000	--	--	0.0000	--	--	--	--	--	--	--	--	--	0.0000	--
Widow rockfish	summer	--	--	--	0.0001	0.0000	--	--	0.0109	0.0009	0.0004	--	--	--	0.0000	0.0000	0.0000
	winter	--	--	--	--	0.0001	0.0001	--	--	0.0025	0.0006	--	--	--	--	0.0000	0.0000
Yellowtail rockfish (North of 40°10' N. lat.)	summer	--	--	--	0.0000	--	--	--	0.0006	--	--	--	--	--	0.0000	--	--
	winter	--	--	--	--	0.0000	0.0002	--	--	0.0005	0.0013	--	--	--	--	0.0000	0.0000
Non-groundfish species	**Season**																
Dungeness crab	summer	--	--	--	--	--	--	--	--	--	--	0.3478	0.0067	0.0001	0.1859	0.0033	0.0001
	winter	--	--	--	--	--	--	--	--	--	--	0.4024	0.0020	0.0001	--	0.0014	0.0001
Non-FMP flatfish																	
Deepsea Sole	summer	--	--	--	--	--	--	--	--	--	--	--	0.0028	0.0295	--	0.0014	0.0232
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0005	0.0167	--	0.0003	0.0123
Slender Sole	summer	--	--	--	--	--	--	--	--	--	--	0.0571	0.0012	0.0003	0.0305	0.0006	0.0003
	winter	--	--	--	--	--	--	--	--	--	--	0.0009	0.0004	0.0002	--	0.0003	0.0001
Non-FMP skate																	
Aleutian Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0013	0.0045	0.0014	0.0007	0.0022	0.0011
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0007	0.0009	--	0.0005	0.0007
Black Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0003	0.0017	0.0296	0.0002	0.0008	0.0233
	winter	--	--	--	--	--	--	--	--	--	--	0.0011	0.0009	0.0381	--	0.0006	0.0281
Butterfly Ray	summer	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000	--	--
Deepsea Skate	summer	--	--	--	--	--	--	--	--	--	--	--	0.0001	0.0016	--	0.0001	0.0013
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0000	0.0007	--	0.0000	0.0005
Flathead Skate	summer	--	--	--	--	--	--	--	--	--	--	--	0.0000	0.0000	--	0.0000	0.0000
	winter	--	--	--	--	--	--	--	--	--	--	--	0.0000	0.0000	--	0.0000	0.0000
Pacific Electric Ray	summer	--	--	--	--	--	--	--	--	--	--	0.0002	0.0004	--	0.0001	0.0002	--
	winter	--	--	--	--	--	--	--	--	--	--	0.0011	--	0.0001	--	--	0.0000
Roughshoulder/Broad Skate	summer	--	--	--	--	--	--	--	--	--	--	--	0.0001	0.0001	--	0.0001	0.0001
	winter	--	--	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000
Sandpaper Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0084	0.0785	0.0144	0.0045	0.0385	0.0114
	winter	--	--	--	--	--	--	--	--	--	--	0.0111	0.0288	0.0230	--	0.0200	0.0170
Starry Skate	summer	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000	--	--
	winter	--	--	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000
White Skate	winter	--	--	--	--	--	--	--	--	--	--	--	--	0.0000	--	--	0.0000

Table 2b. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the 2011 IFQ fishery using bottom trawl gear south of 40°10' N latitude. Winter season is January-April and November-December and summer season is May-October. Strata with no unsampled discard weight are not shown. Unsampled catch weight could be assigned to the categories: IFQ flatfish species (IFQFF), IFQ rockfish species (IFQRF), IFQ roundfish species (IFQRD), IFQ mixed species (IFQM), non-IFQ species (NIFQ), or all species (IFQ & non-IFQ).

IFQ Fishery - Bottom Trawl South of 40°10' N Lat.	IFQFF	IFQFF	NIFQ	NIFQ	NIFQ	NIFQ	NIFQ	NIFQ	All Species	All Species
Season	summer	winter	summer	winter	summer	winter	summer	winter	summer	summer
Depth interval (fm)	0-125	0-125	0-125	0-125	126-250	126-250	>250	>250	126-250	>250
Expansion Factor (mt)	0.1348	0.0057	1.0047	0.0003	0.1134	0.0926	1.2604	0.4100	1.0446	0.3175
	Discard ratio									
Rebuilding species										
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	0.0001	--
Darkblotched rockfish	--	--	--	--	--	--	--	--	0.0005	--
Petrale sole	0.0904	0.0243	--	--	--	--	--	--	0.0004	--
Other groundfish species										
Arrowtooth flounder	0.0173	0.0023	--	--	--	--	--	--	0.0565	0.0026
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	0.0034	--
Dover sole	0.0087	0.0126	--	--	--	--	--	--	0.0521	0.3330
English sole	0.1453	0.1710	--	--	--	--	--	--	0.0009	--
Lingcod (South of 42° N. lat.)	--	--	--	--	--	--	--	--	0.0004	0.0000
Longnose skate	--	--	0.1010	0.0577	0.2732	0.1300	0.0840	0.0767	0.0989	0.0483
Longspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	--	--	--	--	0.0045	0.0568
Minor shelf rockfish (South of 40°10' N. lat.)										
Greenspotted Rockfish	--	--	--	--	--	--	--	--	0.0001	--
Greenstriped Rockfish	--	--	--	--	--	--	--	--	0.0004	--
Halfbanded Rockfish	--	--	--	--	--	--	--	--	0.0007	--
Redstripe Rockfish	--	--	--	--	--	--	--	--	0.0000	--
Rosethorn Rockfish	--	--	--	--	--	--	--	--	0.0000	--
Stripetail Rockfish	--	--	--	--	--	--	--	--	0.0233	--
Minor slope rockfish (South of 40°10' N. lat.)										
Aurora Rockfish	--	--	--	--	--	--	--	--	0.0039	0.0012
Bank Rockfish	--	--	--	--	--	--	--	--	0.0002	--
Blackgill Rockfish	--	--	--	--	--	--	--	--	0.0001	0.0000
Redbanded Rockfish	--	--	--	--	--	--	--	--	0.0004	--
Sharpchin Rockfish	--	--	--	--	--	--	--	--	0.0000	--
Spotted Rockfish Unid	--	--	--	--	--	--	--	--	--	0.0000
Mixed thornyheads										
Shortspine/ Longspine Thornyhead	--	--	--	--	--	--	--	--	--	0.0022
Other flatfish										
Curlfin Turbot	0.0125	0.0131	--	--	--	--	--	--	--	--
Flathead Sole	--	0.0001	--	--	--	--	--	--	--	--
Pacific Sanddab	0.7018	0.7669	--	--	--	--	--	--	0.0000	--
Rex Sole	0.0144	0.0097	--	--	--	--	--	--	0.0112	0.0000
Rock Sole	0.0081	0.0002	--	--	--	--	--	--	--	--
Sanddab Unid	0.0012	--	--	--	--	--	--	--	--	--
Sand Sole	0.0003	--	--	--	--	--	--	--	--	--
Other groundfish										
Big Skate	--	--	0.0200	0.0007	--	0.0000	--	0.0008	--	--
California Skate	--	--	0.0342	0.0017	0.0089	--	0.0003	--	0.0032	0.0002
Pacific Flatnose	--	--	--	--	0.0001	--	0.0037	0.0112	0.0000	0.0021
Pacific Grenadier	--	--	--	--	0.0025	0.0013	0.1500	0.0497	0.0009	0.0863
Roundfish Unid	--	--	--	--	--	--	0.0000	--	--	0.0000
Soupfin Shark	--	--	--	0.0079	--	--	--	--	--	--
Spotted Ratfish	--	--	0.1487	0.3546	0.2159	0.1875	0.0057	0.0142	0.0782	0.0033
Unspecified Skate	--	--	0.0007	0.0572	0.0046	0.0267	0.0001	0.0004	0.0017	0.0000
Pacific hake	--	--	--	--	--	--	--	--	0.1969	0.0255
Sablefish (North of 36° N. lat.)	--	--	--	--	--	--	--	--	0.0261	0.0007
Shortbelly rockfish	--	--	0.1951	0.1598	0.0259	0.0015	--	--	0.0094	--
Shortspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	--	--	--	--	0.0018	0.0020
Spiny dogfish	--	--	0.0197	0.0650	0.0299	0.3279	0.0007	0.0174	0.0108	0.0004
Splitnose rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	0.2539	0.0009
Widow rockfish	--	--	--	--	--	--	--	--	0.0000	--
Non-groundfish species										
Dungeness crab	--	--	0.3229	0.1553	0.0206	0.0048	0.0000	--	0.0075	0.0000
Non-FMP flatfish										
Deepsea Sole	--	--	--	--	0.0009	0.0005	0.0255	0.0872	0.0003	0.0147
Slender Sole	--	--	0.0004	0.0026	0.0008	0.0029	0.0000	--	0.0003	0.0000
Non-FMP skate										
Black Skate	--	--	0.0000	--	0.0291	0.0101	0.0216	0.0569	0.0105	0.0124
Deepsea Skate	--	--	--	--	--	--	0.0016	0.0011	--	0.0009
Pacific Electric Ray	--	--	0.0065	0.0123	0.0078	0.0032	--	--	0.0028	--
Sandpaper Skate	--	--	0.0028	0.0039	0.0538	0.0779	0.0083	0.0062	0.0195	0.0048
Starry Skate	--	--	0.0011	--	0.0002	--	--	--	0.0001	--
White Skate	--	--	--	--	--	--	0.0001	--	--	0.0000

Table 2c. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the 2011 IFQ fishery by sector-gear, area, and depth. Winter season is January-April and November-December and summer season is May-October. Strata with no unsampled discard weight are not shown. Unsampled catch weight could be assigned to the categories: IFQ flatfish species (IFQFF), IFQ rockfish species (IFQRF), IFQ roundfish species (IFQRD), IFQ mixed species (IFQM), non-IFQ species (NIFQ), or all species (IFQ & non-IFQ).

Sector	**IFQ Fishery - Hook and Line**			**IFQ Fishery - Pot**				**LE CA Halibut**	**Shoreside Hake**
Area (Latitude)	**North of 40°10' N**		**South of 40°10' N**	**North of 40°10' N**			**South of 40°10' N**	**South of 40°10' N**	**North of 40°10' N**
	IFQRF	**All Species**	**NIFQ**	**IFQRF**	**NIFQ**	**All Species**	**NIFQ**	**NIFQ**	**NIFQ**
Depth interval (fm)	**0-250**	**0-250**	**All depths**	**0-250**	**>250**	**0-250**	**>250**	**0-125**	**All depths**
Expansion Factor (mt)	0.0809	0.0045	0.0009	0.0032	0.0009	0.0056	0.0017	0.0068	1.3721
	Discard ratio			Discard ratio				Ratio	Ratio
Rebuilding species									
Darkblotched rockfish	0.0135	0.0022	--	0.0058	--	0.0001	--	--	--
Pacific Ocean Perch (North of 40°10' N. lat.)	0.0028	0.0005	--	0.0173	--	0.0002	--	--	--
Petrale sole	--	0.0005	--	--	--	--	--	--	--
Other groundfish species									
Arrowtooth flounder	--	0.0158	--	--	--	0.0215	--	--	--
Dover sole	--	0.0012	--	--	--	0.0003	--	--	--
Lingcod (North of 42° N. lat.)	--	0.0009	--	--	--	0.0130	--	--	--
Longnose skate	--	0.1470	0.2438	--	--	--	--	0.0002	--
Longspine thornyhead (South of 34°27' N. lat.)	--	--	0.0152	--	--	--	--	--	--
Minor shelf rockfish (North of 40°10' N. lat.)									
Greenstriped Rockfish	--	--	--	0.0049	--	0.0001	--	--	--
Redstripe Rockfish	0.0013	0.0002	--	--	--	--	--	--	--
Rosethorn Rockfish	0.0010	0.0002	--	0.0173	--	0.0002	--	--	--
Minor slope rockfish (North of 40°10' N. lat.)									
Aurora Rockfish	0.0001	0.0000	--	--	--	--	--	--	--
Blackgill Rockfish	0.0299	0.0048	--	--	--	--	--	--	--
Redbanded Rockfish	0.0055	0.0009	--	0.0285	--	0.0003	--	--	--
Rockfish Unid	--	--	--	0.0138	--	0.0002	--	--	--
Rougheye Rockfish	0.8779	0.1406	--	0.1643	--	0.0019	--	--	--
Shortraker Rockfish	0.0196	0.0031	--	0.1602	--	0.0019	--	--	--
Shortraker/Rougheye Rockfish	0.0151	0.0024	--	0.4505	--	0.0052	--	--	--
Splitnose Rockfish	0.0027	0.0004	--	--	--	--	--	--	--
Yellowmouth Rockfish	0.0005	0.0001	--	--	--	--	--	--	--
Other flatfish									
Flatfish Unid	--	0.0000	--	--	--	--	--	--	--
Rock Sole	--	0.0001	--	--	--	--	--	--	--
Other groundfish									
Big Skate	--	--	--	--	--	--	--	0.0426	0.0495
California Skate	--	--	0.0001	--	--	--	--	0.0101	--
Leopard Shark	--	--	--	--	--	--	--	0.0010	--
Pacific Flatnose	--	--	0.0093	--	0.0002	0.0000	0.0066	--	--
Pacific Grenadier	--	0.0012	0.2238	--	0.0957	0.0000	0.1747	--	--
Soupfin Shark	--	--	--	--	--	--	--	0.0000	0.0084
Spotted Ratfish	--	0.0003	0.0001	--	--	--	--	0.0002	--
Unspecified Skate	--	0.0148	0.0156	--	--	--	--	--	--
Pacific hake	--	0.0001	--	--	--	--	--	--	--
Sablefish (North of 36° N. lat.)	--	0.0475	--	--	--	0.2951	--	--	--
Shortspine thornyhead (North of 34°27' N. lat.)	0.0300	0.0048	--	0.1375	--	0.0016	--	--	--
Spiny dogfish	--	0.4256	0.0087	--	0.0002	0.0213	0.0001	0.0138	0.0565
Widow rockfish	0.0002	0.0000	--	--	--	--	--	--	--
Non-groundfish species									
California halibut	--	--	--	--	--	--	--	0.0006	--
Dungeness crab	--	--	--	--	--	0.0862	--	0.6805	--
Non-FMP flatfish									
Deepsea Sole	--	--	0.0001	--	0.0013	0.0002	0.0006	--	--
Diamond Turbot	--	--	--	--	--	--	--	0.0000	--
Hornyhead Turbot	--	--	--	--	--	--	--	0.0001	--
C-O (C-O Turbot) Sole	--	--	--	--	--	--	--	0.0000	--
Non-FMP skate									
Aleutian Skate	--	0.0003	--	--	--	--	--	--	--
Banded Guitarfish	--	--	--	--	--	--	--	0.0000	--
Black Skate	--	0.0003	0.0076	--	--	--	0.0003	--	0.0020
Deepsea Skate	--	--	0.0069	--	--	--	--	--	--
Pacific Electric Ray	--	--	--	--	--	--	--	0.0007	--
Sandpaper Skate	--	0.0012	0.0012	--	--	--	0.0000	--	--
Starry Skate	--	--	--	--	--	--	--	0.0000	--
Thornback Skate	--	--	--	--	--	--	--	0.0003	--

Table 3a. Non-hake IFQ sectors and LE California halibut. Landings (mt), estimated discard (mt), and fishing mortality estimate (mt) of groundfish species from non-hake IFQ and limited entry California halibut fisheries in 2011. Discard ratios (Table 2) were multiplied by expansion factors to generate estimated discard, sampled discard was expanded to the haul level and summed by sector, and landings were summarized from PacFIN.

	IFQ - Trawl				IFQ - Hook-and-Line				IFQ - Pot				LE California Halibut			
Weight (mt)	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate
Rebuilding species																
Bocaccio rockfish (South of 40°10' N. lat.)	5.30	0.01	0.00	5.31	--	--	--	--	--	--	--	--	--	--	--	--
Canary rockfish	2.68	0.14	0.03	2.85	0.00	--	--	0.00	--	--	--	--	--	--	--	--
Cowcod rockfish (South of 40°10' N. lat.)	0.01	0.00	--	0.02	--	--	--	--	--	--	--	--	--	--	--	--
Darkblotched rockfish	87.54	1.55	0.16	89.25	0.25	0.12	0.00	0.37	0.05	0.00	0.00	0.05	--	--	--	--
Pacific Ocean Perch (North of 40°10' N. lat.)	45.95	0.37	0.02	46.34	0.01	0.03	0.00	0.04	0.01	0.00	0.00	0.01	--	--	--	--
Petrale sole	793.78	15.85	0.58	810.20	0.00	0.03	0.00	0.03	0.09	0.00	--	0.09	0.06	0.01	--	0.07
Yelloweye rockfish	0.04	0.01	0.00	0.05	0.01	--	--	0.01	--	--	--	--	--	--	--	--
Other groundfish species																
Arrowtooth flounder	2,223.09	240.27	8.90	2,472.26	0.09	1.01	0.00	1.10	0.22	0.15	0.00	0.36	--	--	--	--
Black rockfish (North of 46°16' N. lat.)	0.70	--	--	0.70	--	--	--	--	--	--	--	--	--	--	--	--
Black rockfish (South of 46°16' N. lat.)	0.03	0.01	0.00	0.04	--	--	--	--	--	--	--	--	--	--	--	--
Chilipepper rockfish (South of 40°10' N. lat.)	292.42	24.99	0.00	317.41	--	--	--	--	--	--	--	--	--	--	--	--
Dover sole	7,636.47	156.11	1.16	7,793.74	0.07	0.27	0.00	0.33	0.73	0.31	0.00	1.05	--	--	--	--
English sole	108.02	28.52	0.97	137.51	--	--	--	--	--	--	--	--	0.08	0.05	--	0.13
Lingcod (North of 42° N. lat.)	234.55	37.60	1.41	254.06	0.30	0.05	0.00	0.36	2.94	0.09	0.00	3.03	--	--	--	--
50% discard mortality (Trawl)*		18.80	0.71													
Lingcod (South of 42° N. lat.)	6.66	1.51	0.01	7.42	--	--	--	--	0.01	0.00	--	0.01	0.00	0.01	--	0.00
50% discard mortality (Trawl)*		0.76	0.01											0.00		
Longnose skate	759.33	84.13	3.27	846.74	0.43	14.65	0.00	15.08	--	--	--	--	0.00	0.01	0.00	0.01
Longspine thornyhead (North of 34°27' N. lat.)	900.33	41.74	0.59	942.66	0.29	0.53	--	0.82	0.04	0.02	--	0.05	--	--	--	--
Longspine thornyhead (South of 34°27' N. lat.)	--	--	--	--	0.06	0.32	0.00	0.39	--	--	--	--	--	--	--	--
Minor nearshore rockfish (North of 40°10' N. lat.)																
Blue Rockfish	0.00	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Brown Rockfish	0.01	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	--
Quillback Rockfish	0.03	0.02	0.00	0.06	--	--	--	--	--	--	--	--	--	--	--	--
Minor nearshore rockfish (South of 40°10' N. lat.)																
Brown Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--	--	0.00
Minor shelf rockfish (North of 40°10' N. lat.)																
Bocaccio Rockfish	0.33	--	--	0.33	--	--	--	--	--	--	--	--	--	--	--	--
Chilipepper Rockfish	1.32	0.10	0.00	1.43	--	--	--	--	--	--	--	--	--	--	--	--
Flag Rockfish	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Greenspotted Rockfish	0.02	0.00	0.00	0.02	--	--	--	--	--	--	--	--	--	--	--	--
Greenstriped Rockfish	6.99	1.52	0.28	8.78	--	--	--	--	--	0.00	0.00	0.00	--	--	--	--
Harlequin Rockfish	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Pygmy Rockfish	0.00	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Redstripe Rockfish	0.13	0.03	0.00	0.16	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--
Rosethorn Rockfish	1.22	0.68	0.02	1.92	0.00	0.01	0.00	0.01	--	0.00	0.00	0.00	--	--	--	--
Rosy Rockfish	0.00	0.01	0.00	0.01	--	--	--	--	--	--	--	--	--	--	--	--
Shelf Rockfish Unid	2.28	0.00	0.00	2.28	0.00	--	--	0.00	0.04	--	--	0.04	--	--	--	--
Silvergray Rockfish	0.29	0.00	0.00	0.29	0.00	--	--	0.00	--	--	--	--	--	--	--	--
Starry Rockfish	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Stripetail Rockfish	0.28	0.07	0.02	0.36	--	--	--	--	--	--	--	--	--	--	--	--

Table 3a - Non-hake IFQ sectors and LE California halibut (continued).

	IFQ - Trawl				IFQ - Hook-and-Line				IFQ - Pot				LE California Halibut			
Weight (mt)	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate
Minor shelf rockfish (South of 40°10' N. lat.)																
Greenblotched Rockfish	0.00	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Greenspotted Rockfish	0.01	0.03	0.00	0.04	--	--	--	--	--	--	--	--	--	--	--	--
Greenstriped Rockfish	0.03	0.33	0.00	0.35	--	--	--	--	--	--	--	--	--	--	--	--
Halfbanded Rockfish	--	0.05	0.00	0.05	--	--	--	--	--	--	--	--	--	--	--	--
Pygmy Rockfish	--	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Redstripe Rockfish	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Rosethorn Rockfish	0.02	0.03	0.00	0.05	--	--	--	--	--	--	--	--	--	--	--	--
Rosy Rockfish	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shelf Rockfish Unid	0.03	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--	--
Speckled Rockfish	--	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Squarespot Rockfish	--	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Stripetail Rockfish	--	2.39	0.02	2.42	--	--	--	--	--	--	--	--	--	--	--	--
Yellowtail Rockfish	0.03	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--	--
Minor slope rockfish (North of 40°10' N. lat.)																
Aurora Rockfish	17.94	1.83	0.07	19.84	0.00	0.00	0.00	0.00	0.02	--	--	0.02	--	--	--	--
Bank Rockfish	0.22	0.00	0.00	0.22	0.04	--	--	0.04	--	--	--	--	--	--	--	--
Blackgill Rockfish	2.91	0.02	0.00	2.93	0.05	0.28	0.00	0.33	0.00	--	--	0.00	--	--	--	--
Blackspotted Rockfish	0.65	--	--	0.65	0.01	--	--	0.01	0.00	--	--	0.00	--	--	--	--
Redbanded Rockfish	4.49	0.29	0.01	4.79	0.52	0.06	0.00	0.58	0.03	0.00	0.00	0.04	--	--	--	--
Rougheye Rockfish	51.50	0.04	0.00	51.54	6.36	7.94	0.07	14.37	0.56	0.02	0.00	0.57	--	--	--	--
Sharpchin Rockfish	0.83	0.65	0.01	1.50	--	--	--	0.00	--	--	--	--	--	--	--	--
Shortraker Rockfish	21.54	0.02	0.00	21.56	0.22	0.18	0.00	0.40	0.00	0.01	0.00	0.02	--	--	--	--
Shortraker/Rougheye Rockfish	--	0.00	0.00	0.00	--	0.13	0.00	0.14	--	0.04	0.00	0.04	--	--	--	--
Slope Rockfish Unid	3.74	0.41	0.01	4.17	0.22	--	--	0.22	0.75	0.00	0.00	0.75	--	--	--	--
Splitnose Rockfish	5.76	3.05	0.18	9.00	0.00	0.02	0.00	0.02	0.00	--	--	0.00	--	--	--	--
Yellowmouth Rockfish	0.36	0.00	0.00	0.36	0.02	0.00	0.00	0.02	--	--	--	--	--	--	--	--
Minor slope rockfish (South of 40°10' N. lat.)																
Aurora Rockfish	5.26	0.75	0.00	6.01	0.03	0.00	--	0.03	0.03	0.00	--	0.03	--	--	--	--
Bank Rockfish	27.77	0.05	0.00	27.82	--	--	--	--	--	--	--	--	--	--	--	--
Blackgill Rockfish	14.23	0.04	0.00	14.27	0.92	0.01	--	0.92	0.75	0.04	--	0.80	0.00	--	--	0.00
Pacific Ocean Perch Rockfish	0.03	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--	--
Redbanded Rockfish	0.16	0.03	0.00	0.19	--	--	--	--	--	--	--	--	--	--	--	--
Rougheye Rockfish	0.02	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--	--
Sharpchin Rockfish	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--	--	--	--	--
Slope Rockfish Unid	1.60	0.06	--	1.66	--	--	--	--	0.26	--	--	0.26	--	--	--	--
Spotted Rockfish Unid	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--	--	--	--	--
Mixed thornyheads																
Shortspine/ Longspine Thornyhead	--	4.59	0.06	4.65	--	0.02	--	0.02	--	0.01	--	0.01	--	--	--	--
Other flatfish																
Butter Sole	0.06	0.76	0.04	0.85	--	--	--	--	--	--	--	--	--	--	--	--
Curlfin Turbot	0.37	0.60	0.00	0.97	--	--	--	--	--	--	--	--	0.12	0.32	--	0.43
Flatfish Unid	6.04	0.45	0.01	6.50	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	--	--
Flathead Sole	3.63	2.61	0.13	6.37	--	--	--	--	--	0.00	--	0.00	--	--	--	--
Pacific Sanddab	137.24	91.57	2.69	231.50	--	--	--	--	--	--	--	--	0.05	0.18	--	0.24
Rex Sole	357.05	21.04	0.89	378.98	--	--	--	--	0.00	0.00	--	0.00	0.00	0.00	--	0.01
Rock Sole	2.20	0.41	0.01	2.62	0.00	0.00	0.00	0.00	--	--	--	--	0.05	0.00	--	0.05
Sanddab Unid	3.38	1.05	0.01	4.44	--	--	--	--	--	--	--	--	--	--	--	--
Sand Sole	64.86	0.33	0.01	65.21	--	--	--	--	--	--	--	--	4.83	0.05	--	4.88

Table 3a - Non-hake IFQ sectors and LE California halibut (continued).

	IFQ - Trawl				IFQ - Hook-and-Line				IFQ - Pot				LE California Halibut			
Weight (mt)	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate	Landed	Sampled Discard	Expanded Discard	Estimate
Other groundfish																
Big Skate	--	30.17	1.22	31.40	--	0.01	--	0.01	--	--	--	--	0.03	3.20	0.00	3.22
Cabezon	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
California Skate	0.35	1.98	0.05	2.39	--	0.00	0.00	0.00	--	--	--	--	--	0.75	0.00	0.75
Grenadier Unid	89.27	--	--	89.27	0.54	--	--	0.54	0.00	--	--	0.00	--	--	--	--
Groundfish Unid	0.00	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Kelp Greenling	0.01	0.05	0.00	0.06	--	--	--	--	--	--	--	--	--	--	--	--
Leopard Shark	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.08	0.00	0.09
Pacific Flatnose	--	2.88	0.07	2.95	--	0.49	0.00	0.49	--	0.04	0.00	0.04	--	--	--	--
Pacific Grenadier	--	50.53	1.00	51.53	--	8.23	0.00	8.23	--	1.43	0.00	1.43	--	--	--	--
Roundfish Unid	--	0.02	0.00	0.02	--	--	--	--	--	--	--	--	--	--	--	--
Soupfin Shark	0.40	0.03	0.00	0.43	--	0.00	--	0.00	--	--	--	--	0.07	0.00	0.00	0.07
Spotted Ratfish	0.36	67.45	2.91	70.72	--	0.02	0.00	0.02	--	0.00	--	0.00	--	0.02	0.00	0.02
Unspecified Skate	268.18	7.39	0.26	275.83	0.09	1.29	0.00	1.38	--	--	--	--	0.38	--	--	0.38
Other rockfish	0.00	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Pacific cod	251.34	0.01	0.00	251.35	0.00	--	--	0.00	--	--	--	--	--	--	--	--
Pacific hake	26.50	188.65	4.47	219.63	--	0.15	0.00	0.15	--	0.00	--	0.00	--	--	--	--
Sablefish (North of 36° N. lat.)	1,656.32	9.18	0.20	1,661.01	159.40	5.55	0.00	160.51	525.19	7.70	0.00	526.73	--	--	--	--
50% discard mortality (Trawl)*		4.59	0.10													
20% discard mortality (Fixed Gear)*						1.11	0.00			1.54	0.00					
Sablefish (South of 36° N. lat.)	17.03	--	--	17.03	145.54	2.42	--	146.03	283.56	4.07	--	284.37	--	--	--	--
50% discard mortality (Trawl)*																
20% discard mortality (Fixed Gear)*						0.48				0.81						
Shortbelly rockfish	0.43	9.91	0.21	10.55	--	--	--	--	--	--	--	--	--	--	--	--
Shortspine Thornyhead (North of 34°27' N. lat.)	698.37	3.58	0.09	702.05	11.37	0.66	0.00	12.04	0.62	0.19	0.00	0.81	--	--	--	--
Shortspine Thornyhead (South of 34°27' N. lat.)	--	--	--	--	5.90	0.22	--	6.12	--	--	--	--	--	--	--	--
Spiny dogfish	69.81	277.80	19.34	366.96	0.04	26.76	0.00	26.80	0.02	0.15	0.00	0.17	--	1.05	0.00	1.05
Splitnose rockfish (South of 40°10' N. lat.)	8.62	30.64	0.27	39.52	0.00	--	--	0.00	0.00	--	--	0.00	0.00	--	--	0.00
Starry flounder	8.14	0.57	0.03	8.74	--	--	--	--	--	--	--	--	2.82	0.12	--	2.93
Widow rockfish	14.44	0.08	0.01	14.52	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--
Yellowtail Rockfish (North of 40°10' N. lat.)	314.22	0.03	0.00	314.25	--	--	--	--	--	--	--	--	--	--	--	--
Non-groundfish species																
California halibut	0.01	--	--	0.01	--	--	--	--	--	--	--	--	11.94	0.04	0.00	11.98
Dungeness crab	0.05	146.00	5.78	151.82	--	--	--	--	--	0.59	0.00	0.59	--	51.44	0.00	51.45
Non-FMP flatfish																
C-O (C-O Turbot) Sole	--	--	--	0.00	--	--	--	--	--	--	--	--	--	0.00	0.00	0.00
Deepsea Sole	1.96	17.85	0.38	20.19	--	0.00	0.00	0.00	0.00	0.01	0.00	0.01	--	--	--	--
Diamond Turbot	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00	0.00
Hornyhead Turbot	0.01	--	--	0.01	--	--	--	--	--	--	--	--	0.04	0.01	0.00	0.05
Slender Sole	--	18.85	0.82	19.67	--	--	--	--	--	--	--	--	--	--	--	--
Non-FMP skate																
Aleutian Skate	--	1.58	0.07	1.65	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--
Banded Guitarfish	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00	0.00
Black Skate	0.00	23.49	0.62	24.12	--	0.61	0.00	0.61	--	0.00	0.00	0.00	--	--	--	--
Butterfly Ray	--	0.00	0.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Deepsea Skate	--	0.80	0.02	0.82	--	0.14	0.00	0.14	--	--	--	--	--	--	--	--
Flathead Skate	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--	--	--	--	--
Pacific Electric Ray	--	0.68	0.02	0.70	--	--	--	--	--	--	--	--	--	0.06	0.00	0.06
Roughshoulder/Broad Skate	--	0.03	0.00	0.03	--	--	--	--	--	--	--	--	--	--	--	--
Sandpaper Skate	0.08	29.77	1.42	31.28	--	0.10	0.00	0.10	--	0.00	0.00	0.00	--	--	--	--
Starry Skate	--	0.07	0.00	0.07	--	--	--	--	--	--	--	--	--	0.00	0.00	0.00
Thornback Skate	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.00	0.03
White Skate	--	0.01	0.00	0.01	--	--	--	--	--	--	--	--	--	--	--	--

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 3b. Hake IFQ/Coop sectors. Retained catch/landings (mt), discard (mt), and fishing mortality estimates (mt) of groundfish species from hake IFQ/Coop sectors in 2011. In shoreside hake, discard ratios (Table 2) were multiplied by expansion factors to generate estimated discard, sampled discard was expanded to the haul level and summed by sector, and landings were summarized from PacFIN. At-sea hake Coop Program data was summarized from the A-SHOP.

	IFQ - Shoreside Hake				At-sea Catcher-Processors			At-sea Mothership		
Weight (mt)	Landed	Sampled Discard	Expanded Discard	Estimate	Retained	Sampled Discard	Estimate	Retained	Sampled Discard	Estimate
Rebuilding species										
Canary rockfish	0.85	--	--	0.85	0.25	0.20	0.46	0.02	0.06	0.08
Darkblotched rockfish	1.22	0.00	--	1.22	8.87	1.42	10.29	1.00	0.70	1.70
Pacific Ocean Perch (North of 40°10' N. lat.)	0.28	--	--	0.28	3.40	3.11	6.51	0.32	0.34	0.66
Petrale sole	0.00	--	--	0.00	--	--	--	--	--	--
Other groundfish species										
Arrowtooth flounder	12.69	--	--	12.69	13.06	24.92	37.98	3.36	3.87	7.23
Black rockfish (North of 46°16' N. lat.)	0.00	--	--	0.00	--	--	--	--	--	--
Dover sole	0.07	--	--	0.07	0.83	0.10	0.93	0.12	0.13	0.25
English sole	0.00	--	--	0.00	0.01	0.00	0.02	--	0.00	0.00
Lingcod (North of 42° N. lat.)	4.52	0.04	--	4.55	0.03	0.01	0.04	0.02	0.10	0.12
Longnose skate	0.18	--	--	0.18	0.24	0.04	0.29	0.02	0.10	0.12
Longspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	0.37	0.00	0.37	0.00	0.02	0.02
Minor shelf rockfish (North of 40°10' N. lat.)										
Bocaccio Rockfish	0.96	0.00	--	0.97	0.08	0.15	0.22	0.02	0.15	0.17
Chilipepper Rockfish	--	--	--	--	--	--	--	--	0.01	0.01
Dusky Rockfish	--	--	--	--	--	--	--	--	0.01	0.01
Greenstriped Rockfish	0.05	--	--	0.05	--	--	--	--	--	--
Redstripe Rockfish	0.00	--	--	0.00	0.00	0.00	0.01	--	0.01	0.01
Rosethorn Rockfish	0.18	--	--	0.18	--	--	--	--	--	--
Shelf Rockfish Unid	0.09	--	--	0.09	--	0.00	0.00	--	0.03	0.03
Silvergray Rockfish	0.15	0.00	--	0.15	0.02	0.02	0.04	0.01	0.22	0.22
Stripetail Rockfish	0.00	--	--	0.00	--	--	--	--	--	--
Minor slope rockfish (North of 40°10' N. lat.)										
Aurora Rockfish	0.28	--	--	0.28	0.06	0.03	0.09	0.00	0.01	0.01
Bank Rockfish	0.04	--	--	0.04	0.01	0.00	0.01	--	0.00	0.00
Blackgill Rockfish	--	--	--	--	--	--	--	0.00	--	0.00
Blackspotted Rockfish	0.12	--	--	0.12	--	--	--	--	--	--
Redbanded Rockfish	0.14	--	--	0.14	--	0.00	0.00	--	--	--
Rougheye Rockfish	2.74	--	--	2.74	48.76	25.59	74.35	2.86	1.17	4.04
Sharpchin Rockfish	0.01	--	--	0.01	0.01	0.00	0.01	0.00	--	0.00
Shortraker Rockfish	1.75	--	--	1.75	0.15	0.03	0.18	--	--	--
Shortraker/Rougheye Rockfish	--	--	--	--	--	--	0.00	--	0.01	0.01
Slope Rockfish Unid	1.35	--	--	1.35	--	--	0.00	--	--	--
Splitnose Rockfish	3.69	--	--	3.69	3.81	0.97	4.78	3.42	3.71	7.13
Yellowmouth Rockfish	--	--	--	--	0.05	0.01	0.06	0.01	0.00	0.01
Mixed thornyheads										
Shortspine/ Longspine Thornyhead	--	--	--	--	0.13	--	0.13	--	--	--
Other flatfish										
Flatfish Unid	0.00	--	--	0.00	0.00	0.00	0.00	--	0.00	0.00
Flathead Sole	--	--	--	--	0.00	--	0.00	--	--	--
Pacific Sanddab	0.00	--	--	0.00	0.00	--	0.00	--	--	--
Rex Sole	0.85	0.00	--	0.85	2.92	1.03	3.95	1.63	0.29	1.91
Other groundfish										
Big Skate	--	0.17	0.07	0.24	--	0.13	0.13	--	0.04	0.04
Grenadier Unid	--	--	--	--	0.05	0.01	0.05	0.03	0.05	0.08
Groundfish Unid	0.28	--	--	0.28	--	--	--	--	--	--
Pacific Electric Ray	--	--	--	--	0.01	--	0.01	--	--	--
Pacific Grenadier	--	--	--	--	--	0.03	0.03	--	--	--
Roundfish Unid	--	--	--	--	0.01	0.00	0.01	--	0.00	0.00
Soupfin Shark	0.47	0.03	0.01	0.51	--	0.12	0.12	--	--	--
Spotted Ratfish	0.00	--	--	0.00	--	--	--	--	--	--
Unspecified Skate	0.58	--	--	0.58	0.00	--	0.00	--	--	--
Pacific cod	6.59	--	--	6.59	0.00	0.00	0.01	--	0.00	0.00
Pacific hake	90249.14	509.54	--	90758.68	71194.84	327.61	71522.44	49871.20	178.65	50049.85
Sablefish (North of 36° N. lat.)	30.39	--	--	30.39	2.08	0.86	2.94	1.73	0.31	2.04
Shortbelly rockfish	0.00	--	--	0.00	--	--	--	--	--	--
Shortspine thornyhead (North of 34°27' N. lat.)	2.18	--	--	2.18	10.17	1.67	11.84	0.36	1.08	1.44
Spiny dogfish	180.77	0.19	0.08	181.04	251.63	388.43	640.06	39.08	45.93	85.01
Widow rockfish	111.28	11.80	--	123.07	9.62	14.44	24.05	1.15	11.69	12.85
Yellowtail Rockfish (North of 40°10' N. lat.)	424.24	0.08	--	424.33	9.34	5.23	14.57	6.25	60.42	66.67
Non-groundfish species										
Dungeness crab	0.03	--	--	0.03	--	--	--	--	0.00	0.00
Non-FMP flatfish										
Slender Sole	--	--	--	--	0.03	0.00	0.03	0.00	0.00	0.00
Non-FMP skate										
Black Skate	--	0.01	0.00	0.01	--	--	--	--	--	--
Sandpaper Skate	--	--	--	--	0.00	--	0.00	--	0.00	0.00

Table 4. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from federal open access participants in the state-licensed California halibut fishery in 2011 (only occurs south of 40°10' N Lat.). Ratios are computed as the observed discard weight divided by the observed weight of retained California halibut (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of California halibut to generate estimated discard.

Open Access California Halibut Fishery South of 40°10' N Lat.	Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of California halibut (mt)	
	13	48	204	79.9	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Total Estimate
Rebuilding species					
Petrale sole	0.0008	0.0322	0.07	0.06	0.13
Other groundfish species					
California scorpionfish (South of 34°27' N. lat.)	0.0034	0.1362	0.27	0.00	0.28
English sole	0.0177	0.0918	1.41	0.04	1.45
Lingcod (South of 42° N. lat.)	0.0027	0.0455	0.22	--	0.11
50% discard mortality (Trawl)*			0.11		
Longnose skate	0.0027	3.3819	0.22	--	0.22
Minor nearshore rockfish (South of 40°10' N. lat.)					
Brown Rockfish	0.0000	0.0106	0.00	0.00	0.00
Calico Rockfish	0.0000	NA	0.00	--	0.00
Copper Rockfish	0.0000	NA	0.00	--	0.00
Minor shelf rockfish (South of 40°10' N. lat.)					
Greenspotted Rockfish	--	--	--	0.01	0.01
Other flatfish					
Curlfin Turbot	0.0035	0.0448	0.28	--	0.28
Flatfish Unid	0.0077	0.1600	0.62	0.61	1.23
Pacific Sanddab	0.0178	0.1006	1.42	0.00	1.42
Rex Sole	--	--	--	0.00	0.00
Rock Sole	0.0005	0.1511	0.04	0.13	0.17
Sanddab Unid	0.0015	NA	0.12	0.01	0.14
Sand Sole	0.0087	0.0639	0.69	7.76	8.45
Other groundfish					
Big Skate	0.4552	1.3888	36.37	0.28	36.65
California Skate	0.0759	0.3024	6.07	--	6.07
Leopard Shark	0.0691	3.1273	5.52	0.00	5.52
Soupfin Shark	0.0203	1.9891	1.62	0.08	1.70
Spotted Ratfish	0.0009	0.6099	0.07	--	0.07
Unspecified Skate	0.0264	1.0887	2.11	0.59	2.70
Sablefish (South of 36° N. lat.)	--	--	--	0.01	0.01
Spiny dogfish	0.0067	0.4300	0.54	--	0.54
Starry flounder	0.0541	0.3324	4.33	3.89	8.22
Non-groundfish species					
California halibut	0.0761	0.1076	6.08	79.91	85.98
Dungeness crab	0.8203	3.5092	65.55	--	65.55
Non-FMP flatfish					
Deepsea Sole	--	--	--	0.94	0.94
Fantail Sole	0.0060	0.0570	0.48	0.14	0.62
Hornyhead Turbot	0.0146	0.0615	1.17	0.03	1.20
Longfin Sanddab	0.0001	0.0151	0.00	--	0.00
Slender Sole	0.0000	0.0060	0.00	--	0.00
Speckled Sanddab	0.0004	0.0214	0.03	--	0.03
Non-FMP skate					
Pacific Electric Ray	0.0074	0.2366	0.59	--	0.59
Shovelnose Guitarfish	0.0262	1.3367	2.10	--	2.10
Starry Skate	0.0016	0.2380	0.13	--	0.13
Thornback Skate	0.0096	0.4155	0.77	--	0.77

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 5. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from state pink shrimp fisheries. Ratios are computed as the observed discard weight divided by the observed weight of retained pink shrimp (adjusted to fish tickets). Discard ratios were multiplied by state fleet landings of pink shrimp to generate estimated discard.

	Washington					Oregon					California				
Pink Shrimp Trawl Fishery	Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)		Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)		Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)	
	11	35	566	4,211.9		41	132	1,819	21,915.1		8	19	194	3,333.0	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Rebuilding species															
Canary rockfish	0.0000	0.0013	0.02	--	0.02	0.0000	NA	0.01	--	0.01	--	--	--	--	--
Darkblotched rockfish	0.0003	0.0006	1.37	--	1.37	0.0005	0.0058	10.09	0.00	10.09	0.0002	0.0004	0.53	--	0.53
Pacific Ocean Perch (North of 40°10' N. lat.)	0.0000	0.0004	0.14	--	0.14	0.0000	0.0001	0.41	--	0.41	0.0000	NA	0.00	--	0.00
Petrale sole	0.0002	0.0007	0.74	--	0.74	0.0000	0.0009	1.01	0.00	1.02	0.0000	0.0003	0.02	--	0.02
Yelloweye rockfish	--	--	--	--	--	0.0000	0.0001	0.00	--	0.00	--	--	--	--	--
Other groundfish species															
Arrowtooth flounder	0.0005	0.0020	2.03	--	2.03	0.0002	0.0005	4.35	--	4.35	0.0003	0.0013	1.13	--	1.13
California scorpionfish (South of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	--	--	--	1.05	1.05
Dover sole	0.0002	0.0009	0.93	--	0.93	0.0001	0.0009	2.37	0.00	2.37	0.0000	0.0007	0.03	0.08	0.11
English sole	0.0000	0.0015	0.03	--	0.03	0.0000	0.0010	0.39	--	0.39	--	--	--	0.33	0.33
Lingcod (North of 42° N. lat.)	0.0001	0.0027	0.44	--	0.44	0.0000	0.0005	0.14	--	0.14	--	--	--	--	--
Lingcod (South of 42° N. lat.)	--	--	--	--	--	0.0000	0.0008	0.01	--	0.01	0.0000	0.0003	0.04	--	0.04
Longnose skate	0.0001	0.0037	0.47	--	0.47	0.0000	0.0014	0.41	--	0.41	0.0000	0.0003	0.04	0.04	0.08
Minor nearshore rockfish (North of 40°10' N. lat.)															
Olive Rockfish	--	--	--	--	--	0.0000	NA	0.03	--	0.03	--	--	--	--	--
Minor nearshore rockfish (South of 40°10' N. lat.)															
Brown Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.03
Copper Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Minor shelf rockfish (North of 40°10' N. lat.)															
Bocaccio Rockfish	--	--	--	--	--	--	--	--	--	--	0.0000	NA	0.00	--	0.00
Chilipepper Rockfish	0.0000	0.0001	0.00	--	0.00	0.0000	0.0001	0.10	--	0.10	0.0000	0.0001	0.07	--	0.07
Cowcod Rockfish	--	--	--	--	--	0.0000	0.0008	0.00	--	0.00	--	--	--	--	--
Greenstriped Rockfish	0.0001	0.0002	0.31	--	0.31	0.0000	0.0005	0.69	--	0.69	0.0000	0.0002	0.16	--	0.16
Halfbanded Rockfish	--	--	--	--	--	0.0000	0.0002	0.00	--	0.00	0.0000	NA	0.00	--	0.00
Harlequin Rockfish	0.0000	0.0001	0.02	--	0.02	0.0000	0.0001	0.00	--	0.00	--	--	--	--	--
Pygmy Rockfish	--	--	--	--	--	0.0000	0.0002	0.04	--	0.04	--	--	--	--	--
Redstripe Rockfish	0.0000	NA	0.00	--	0.00	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Rosethorn Rockfish	--	--	--	--	--	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Shelf Rockfish Unid	0.0000	0.0013	0.14	--	0.14	0.0001	0.0006	1.21	0.00	1.21	0.0002	0.0113	0.76	--	0.76
Stripetail Rockfish	0.0000	0.0001	0.01	--	0.01	0.0000	0.0010	0.61	--	0.61	0.0000	0.0006	0.00	--	0.00
Tiger Rockfish	--	--	--	--	--	0.0000	NA	0.00	--	0.00	0.0000	NA	0.00	--	0.00
Minor slope rockfish (North of 40°10' N. lat.)															
Aurora Rockfish	--	--	--	--	--	0.0000	0.0045	0.12	--	0.12	--	--	--	--	--
Bank Rockfish	--	--	--	--	--	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Blackgill Rockfish	0.0000	0.0002	0.01	--	0.01	0.0000	0.0009	0.00	--	0.00	--	--	--	--	--
Redbanded Rockfish	0.0000	0.0000	0.03	--	0.03	0.0000	0.0001	0.03	--	0.03	0.0000	0.0002	0.00	--	0.00
Rougheye Rockfish	--	--	--	--	--	0.0000	0.0008	0.01	--	0.01	--	--	--	--	--
Sharpchin Rockfish	0.0000	0.0005	0.01	--	0.01	0.0000	0.0022	0.03	--	0.03	0.0000	NA	0.00	--	0.00
Slope Rockfish Unid	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Splitnose Rockfish	0.0002	0.0023	0.92	--	0.92	0.0001	0.0004	1.10	--	1.10	0.0000	0.0001	0.01	--	0.01

Table 5 (continued).

Pink Shrimp Trawl Fishery	Washington					Oregon					California				
	Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)		Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)		Observed vessels	Observed trips	Observed tows	Expansion factor: Fleet landings of pink shrimp (mt)	
	11	35	566	4,211.9		41	132	1,819	21,915.1		8	19	194	3,333.0	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Other flatfish															
Curlfin Turbot	--	--	--	--	--	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Flatfish Unid	--	--	--	--	--	0.0001	0.0072	1.11	--	1.11	0.0008	0.0638	2.79	8.79	11.58
Flathead Sole	0.0000	0.0004	0.20	--	0.20	0.0000	0.0002	1.08	--	1.08	0.0000	0.0001	0.01	--	0.01
Pacific Sanddab	0.0000	0.0013	0.15	--	0.15	0.0001	0.0005	2.20	--	2.20	0.0001	0.0014	0.33	--	0.33
Rex Sole	0.0018	0.0032	7.57	0.01	7.58	0.0006	0.0009	13.33	--	13.33	0.0001	0.0003	0.33	1.05	1.38
Rock Sole	--	--	--	--	--	0.0000	0.0004	0.01	--	0.01	--	--	--	0.08	0.08
Sanddab Unid	--	--	--	--	--	--	--	--	--	--	--	--	--	0.70	0.70
Other groundfish															
Big Skate	0.0001	0.0344	0.34	--	0.34	0.0000	0.0513	0.22	--	0.22	--	--	--	--	--
Spotted Ratfish	0.0000	0.0009	0.11	--	0.11	0.0000	0.0005	0.06	--	0.06	--	--	--	--	--
Unspecified Skate	--	--	--	--	--	--	--	--	--	--	--	--	--	2.66	2.66
Pacific cod	0.0000	0.0017	0.04	--	0.04	--	--	--	0.03	0.03	--	--	--	--	--
Pacific hake	0.0049	0.0088	20.66	--	20.66	0.0107	0.0195	233.53	--	233.53	0.0084	0.1397	27.90	--	27.90
Sablefish (North of 36° N. lat.)	0.0000	0.0014	0.02	--	0.02	0.0000	0.0026	0.05	0.00	0.05	0.0000	0.0016	0.03	--	0.03
Shortbelly rockfish	0.0000	0.0003	0.00	--	0.00	0.0000	0.0001	0.15	--	0.15	0.0000	0.0001	0.06	--	0.06
Shortspine thornyhead (Northof34°27'N.lat.)	0.0000	0.0004	0.00	--	0.00	0.0000	0.0010	0.21	--	0.21	--	--	--	--	--
Spiny dogfish	0.0007	0.7001	2.80	--	2.80	0.0000	0.0006	0.06	--	0.06	0.0000	0.0004	0.03	0.01	0.03
Widow rockfish	--	--	--	--	--	0.0000	NA	0.00	--	0.00	0.0000	NA	0.00	0.04	0.04
Yellowtail rockfish (North of 40°10' N. lat.)	0.0001	0.0078	0.26	--	0.26	0.0000	NA	0.01	0.00	0.01	0.0000	0.0001	0.00	--	0.00
Non-groundfish species															
California halibut	--	--	--	--	--	--	--	--	--	--	--	--	--	7.58	7.58
Dungeness crab	0.0000	NA	0.01	--	0.01	0.0000	0.0007	0.05	--	0.05	0.0000	0.0002	0.01	--	0.01
Non-FMP flatfish															
C-O (C-O Turbot) Sole	0.0000	NA	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--
Hornyhead Turbot	--	--	--	--	--	--	--	--	--	--	--	--	--	4.49	4.49
Slender Sole	0.0056	0.0069	23.70	--	23.70	0.0041	0.0040	90.35	--	90.35	0.0014	0.0033	4.73	--	4.73
Non-FMP skate															
Aleutian Skate	--	--	--	--	--	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Black Skate	0.0000	NA	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--
Sandpaper Skate	0.0000	0.0019	0.01	--	0.01	0.0000	0.0002	0.02	--	0.02	--	--	--	--	--
Starry Skate	0.0000	0.0005	0.00	--	0.00	--	--	--	--	--	--	--	--	--	--

Table 6. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE sablefish endorsed primary season (tier endorsed) fixed gear fleet in 2011. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of sablefish to generate discard estimates for each gear type; combined with other fixed gear sectors in Table 9.

Limited Entry Sablefish Endorsed Primary Season	**Longline**					**Pot**				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)	
	23	98	673	1,142.2		3	22	227	376.8	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Rebuilding species										
Canary rockfish	0.0001	0.0205	0.09	--	0.09	--	--	--	--	--
Darkblotched rockfish	0.0001	0.0016	0.13	7.01	7.14	0.0001	0.0014	0.05	0.76	0.81
Pacific Ocean Perch (North of 40°10' N. lat.)	0.0000	0.0036	0.02	0.41	0.42	--	--	--	0.01	0.01
Petrale sole	0.0000	0.0043	0.05	0.11	0.17	0.0000	NA	0.00	0.00	0.00
Yelloweye rockfish	0.0003	0.0513	0.29	0.00	0.30	--	--	--	--	--
Other groundfish species										
Arrowtooth flounder	0.0309	0.0514	35.25	1.31	36.56	0.0029	0.0139	1.09	0.23	1.32
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	--	--
Dover sole	0.0005	0.0039	0.54	1.34	1.88	0.0018	0.0071	0.69	0.12	0.81
Lingcod (North of 42° N. lat.)	0.0007	0.0131	0.82	5.83	6.65	0.0003	0.0137	0.13	0.95	1.08
Lingcod (South of 42° N. lat.)	0.0001	0.0174	0.06	0.48	0.55	0.0053	0.1080	2.00	0.45	2.45
Longnose skate	0.0469	0.0641	53.55	13.80	67.35	--	--	--	--	--
Longspine thornyhead (North of 34°27' N. lat.)	0.0000	0.0010	0.02	0.71	0.74	0.0000	0.0005	0.01	0.01	0.02
Longspine thornyhead (South of 34°27' N. lat.)	0.0000	0.0150	0.03	--	0.03	--	--	--	--	--
Minor shelf rockfish (North of 40°10' N. lat.)										
Bocaccio Rockfish	0.0000	NA	0.02	0.14	0.16	--	--	--	--	--
Bronzespotted Rockfish	0.0000	NA	0.01	--	0.01	--	--	--	--	--
Chilipepper Rockfish	--	--	--	0.00	0.00	0.0000	NA	0.00	--	0.00
Greenspotted Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Greenstriped Rockfish	0.0002	0.0076	0.21	0.01	0.23	--	--	--	--	--
Redstripe Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Rosethorn Rockfish	0.0001	0.0042	0.17	0.20	0.37	0.0000	0.0004	0.00	--	0.00
Shelf Rockfish Unid	0.0000	NA	0.01	0.60	0.60	--	--	--	0.00	0.00
Silvergray Rockfish	--	--	--	0.03	0.03	--	--	--	--	--
Stripetail Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Tiger Rockfish	0.0000	0.0054	0.01	--	0.01	--	--	--	--	--
Minor shelf rockfish (South of 40°10' N. lat.)										
Flag Rockfish	--	--	--	0.01	0.01	--	--	--	--	--
Greenstriped Rockfish	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Rosethorn Rockfish	0.0000	0.0088	0.03	--	0.03	--	--	--	--	--
Shelf Rockfish Unid	--	--	--	0.00	0.00	--	--	--	--	--
Minor slope rockfish (North of 40°10' N. lat.)										
Aurora Rockfish	0.0000	0.0020	0.01	0.05	0.06	0.0000	0.0024	0.00	0.01	0.01
Bank Rockfish	--	--	--	0.18	0.18	--	--	--	--	--
Blackgill Rockfish	0.0001	0.0074	0.08	0.79	0.86	0.0001	0.0032	0.03	0.02	0.06
Blackspotted Rockfish	--	--	--	0.24	0.24	--	--	--	--	--
Redbanded Rockfish	0.0014	0.0070	1.55	9.57	11.13	0.0007	0.0066	0.26	0.13	0.39
Rougheye Rockfish	0.0008	0.0057	0.89	31.19	32.08	0.0001	0.0040	0.03	1.87	1.89
Shortraker Rockfish	0.0000	0.0049	0.01	2.50	2.51	--	--	--	0.07	0.07
Shortraker/Rougheye Rockfish	0.0001	0.0387	0.15	--	0.15	--	--	--	--	--
Slope Rockfish Unid	0.0000	0.0134	0.01	0.99	1.00	--	--	--	0.66	0.66
Splitnose Rockfish	0.0000	0.0008	0.00	0.07	0.07	0.0000	0.0027	0.01	--	0.01
Yellowmouth Rockfish	--	--	--	0.04	0.04	--	--	--	--	--
Minor slope rockfish (South of 40°10' N. lat.)										
Aurora Rockfish	0.0002	0.0502	0.19	0.09	0.28	--	--	--	--	--
Blackgill Rockfish	0.0023	0.4418	2.67	7.93	10.61	--	--	--	--	--
Redbanded Rockfish	0.0001	0.0359	0.09	0.02	0.11	--	--	--	--	--
Rougheye Rockfish	0.0001	0.0186	0.08	0.20	0.28	--	--	--	--	--
Slope Rockfish Unid	--	--	--	0.40	0.40	--	--	--	1.06	1.06

Table 6 (continued).

Limited Entry Sablefish Endorsed Primary Season	Longline					Pot				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)	
	23	98	673	1,142.2		3	22	227	376.8	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Mixed thornyheads										
Shortspine/ Longspine Thornyhead	0.0000	NA	0.01	--	0.01	--	--	--	--	--
Other flatfish										
Curlfin Turbot	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Rex Sole	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Other groundfish										
Big Skate	0.0007	0.1151	0.80	0.07	0.87	--	--	--	--	--
Grenadier Unid	--	--	--	5.20	5.20	--	--	--	0.00	0.00
Pacific Flatnose	0.0001	0.0718	0.12	--	0.12	0.0000	0.0024	0.01	--	0.01
Pacific Grenadier	0.0010	0.0942	1.20	--	1.20	0.0016	0.0165	0.62	--	0.62
Spotted Ratfish	0.0020	0.0115	2.26	--	2.26	--	--	--	--	--
Unspecified Skate	--	--	--	5.19	5.19	--	--	--	0.01	0.01
Other rockfish	--	--	--	0.01	0.01	--	--	--	--	--
Pacific cod	0.0001	0.0114	0.10	1.45	1.55	--	--	--	--	--
Pacific hake	0.0001	0.0096	0.10	0.01	0.11	0.0000	NA	0.01	--	0.01
Sablefish (North of 36° N. lat.)	0.2481	0.0875	283.33	1,121.61	1,178.28	0.4005	0.1701	150.90	350.21	380.39
20% discard mortality (Fixed Gear)*			56.67					30.18		
Sablefish (South of 36° N. lat.)	--	--	--	20.60	20.60	--	--	--	26.56	26.56
Shortspine thornyhead (North of 34°27' N. lat.)	0.0009	0.0023	1.03	19.31	20.34	0.0001	0.0035	0.03	0.29	0.32
Shortspine thornyhead (South of 34°27' N. lat.)	0.0001	0.0456	0.08	2.01	2.08	--	--	--	--	--
Spiny dogfish	0.0401	0.1254	45.82	4.82	50.63	0.0010	0.0239	0.38	0.41	0.80
Splitnose rockfish (South of 40°10' N. lat.)	0.0000	0.0016	0.00	0.03	0.03	--	--	--	--	--
Widow rockfish	0.0000	0.0389	0.04	0.01	0.05	--	--	--	--	--
Yellowtail rockfish (North of 40°10' N. lat.)	0.0001	0.0109	0.08	0.25	0.34	--	--	--	--	--
Non-groundfish species										
Dungeness crab	0.0000	0.0135	0.04	--	0.04	0.0015	0.0193	0.58	--	0.58
Non-FMP flatfish										
Deepsea Sole	--	--	--	--	--	0.0000	0.0007	0.00	--	0.00
Non-FMP skate										
Black Skate	0.0003	0.0664	0.32	--	0.32	--	--	--	--	--
Sandpaper Skate	0.0005	0.0139	0.53	--	0.53	0.0000	NA	0.00	--	0.00

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 7. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE non-endorsed fixed gear fleet in 2011. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish (north of 36° N lat.) or FMP groundfish (south of 36° N lat. and coast-wide) (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of sablefish or FMP groundfish to generate discard estimates for each gear type; combined with fixed gear sectors in Table 9.

Limited Entry Non-Endorsed Fixed Gear	**Longline - North of 36° N lat.**					**Longline - South of 36° N lat.**					**Pot - Coastwide**				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)		OA Observed (see Table 8b)		Expansion factor: Fleet landings of groundfish (mt)		
	11	34	93	524.5		27	167	333	420.3				25.6		
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Rebuilding species															
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	--	0.02	0.02	--	--	--	0.00	0.00	--	--	--	--	--
Darkblotched rockfish	0.0002	0.0040	0.08	0.14	0.23	--	--	--	5.08	5.08	--	--	--	0.00	0.00
Pacific Ocean Perch (North of 40°10' N. lat.)	--	--	--	--	--	--	--	--	0.12	0.12	--	--	--	--	--
Petrale sole	0.0000	0.0039	0.01	0.01	0.01	--	--	--	0.37	0.37	--	--	--	0.00	0.00
Other groundfish species															
Arrowtooth flounder	0.0308	0.2056	16.13	--	16.13	--	--	--	1.68	1.68	0.0001	NA	0.00	0.06	0.06
Black rockfish (South of 46°16' N. lat.)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chilipepper rockfish (South of 40°10' N.lat.)	--	--	--	--	--	--	--	--	0.03	0.03	--	--	--	--	--
Dover sole	0.0001	0.0035	0.04	0.43	0.47	0.0027	0.0107	1.15	0.71	1.86	0.0007	0.0041	0.02	0.02	0.03
Lingcod (North of 42° N. lat.)	0.0002	0.0382	0.12	--	0.12	--	--	--	1.18	1.18	--	--	--	--	--
Lingcod (South of 42° N. lat.)	--	--	--	0.01	0.01	--	--	--	0.18	0.18	0.0001	NA	0.00	0.11	0.11
Longnose skate	0.0386	0.1087	20.24	1.05	21.29	0.0248	0.2487	10.42	9.40	19.82	--	--	--	--	--
Longspine thornyhead (North of 34°27'N.lat.)	0.0003	0.0031	0.16	3.38	3.54	0.0022	0.0344	0.94	0.56	1.50	--	--	--	--	--
Longspine thornyhead (South of 34°27'N.lat.)	--	--	--	19.73	19.73	0.0041	0.0038	1.74	--	1.74	--	--	--	--	--
Minor shelf rockfish (North of 40°10' N. lat.)															
Bocaccio Rockfish	--	--	--	--	--	--	--	--	0.03	0.03	--	--	--	--	--
Chilipepper Rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Greenspotted Rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Greenstriped Rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Redstripe Rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Rosethorn Rockfish	--	--	--	--	--	--	--	--	0.03	0.03	--	--	--	--	--
Shelf Rockfish Unid	--	--	--	--	--	--	--	--	0.04	0.04	--	--	--	--	--
Silvergray Rockfish	--	--	--	--	--	--	--	--	0.02	0.02	--	--	--	--	--
Stripetail Rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Minor shelf rockfish (South of 40°10' N. lat.)															
Flag Rockfish	--	--	--	--	--	--	--	--	0.01	0.01	--	--	--	--	--
Greenspotted Rockfish	--	--	--	0.01	0.01	--	--	--	0.00	0.00	--	--	--	--	--
Shelf Rockfish Unid	--	--	--	--	--	--	--	--	0.03	0.03	--	--	--	--	--
Vermilion Rockfish	--	--	--	0.71	0.71	--	--	--	--	--	--	--	--	--	--

Table 7 (continued).

Limited Entry Non-Endorsed Fixed Gear	Longline - North of 36° N lat.					Longline - South of 36° N lat.					Pot - Coastwide				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)		OA Observed (see Table 8b)		Expansion factor: Fleet landings of groundfish (mt)		
	11	34	93	524.5		27	167	333	420.3				25.6		
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Minor slope rockfish (North of 40°10' N. lat.)															
Aurora Rockfish	0.0000	NA	0.02	--	0.02	--	--	--	0.01	0.01	--	--	--	0.00	0.00
Bank Rockfish	--	--	--	--	--	--	--	--	0.04	0.04	--	--	--	--	--
Blackgill Rockfish	--	--	--	--	--	--	--	--	0.30	0.30	--	--	--	--	--
Blackspotted Rockfish	--	--	--	--	--	--	--	--	0.03	0.03	--	--	--	--	--
Redbanded Rockfish	--	--	--	--	--	--	--	--	4.24	4.24	0.0001	NA	0.00	--	0.00
Rougheye Rockfish	0.0001	0.0013	0.03	--	0.03	--	--	--	4.96	4.96	--	--	--	0.00	0.00
Shortraker Rockfish	--	--	--	--	--	--	--	--	0.31	0.31	--	--	--	--	--
Slope Rockfish Unid	--	--	--	--	--	--	--	--	0.32	0.32	--	--	--	0.12	0.12
Splitnose Rockfish	--	--	--	--	--	--	--	--	0.07	0.07	--	--	--	--	--
Yellowmouth Rockfish	--	--	--	--	--	--	--	--	0.01	0.01	--	--	--	--	--
Minor slope rockfish (South of 40°10' N.lat.)															
Aurora Rockfish	--	--	--	0.15	0.15	0.0000	0.0010	0.00	0.04	0.04	0.0005	0.0273	0.01	--	0.01
Bank Rockfish	--	--	--	0.92	0.92	--	--	--	0.09	0.09	--	--	--	--	--
Blackgill Rockfish	--	--	--	66.62	66.62	0.0028	0.1273	1.18	4.60	5.78	0.0018	0.0135	0.05	0.00	0.05
Redbanded Rockfish	--	--	--	--	--	--	--	--	0.01	0.01	0.0007	0.0055	0.02	--	0.02
Rougheye Rockfish	--	--	--	--	--	--	--	--	0.06	0.06	--	--	--	--	--
Slope Rockfish Unid	--	--	--	0.01	0.01	--	--	--	0.09	0.09	--	--	--	--	--
Mixed thornyheads															
Shortspine/ Longspine Thornyhead	--	--	--	0.02	0.02	0.0005	0.2383	0.20	--	0.20	--	--	--	0.00	0.00
Other flatfish															
Flatfish Unid	--	--	--	0.06	0.06	--	--	--	--	--	--	--	--	--	--
Pacific Sanddab	--	--	--	0.98	0.98	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Sanddab Unid	--	--	--	0.01	0.01	--	--	--	--	--	--	--	--	--	--
Sand Sole	--	--	--	0.00	0.00	--	--	--	--	--	--	--	--	--	--
Other groundfish															
Big Skate	--	--	--	--	--	0.0020	0.5277	0.82	0.00	0.82	--	--	--	--	--
Grenadier Unid	--	--	--	9.56	9.56	--	--	--	11.73	11.73	--	--	--	0.01	0.01
Pacific Flatnose	0.0020	0.1163	1.07	--	1.07	0.0024	0.1636	1.01	--	1.01	--	--	--	--	--
Pacific Grenadier	0.0611	1.9740	32.06	--	32.06	0.0316	1.3400	13.27	--	13.27	0.0007	0.0157	0.02	--	0.02
Spotted Ratfish	0.0018	0.0174	0.93	0.01	0.94	0.0007	0.0575	0.29	--	0.29	--	--	--	--	--
Unspecified Skate	--	--	--	0.65	0.65	--	--	--	3.07	3.07	--	--	--	--	--
Other rockfish	--	--	--	0.00	0.00	--	--	--	0.00	0.00	--	--	--	--	--

Table 7 (continued).

Limited Entry Non-Endorsed Fixed Gear	**Longline - North of 36° N lat.**					**Longline - South of 36° N lat.**					**Pot - Coastwide**				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)		OA Observed (see Table 8b)		Expansion factor: Fleet landings of groundfish (mt)		
	11	34	93	524.5		27	167	333	420.3				25.6		
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Pacific cod	--	--	--	--	--	--	--	--	0.36	0.36	--	--	--	--	--
Pacific hake	0.0004	0.1243	0.22	0.03	0.25	0.0001	0.0134	0.06	0.01	0.07	--	--	--	--	--
Sablefish (North of 36° N. lat.)	0.2032	0.1365	106.61	--	21.32	--	--	--	357.71	357.71	0.1034	0.1062	2.65	15.27	15.80
20% discard mortality (Fixed Gear)*			21.32										0.53		
Sablefish (South of 36° N. lat.)	--	--	--	524.55	524.55	0.0926	0.2665	38.91	--	7.78	0.0026	0.0098	0.07	9.77	9.78
20% discard mortality (Fixed Gear)*								7.78					0.01		
Shortspine thornyhead (North of 34°27'N.lat.)	0.0007	0.0052	0.39	28.47	28.85	0.0010	0.0136	0.44	9.82	10.26	0.0001	NA	0.00	0.04	0.04
Shortspine thornyhead (South of 34°27'N.lat.)	--	--	--	160.72	160.72	0.0143	0.0098	6.02	--	6.02	--	--	--	--	--
Spiny dogfish	0.1281	0.5123	67.19	0.01	67.19	0.0011	0.0452	0.47	2.90	3.36	--	--	--	0.20	0.20
Splitnose rockfish (South of 40°10' N. lat.)	--	--	--	0.02	0.02	--	--	--	0.00	0.00	--	--	--	--	--
Widow rockfish	--	--	--	--	--	--	--	--	0.00	0.00	--	--	--	--	--
Yellowtail rockfish (North of 40°10' N. lat.)	0.0015	0.0773	0.78	--	0.78	--	--	--	0.01	0.01	--	--	--	--	--
Non-groundfish species															
California halibut	--	--	--	0.00	0.00	--	--	--	--	--	--	--	--	--	--
Dungeness crab	--	--	--	--	--	--	--	--	--	--	0.0009	0.0209	0.02	0.52	0.54
Non-FMP skate															
Black Skate	0.0001	NA	0.07	0.11	0.18	0.0077	0.1124	3.25	--	3.25	--	--	--	--	--
Deepsea Skate	--	--	--	--	--	0.0003	0.1281	0.12	--	0.12	--	--	--	--	--
Pelagic Stingray	--	--	--	--	--	0.0002	0.0517	0.08	--	0.08	--	--	--	--	--
Sandpaper Skate	0.0006	0.0444	0.29	--	0.29	0.0008	0.0816	0.33	--	0.33	0.0001	NA	0.00	--	0.00

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 8a. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet in 2011. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish or FMP groundfish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of sablefish or FMP groundfish to generate discard estimates; combined with fixed gear sectors in Table 9.

Open Access Fixed Gear	**Longline - North of 36° N lat.**					**Longline - South of 36° N lat.**				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)	
	59	107	147	100.3		4	9	24	273.3	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Rebuilding species										
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	--	1.16	1.16	--	--	--	0.39	0.39
Darkblotched rockfish	0.0006	0.0126	0.06	0.00	0.06	--	--	--	2.47	2.47
Pacific Ocean Perch (North of 40°10' N. lat.)	--	--	--	--	--	--	--	--	0.08	0.08
Petrale sole	--	--	--	0.08	0.08	--	--	--	0.04	0.04
Other groundfish species										
Arrowtooth flounder	0.0363	0.1769	3.64	--	3.64	--	--	--	0.98	0.98
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	--	0.05	0.05	--	--	--	0.59	0.59
Dover sole	0.0032	0.0187	0.32	0.04	0.36	0.0040	0.0356	1.08	0.32	1.40
Lingcod (North of 42° N. lat.)	0.0010	0.0642	0.10	--	0.10	--	--	--	8.32	8.32
Lingcod (South of 42° N. lat.)	0.0003	0.1098	0.03	0.74	0.77	--	--	--	2.00	2.00
Longnose skate	0.0282	0.1659	2.83	--	2.83	0.5087	4.4442	139.04	3.81	142.85
Longspine thornyhead (North of 34°27' N. lat.)	0.0019	0.0503	0.19	0.05	0.24	0.0017	0.0187	0.46	0.00	0.46
Longspine thornyhead (South of 34°27' N. lat.)	--	--	--	0.66	0.66	--	--	--	--	--
Minor shelf rockfish (North of 40°10' N. lat.)										
Bocaccio Rockfish	--	--	--	--	--	--	--	--	0.01	0.01
Greenspotted Rockfish	--	--	--	--	--	--	--	--	0.00	0.00
Greenstriped Rockfish	0.0000	NA	0.00	--	0.00	--	--	--	0.00	0.00
Redstripe Rockfish	0.0000	NA	0.00	--	0.00	--	--	--	--	--
Rosethorn Rockfish	0.0000	0.0047	0.00	--	0.00	--	--	--	0.00	0.00
Shelf Rockfish Unid	--	--	--	--	--	--	--	--	0.14	0.14
Silvergray Rockfish	--	--	--	--	--	--	--	--	0.02	0.02
Stripetail Rockfish	--	--	--	--	--	--	--	--	0.00	0.00
Tiger Rockfish	--	--	--	--	--	--	--	--	0.00	0.00
Vermilion Rockfish	--	--	--	--	--	--	--	--	0.04	0.04
Minor shelf rockfish (South of 40°10' N. lat.)										
Flag Rockfish	--	--	--	0.18	0.18	--	--	--	0.00	0.00
Freckled Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Greenblotched Rockfish	--	--	--	0.10	0.10	--	--	--	--	--
Greenspotted Rockfish	0.0000	NA	0.00	0.80	0.80	--	--	--	0.01	0.01
Greenstriped Rockfish	--	--	--	0.06	0.06	--	--	--	--	--
Honeycomb Rockfish	--	--	--	0.03	0.03	--	--	--	--	--
Rosethorn Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Rosy Rockfish	--	--	--	0.05	0.05	--	--	--	0.00	0.00
Shelf Rockfish Unid	--	--	--	0.14	0.14	--	--	--	0.01	0.01
Speckled Rockfish	--	--	--	0.09	0.09	--	--	--	--	--
Squarespot Rockfish	--	--	--	0.00	0.00	--	--	--	--	--
Starry Rockfish	--	--	--	0.22	0.22	--	--	--	0.01	0.01
Vermilion Rockfish	--	--	--	7.45	7.45	--	--	--	0.64	0.64
Yellowtail Rockfish	--	--	--	0.18	0.18	--	--	--	0.18	0.18
Minor slope rockfish (North of 40°10' N. lat.)										
Aurora Rockfish	--	--	--	--	--	--	--	--	0.00	0.00
Bank Rockfish	--	--	--	--	--	--	--	--	0.01	0.01
Blackgill Rockfish	--	--	--	--	--	--	--	--	0.12	0.12
Blackspotted Rockfish	--	--	--	--	--	--	--	--	0.01	0.01
Redbanded Rockfish	0.0013	0.0184	0.13	--	0.13	--	--	--	1.94	1.94
Rougheye Rockfish	0.0002	0.0066	0.02	--	0.02	--	--	--	1.43	1.43
Shortraker Rockfish	0.0002	0.0091	0.02	--	0.02	--	--	--	0.07	0.07
Slope Rockfish Unid	--	--	--	--	--	--	--	--	0.10	0.10
Splitnose Rockfish	0.0000	0.0141	0.00	--	0.00	--	--	--	0.02	0.02
Yellowmouth Rockfish	--	--	--	--	--	--	--	--	0.00	0.00

Table 8a (continued).

Open Access Fixed Gear	Longline - North of 36° N lat.					Longline - South of 36° N lat.				
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of sablefish (mt)		Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)	
	59	107	147	100.3		4	9	24	273.3	
Weight (mt)	Discard Ratio	SE	Discard	Landed	Estimate	Discard Ratio	SE	Discard	Landed	Estimate
Minor slope rockfish (South of 40°10' N. lat.)										
Aurora Rockfish	0.0000	NA	0.00	0.01	0.01	--	--	--	0.00	0.00
Bank Rockfish	--	--	--	0.09	0.09	--	--	--	--	--
Blackgill Rockfish	0.0007	0.0220	0.07	48.15	48.22	--	--	--	0.59	0.59
Redbanded Rockfish	0.0002	0.0382	0.02	--	0.02	--	--	--	0.00	0.00
Rougheye Rockfish	--	--	--	--	--	--	--	--	0.00	0.00
Slope Rockfish Unid	--	--	--	0.10	0.10	--	--	--	--	--
Mixed thornyheads										
Shortspine/ Longspine Thornyhead	--	--	--	0.85	0.85	--	--	--	--	--
Other flatfish										
Flatfish Unid	--	--	--	0.11	0.11	--	--	--	0.00	0.00
Pacific Sanddab	--	--	--	1.89	1.89	--	--	--	1.22	1.22
Rock Sole	--	--	--	0.00	0.00	--	--	--	--	--
Sanddab Unid	--	--	--	--	--	--	--	--	0.00	0.00
Sand Sole	--	--	--	0.00	0.00	--	--	--	--	--
Other groundfish										
Big Skate	0.0008	0.2206	0.08	--	0.08	--	--	--	0.03	0.03
Grenadier Unid	--	--	--	0.18	0.18	--	--	--	7.59	7.59
Leopard Shark	--	--	--	0.11	0.11	--	--	--	0.05	0.05
Pacific Flatnose	0.0002	0.0150	0.02	--	0.02	--	--	--	--	--
Pacific Grenadier	0.0253	1.1136	2.54	--	2.54	0.0013	NA	0.35	--	0.35
Soupfin Shark	--	--	--	0.20	0.20	--	--	--	0.05	0.05
Spotted Ratfish	0.0007	0.0137	0.07	--	0.07	--	--	--	0.00	0.00
Unspecified Skate	0.0017	0.2293	0.17	0.25	0.42	--	--	--	1.02	1.02
Other rockfish	--	--	--	0.34	0.34	--	--	--	--	--
Pacific cod	0.0006	0.1298	0.06	--	0.06	--	--	--	0.39	0.39
Pacific hake	0.0001	NA	0.01	0.00	0.01	0.0035	0.1039	0.96	0.15	1.11
Sablefish (North of 36° N. lat.)	0.2097	0.1238	21.03	--	4.21	--	--	--	235.85	235.85
20% discard mortality (Fixed Gear)*			4.21							
Sablefish (South of 36° N. lat.)	--	--	--	100.31	100.31	0.0574	0.1039	15.69	--	3.14
20% discard mortality (Fixed Gear)*								3.14		
Shortspine thornyhead (North of 34°27' N. lat.)	0.0122	0.0615	1.22	0.94	2.16	0.0383	0.2639	10.48	0.42	10.90
Shortspine thornyhead (South of 34°27' N. lat.)	--	--	--	6.53	6.53	--	--	--	--	--
Spiny dogfish	0.0457	0.2549	4.58	0.01	4.60	0.0019	0.0314	0.51	2.22	2.73
Splitnose rockfish (South of 40°10' N. lat.)	--	--	--	0.06	0.06	--	--	--	0.00	0.00
Starry flounder	--	--	--	0.00	0.00	--	--	--	0.01	0.01
Widow rockfish	--	--	--	0.00	0.00	--	--	--	0.00	0.00
Yellowtail rockfish (North of 40°10' N. lat.)	0.0001	0.0246	0.01	--	0.01	--	--	--	0.07	0.07
Non-groundfish species										
California halibut	--	--	--	0.35	0.35	--	--	--	0.10	0.10
Dungeness crab	0.0010	0.1832	0.10	--	0.10	--	--	--	--	--
Non-FMP flatfish										
Bigmouth Sole	--	--	--	0.00	0.00	--	--	--	--	--
Slender Sole	--	--	--	0.00	0.00	--	--	--	--	--
Non-FMP skate										
Black Skate	0.0003	NA	0.03	0.12	0.15	--	--	--	--	--
Sandpaper Skate	0.0003	0.0039	0.03	--	0.03	0.0049	NA	1.35	--	1.35

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 8b. Observed discard ratios, standard error, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear pot fleet in 2011. Ratios are computed as the observed discard weight divided by the observed weight of retained FMP groundfish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of FMP groundfish to generate discard estimates; combined with fixed gear sectors in Table 9.

Open Access Fixed Gear	Pot - Coastwide			North of 36° N lat.			South of 36° N lat.		
	Observed vessels	Observed trips	Observed sets	Expansion factor: Fleet landings of groundfish (mt)			Expansion factor: Fleet landings of groundfish (mt)		
	27	55	71	64.3			191.0		
Weight (mt)	Discard Ratio		SE	Discard	Landed	Estimate	Discard	Landed	Estimate
Rebuilding species									
Bocaccio rockfish (South of 40°10' N. lat.)	--		--	--	0.00	0.00	--	--	--
Darkblotched rockfish	--		--	--	--	--	--	0.00	0.00
Pacific Ocean Perch (North of 40°10' N. lat.)	--		--	--	--	--	--	0.03	0.03
Petrale sole	--		--	--	--	--	--	0.00	0.00
Other groundfish species									
Arrowtooth flounder	0.0001		NA	0.01	--	0.01	0.03	0.01	0.04
Dover sole	0.0007		0.0041	0.05	0.01	0.05	0.13	0.01	0.15
Lingcod (North of 42° N. lat.)	--		--	--	--	--	--	0.21	0.21
Lingcod (South of 42° N. lat.)	0.0001		NA	0.00	0.00	0.01	0.01	0.08	0.09
Longnose skate	--		--	--	--	--	--	0.00	0.00
Minor shelf rockfish (South of 40°10' N. lat.)									
Vermilion Rockfish	--		--	--	0.01	0.01	--	--	--
Minor slope rockfish (North of 40°10' N. lat.)									
Redbanded Rockfish	0.0001		NA	0.00	--	0.00	0.01	--	0.01
Slope Rockfish Unid	--		--	--	--	--	--	0.04	0.04
Minor slope rockfish (South of 40°10' N. lat.)									
Aurora Rockfish	0.0005		0.0273	0.03	--	0.03	0.10	--	0.10
Blackgill Rockfish	0.0018		0.0135	0.12	1.05	1.16	0.34	0.25	0.59
Redbanded Rockfish	0.0007		0.0055	0.04	--	0.04	0.13	--	0.13
Slope Rockfish Unid	--		--	--	--	--	--	0.02	0.02
Other flatfish									
Sanddab Unid	--		--	--	--	--	--	0.01	0.01
Other groundfish									
Grenadier Unid	--		--	--	0.01	0.01	--	0.01	0.01
Pacific Grenadier	0.0007		0.0157	0.04	--	0.04	0.13	--	0.13
Sablefish (North of 36° N. lat.)	0.1034		0.1062	6.65	--	1.33	19.75	190.33	194.28
20% discard mortality (Fixed Gear)*				1.33			3.95		
Sablefish (South of 36° N. lat.)	0.0026		0.0098	0.16	62.84	62.87	0.49	--	0.10
20% discard mortality (Fixed Gear)*				0.03			0.10		
Shortspine thornyhead (North of 34°27' N. lat.)	0.0001		NA	0.01	0.02	0.03	0.02	--	0.02
Shortspine thornyhead (South of 34°27' N. lat.)	--		--	--	0.36	0.36	--	--	--
Non-groundfish species									
Dungeness crab	0.0009		0.0209	0.06	--	0.06	0.18	1.42	1.60
Non-FMP skate									
Sandpaper Skate	0.0001		NA	0.00	--	0.00	0.01	--	0.01

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 9. Estimated discard (mt), landings (mt), and fishing mortality estimate (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors in 2011. Discard ratios were multiplied by fleet landings of sablefish or FMP groundfish to generate estimated discard (Tables 6-8: LE sablefish endorsed primary season, LE non-endorsed, OA).

	Limited Entry - Coastwide			Open Access - Coastwide			**LE & OA**
Weight (mt)	Discard	Landed	LE Total	Discard	Landed	OA Total	**Coastwide**
Rebuilding species							
Bocaccio rockfish (South of 40°10' N. lat.)	--	0.02	0.02	--	1.54	1.54	1.57
Canary rockfish	0.09	--	0.09	--	--	--	0.09
Darkblotched rockfish	0.26	13.00	13.26	0.09	2.47	2.56	15.82
Pacific Ocean Perch (North of 40°10' N. lat.)	0.02	0.53	0.55	--	0.12	0.12	0.67
Petrale sole	0.06	0.49	0.55	--	0.12	0.12	0.67
Yelloweye rockfish	0.29	0.00	0.30	--	--	--	0.30
Other groundfish species							
Arrowtooth flounder	52.48	3.27	55.75	5.33	0.99	6.32	62.07
Black rockfish (South of 46°16' N. lat.)	--	--	--	--	--	--	--
Chilipepper rockfish (South of 40°10' N. lat.)	--	0.03	0.03	0.00	0.64	0.64	0.67
Dover sole	2.48	2.61	5.09	2.41	0.37	2.79	7.88
Lingcod (North of 42° N. lat.)	1.07	7.96	9.03	0.14	8.53	8.67	17.69
Lingcod (South of 42° N. lat.)	2.07	1.23	3.30	0.10	2.82	2.92	6.22
Longnose skate	84.21	24.25	108.47	207.71	3.81	211.52	319.99
Longspine thornyhead (North of 34°27' N. lat.)	1.13	4.66	5.79	0.90	0.06	0.96	6.75
Longspine thornyhead (South of 34°27' N. lat.)	1.77	19.73	21.51	--	0.66	0.66	22.17
Minor shelf rockfish (North of 40°10' N. lat.)							
Bocaccio Rockfish	0.02	0.17	0.19	--	0.01	0.01	0.19
Bronzespotted Rockfish	0.01	--	0.01	--	--	--	0.01
Chilipepper Rockfish	0.00	0.00	0.00	--	--	--	0.00
Greenspotted Rockfish	--	0.00	0.00	--	0.00	0.00	0.00
Greenstriped Rockfish	0.21	0.01	0.23	0.01	0.00	0.01	0.24
Redstripe Rockfish	--	0.00	0.00	0.00	--	0.00	0.00
Rosethorn Rockfish	0.17	0.23	0.40	0.00	0.00	0.00	0.41
Shelf Rockfish Unid	0.01	0.64	0.65	--	0.14	0.14	0.79
Silvergray Rockfish	--	0.05	0.05	--	0.02	0.02	0.07
Stripetail Rockfish	--	0.00	0.00	--	0.00	0.00	0.00
Tiger Rockfish	0.01	--	0.01	--	0.00	0.00	0.01
Vermilion Rockfish	--	--	--	--	0.04	0.04	0.04
Minor shelf rockfish (South of 40°10' N. lat.)							
Flag Rockfish	--	0.03	0.03	--	0.18	0.18	0.20
Freckled Rockfish	--	--	--	--	0.00	0.00	0.00
Greenblotched Rockfish	--	--	--	--	0.10	0.10	0.10
Greenspotted Rockfish	--	0.01	0.01	0.01	0.80	0.81	0.82
Greenstriped Rockfish	0.00	--	0.00	--	0.06	0.06	0.06
Honeycomb Rockfish	--	--	--	--	0.03	0.03	0.03
Rosethorn Rockfish	0.03	--	0.03	--	0.00	0.00	0.03
Rosy Rockfish	--	--	--	--	0.05	0.05	0.05
Shelf Rockfish Unid	--	0.03	0.03	--	0.15	0.15	0.18
Speckled Rockfish	--	--	--	--	0.09	0.09	0.09
Squarespot Rockfish	--	--	--	--	0.00	0.00	0.00
Starry Rockfish	--	--	--	--	0.23	0.23	0.23
Vermilion Rockfish	--	0.71	0.71	--	8.10	8.10	8.81
Yellowtail Rockfish	--	--	--	--	0.36	0.36	0.36
Minor slope rockfish (North of 40°10' N. lat.)							
Aurora Rockfish	0.03	0.07	0.10	--	0.00	0.00	0.10
Bank Rockfish	--	0.22	0.22	--	0.01	0.01	0.23
Blackgill Rockfish	0.11	1.11	1.22	--	0.12	0.12	1.34
Blackspotted Rockfish	--	0.27	0.27	--	0.01	0.01	0.29
Redbanded Rockfish	1.81	13.94	15.75	0.20	1.94	2.14	17.89
Rougheye Rockfish	0.95	38.02	38.97	0.03	1.43	1.46	40.43
Sharpchin Rockfish	--	--	--	--	--	--	--
Shortraker Rockfish	0.01	2.88	2.89	0.03	0.07	0.10	2.99
Shortraker/Rougheye Rockfish	0.15	--	0.15	--	--	--	0.15
Slope Rockfish Unid	0.01	2.09	2.11	--	0.14	0.14	2.25
Splitnose Rockfish	0.02	0.14	0.16	0.00	0.02	0.03	0.18
Yellowmouth Rockfish	--	0.05	0.05	--	0.00	0.00	0.05

Table 9 (continued).

Weight (mt)	Limited Entry - Coastwide			Open Access - Coastwide			**LE & OA**
	Discard	Landed	LE Total	Discard	Landed	OA Total	**Coastwide**
Minor slope rockfish (South of 40°10' N. lat.)							
Aurora Rockfish	0.20	0.28	0.48	0.08	0.01	0.09	0.56
Bank Rockfish	--	1.00	1.00	--	0.09	0.09	1.10
Blackgill Rockfish	3.90	79.15	83.05	0.47	50.03	50.51	133.56
Redbanded Rockfish	0.10	0.02	0.13	0.13	0.00	0.13	0.26
Rougheye Rockfish	0.08	0.26	0.34	--	0.00	0.00	0.34
Slope Rockfish Unid	--	1.56	1.56	--	0.13	0.13	1.68
Mixed thornyheads							
Shortspine/ Longspine Thornyhead	0.20	0.02	0.22	--	0.85	0.85	1.07
Other flatfish							
Curlfin Turbot	0.00	--	0.00	--	--	--	0.00
Flatfish Unid	--	0.06	0.06	--	0.11	0.11	0.17
Pacific Sanddab	0.00	0.98	0.99	--	3.10	3.10	4.09
Rex Sole	0.00	--	0.00	--	--	--	0.00
Rock Sole	--	--	--	--	0.00	0.00	0.00
Sanddab Unid	--	0.01	0.01	--	0.02	0.02	0.03
Sand Sole	--	0.00	0.00	--	0.00	0.00	0.00
Other groundfish							
Big Skate	1.63	0.07	1.70	0.12	0.03	0.15	1.85
Grenadier Unid	--	26.51	26.51	--	7.78	7.78	34.28
Leopard Shark	--	--	--	--	0.16	0.16	0.16
Pacific Flatnose	2.21	--	2.21	0.05	--	0.05	2.26
Pacific Grenadier	47.16	--	47.16	3.86	--	3.86	51.03
Soupfin Shark	--	--	--	--	0.25	0.25	0.25
Spotted Ratfish	3.48	0.01	3.49	0.11	0.00	0.11	3.59
Unspecified Skate	--	8.92	8.92	0.24	1.27	1.51	10.43
Other rockfish	--	0.02	0.02	--	0.34	0.34	0.36
Pacific cod	0.10	1.81	1.91	0.09	0.39	0.48	2.40
Pacific hake	0.38	0.05	0.43	1.42	0.15	1.57	2.00
Sablefish (North of 36° N. lat.)	543.67	1,844.80	1,953.54	53.05	426.18	436.79	2,390.33
20% discard mortality (Fixed Gear)*	108.73			10.61			
Sablefish (South of 36° N. lat.)	39.03	581.48	589.28	6.73	163.15	164.49	753.78
20% discard mortality (Fixed Gear)*	7.81			1.35			
Shortspine thornyhead (North of 34°27' N. lat.)	1.88	57.92	59.81	17.13	1.38	18.52	78.32
Shortspine thornyhead (South of 34°27' N. lat.)	6.10	162.73	168.83	--	6.88	6.88	175.71
Spiny dogfish	113.85	8.33	122.18	7.40	2.23	9.63	131.81
Splitnose rockfish (South of 40°10' N. lat.)	0.00	0.05	0.06	--	0.06	0.06	0.11
Starry flounder	--	--	--	--	0.01	0.01	0.01
Widow rockfish	0.04	0.02	0.06	--	0.00	0.00	0.06
Yellowtail rockfish (North of 40°10' N. lat.)	0.86	0.27	1.13	0.01	0.07	0.08	1.21
Non-groundfish species							
California halibut	--	0.00	0.00	--	0.45	0.45	0.45
Dungeness crab	0.66	0.52	1.18	0.46	1.42	1.88	3.06
Non-FMP flatfish							
Bigmouth Sole	--	--	--	--	0.00	0.00	0.00
Deepsea Sole	0.00	--	0.00	--	--	--	0.00
Slender Sole	--	--	--	--	0.00	0.00	0.00
Non-FMP skate							
Black Skate	3.64	0.11	3.75	0.04	0.12	0.16	3.91
Deepsea Skate	0.12	--	0.12	--	--	--	0.12
Pelagic Stingray	0.08	--	0.08	--	--	--	0.08
Sandpaper Skate	1.15	--	1.15	2.03	--	2.03	3.18

*Mortality rates provided by the Groundfish Management Team (GMT).

Table 10. Commercial landings of nearshore species (mt) in Oregon and California during 2011, partitioned by depth interval and groundfish management area based on observed catch from 2003 to 2011.

	2003-2011 Total observed landings (mt)	2003-2011 Percentage of observed catch by depth (fathoms)			2011 Fleet landings (mt)	2011 Fleet landings (mt) reallocated by depth (fathoms)		
		0 - 10	11 - 20	> 20		0 - 10	11 - 20	> 20
NORTH of 40° 10' N Lat.								
Nearshore species - commercial								
Black rockfish (South of 46°16' N. lat.)	111.17	46.8%	51.3%	1.9%	120.61	56.43	61.84	2.34
Cabezon (California)	1.68	44.4%	45.3%	10.3%	2.35	1.05	1.07	0.24
Cabezon (Oregon)	16.86	30.7%	66.7%	2.6%	29.49	9.06	19.66	0.76
Lingcod (North of 42° N. lat.)	14.96	34.0%	61.7%	4.3%	30.15	10.26	18.61	1.28
Lingcod (South of 42° N. lat.)	4.68	29.9%	51.4%	18.7%	3.96	1.18	2.03	0.74
Minor nearshore rockfish (North of 40°10' N. lat.)								
Black and Yellow Rockfish	0.03	71.8%	28.2%	0.0%	0.12	0.08	0.03	0.00
Blue Rockfish	12.37	23.8%	68.0%	8.3%	12.37	2.94	8.41	1.02
Brown Rockfish	0.25	8.2%	25.4%	66.3%	0.03	0.00	0.01	0.02
China Rockfish	4.50	32.6%	62.6%	4.8%	8.43	2.75	5.28	0.41
Copper Rockfish	1.10	10.7%	68.3%	21.0%	1.70	0.18	1.16	0.36
Gopher Rockfish	0.03	39.5%	58.4%	2.1%	0.11	0.04	0.06	0.00
Grass Rockfish	--	--	--	--	0.22	--	--	--
Olive Rockfish	0.06	4.5%	81.6%	14.0%	0.10	0.00	0.08	0.01
Quillback Rockfish	1.87	7.6%	57.1%	35.3%	2.91	0.22	1.66	1.03
Other groundfish								
Kelp Greenling	10.94	51.7%	46.8%	1.4%	20.98	10.85	9.83	0.30
SOUTH of 40° 10' N Lat.								
Nearshore species - commercial								
Black rockfish (South of 46°16' N. lat.)	0.94	49.5%	45.5%	4.9%	2.29	1.14	1.04	0.11
Cabezon (California)	5.26	94.5%	4.1%	1.4%	29.81	28.17	1.23	0.41
California scorpionfish (South of 34°27' N. lat.)	0.37	4.0%	1.3%	94.8%	3.25	0.13	0.04	3.08
Deeper nearshore rockfish								
Brown Rockfish	6.34	27.7%	60.8%	11.5%	28.73	7.97	17.45	3.31
Copper Rockfish	0.35	17.4%	43.7%	38.9%	3.07	0.54	1.34	1.19
Nearshore Rockfish Unid	0.17	20.6%	46.3%	33.1%	0.04	0.01	0.02	0.01
Olive Rockfish	0.35	24.3%	55.2%	20.5%	0.75	0.18	0.41	0.15
Quillback Rockfish	0.14	0.0%	43.7%	56.3%	0.10	0.00	0.04	0.05
Treefish Rockfish	0.15	36.8%	58.7%	4.5%	1.94	0.72	1.14	0.09
Lingcod (South of 42° N. lat.)	4.27	48.4%	42.4%	9.2%	17.22	8.34	7.29	1.59
Minor nearshore rockfish (South of 40°10' N. lat.)								
Blue Rockfish	0.90	46.7%	42.2%	11.1%	1.58	0.74	0.67	0.18
Gopher Rockfish	3.65	52.7%	37.3%	10.0%	29.96	15.80	11.17	2.99
Other groundfish								
Kelp Greenling	0.46	88.5%	8.8%	2.8%	1.85	1.64	0.16	0.05
Other nongroundfish								
California Sheephead	8.41	73.6%	25.3%	1.1%	30.67	22.56	7.78	0.33
Shallow nearshore rockfish								
Black and Yellow Rockfish	1.17	95.3%	2.9%	1.8%	12.25	11.68	0.35	0.22
China Rockfish	0.39	31.6%	46.9%	21.5%	1.53	0.48	0.72	0.33
Grass Rockfish	0.86	95.2%	4.4%	0.3%	12.11	11.54	0.54	0.04
Kelp Rockfish	0.09	68.9%	29.4%	1.7%	0.73	0.50	0.21	0.01
Nearshore Rockfish Unid	--	--	--	--	0.00	--	--	--

Table 11. Observed discard ratios with standard error and nearshore species fleet landings (mt) from the commercial nearshore fixed gear fishery in 2011 by groundfish management area and depth (fathoms).

	North of 40° 10' N lat.						South of 40° 10' N lat.								
	0 - 10 fm			11 - 20 fm + > 20 fm			0 - 10 fm			11 - 20 fm			> 20 fm		
Nearshore Fixed Gear Fishery	Vessels	Trips	Sets	Vessels	Trips	Sets	Vessels	Trips	Sets	Vessels	Trips	Sets	Vessels	Trips	Sets
Observed	46	125	149	49	143	166	13	35	63	15	51	57	4	17	19
Expansion factor:															
Fleet landings of nearshore species (mt)	95.3			129.7		8.5	112.1			51.6			14.2		
	Discard Ratio		SE	Discard Ratio		SE	Discard Ratio		SE	Discard Ratio		SE	Discard Ratio		SE
Rebuilding species															
Canary rockfish		0.0058	0.0556		0.0208	0.0511		0.0064	0.2478		0.2428	1.0414		0.4815	2.1931
Petrale sole		--	--		--	--		--	--		0.0001	NA		0.0016	0.0428
Yelloweye rockfish		0.0029	0.0753		0.0088	0.0950		--	--		0.0025	0.4635		0.0016	0.0323
Other groundfish species															
Black rockfish (South of 46°16' N. lat.)		0.0171	0.0258		0.0091	0.0169		0.0248	0.1455		0.0078	0.0482		0.0005	0.0321
Cabezon (California)		0.0030	0.0918		--	--		0.0369	0.0937		0.0059	0.2545		0.0013	0.1208
Cabezon (Oregon)		0.0122	0.0625		0.0190	0.0867		--	--		--	--		--	--
Deeper nearshore rockfish (South of 40°10' N. lat.)															
Brown Rockfish		NA	NA		NA	NA		0.0035	0.0182		0.0131	0.0431		0.0133	0.0671
Calico Rockfish		NA	NA		NA	NA		0.0001	NA		0.0016	0.0321		0.0033	0.0444
Copper Rockfish		NA	NA		NA	NA		0.0006	0.0305		0.0034	0.0160		0.0027	0.0223
Olive Rockfish		NA	NA		NA	NA		0.0004	NA		0.0060	0.0857		0.0041	0.1174
Treefish Rockfish		NA	NA		NA	NA		--	--		0.0004	0.0150		--	--
Lingcod (North of 42° N. lat.)		0.1321	0.1538		0.1302	0.1511		--	--		--	--		--	--
Lingcod (South of 42° N. lat.)		0.0022	0.0517		0.0068	0.0690		0.1794	0.2514		0.2102	0.3066		0.2504	1.4199
Minor nearshore rockfish (North of 40°10' N. lat.)															
Blue Rockfish		0.0240	0.0593		0.0302	0.0629		NA	NA		NA	NA		NA	NA
China Rockfish		0.0008	0.0040		0.0015	0.0067		NA	NA		NA	NA		NA	NA
Copper Rockfish		0.0012	0.0689		0.0006	0.0099		NA	NA		NA	NA		NA	NA
Quillback Rockfish		0.0004	0.0173		0.0003	0.0051		NA	NA		NA	NA		NA	NA
Minor nearshore rockfish (South of 40°10' N. lat.)															
Blue Rockfish		--	--		--	--		0.0110	0.1228		0.0347	0.1699		0.0820	0.3801
Gopher Rockfish		--	--		--	--		0.0215	0.0303		0.0717	0.1288		0.0329	0.1764
Minor shelf rockfish (North of 40°10' N. lat.)															
Vermilion Rockfish		--	--		0.0011	0.0219		--	--		--	--		--	--
Minor shelf rockfish (South of 40°10' N. lat.)															
Flag Rockfish		--	--		--	--		--	--		--	--		0.0006	0.0229
Greenstriped Rockfish		--	--		--	--		--	--		--	--		0.0003	NA
Rosethorn Rockfish		--	--		--	--		--	--		0.0004	NA		--	--
Rosy Rockfish		--	--		--	--		--	--		0.0018	0.0170		0.0146	0.0860
Starry Rockfish		--	--		--	--		--	--		0.0001	0.0068		0.0023	0.0535
Vermilion Rockfish		--	--		--	--		0.0004	0.0188		0.0046	0.0396		--	--
Yellowtail Rockfish		--	--		--	--		--	--		0.0056	0.0696		0.0314	0.2112
Other flatfish															
Pacific Sanddab		--	--		--	--		0.0004	NA		0.0004	0.0173		0.0016	0.0331
Rock Sole		--	--		--	--		--	--		--	--		0.0039	0.0766
Sand Sole		0.0000	0.0135		--	--		0.0015	0.0491		0.0055	0.0641		0.0047	0.0565
Other groundfish															
Big Skate		0.0003	NA		--	--		--	--		--	--		--	--
Kelp Greenling		0.0191	0.0182		0.0153	0.0239		0.0443	0.1289		0.0360	0.3422		0.0669	0.7668
Spotted Ratfish		--	--		0.0001	NA		--	--		0.0009	NA		--	--
Shallow nearshore rockfish (South of 40°10' N. lat.)															
Black and Yellow Rockfish		NA	NA		NA	NA		0.0179	0.0580		--	--		--	--
China Rockfish		NA	NA		NA	NA		0.0110	0.0865		0.0224	0.0862		0.0291	0.1052
Grass Rockfish		NA	NA		NA	NA		0.0016	0.0265		--	--		--	--
Kelp Rockfish		NA	NA		NA	NA		0.0025	0.0937		--	--		--	--
Spiny dogfish		0.0003	NA		--	--		0.0016	NA		0.0464	2.3761		0.0580	1.0614
Widow rockfish		--	--		0.0001	0.0267		--	--		--	--		--	--
Yellowtail rockfish (North of 40°10' N. lat.)		0.0009	0.0124		0.0044	0.0222		--	--		--	--		--	--
Non-groundfish species															
Dungeness crab		--	--		0.0000	NA		0.0004	NA		0.0003	NA		0.0023	NA
Non-FMP skate															
Starry Skate		--	--		--	--		--	--		0.0014	--		--	--
Other nongroundfish															
Buffalo Sculpin		0.0000	NA		0.0001	NA		0.0067	0.2362		0.0002	NA		--	--
Pacific Staghorn Sculpin		--	--		--	--		--	--		0.0002	NA		--	--
Red Irish Lord Sculpin		0.0004	0.0201		0.0000	0.0355		0.0006	NA		--	--		--	--
Sculpin Unid		0.0074	0.0442		0.0040	0.0309		0.0015	0.0829		0.0049	0.1031		0.0186	0.1860

Table 12a. Gross estimated discard (mt), discard mortality rates (provided by the Groundfish Management Team), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) for the 2011 commercial nearshore fixed gear fishery north of 40° 10' N latitude.

Nearshore Fixed Gear Fishery North of 40° 10' N lat.	**Gross estimated discard (mt) by depth (fm)**			**Discard mortality rate * by depth (fm)**			**Estimated discard mortality (mt) by depth (fm)**			**Estimated discard mortality (mt)**	**Fleet Landings (mt)**	**Estimated fishing mortality (mt)**
	0-10	11-20	> 20	0-10	11-20	> 20	0-10	11-20	> 20			
Rebuilding species												
Canary rockfish	0.56	2.69	0.18	10%	55%	100%	0.06	1.48	0.18	1.71	--	1.71
Darkblotched rockfish	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Pacific Ocean Perch (North of 40°10' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Yelloweye rockfish	0.27	1.14	0.07	10%	50%	100%	0.03	0.57	0.07	0.67	--	0.67
Other groundfish species												
Arrowtooth flounder	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Black rockfish (South of 46°16' N. lat.)	1.63	1.18	0.08	10%	40%	90%	0.16	0.47	0.07	0.71	120.61	121.32
Cabezon (California)	0.28	--	--	7%	7%	7%	0.02	--	--	0.02	2.35	2.37
Cabezon (Oregon)	1.17	2.47	0.16	7%	7%	7%	0.08	0.17	0.01	0.27	29.49	29.76
Dover sole	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Lingcod (North of 42° N. lat.)	12.59	16.90	1.11	7%	7%	7%	0.88	1.18	0.08	2.14	30.15	32.29
Lingcod (South of 42° N. lat.)	0.21	0.88	0.06	7%	7%	7%	0.01	0.06	0.00	0.08	3.96	4.04
Longnose skate	--	--	--	--	--	--	--	--	--	--	0.06	0.06
Minor nearshore rockfish (North of 40°10' N. lat.)												
Black and Yellow Rockfish	--	--	--	--	--	--	--	--	--	--	0.12	0.12
Blue Rockfish	2.28	3.91	0.26	10%	60%	100%	0.23	2.35	0.26	2.83	12.37	15.20
Brown Rockfish	--	--	--	--	--	--	--	--	--	--	0.03	0.03
China Rockfish	0.08	0.19	0.01	10%	50%	100%	0.01	0.09	0.01	0.11	8.43	8.55
Copper Rockfish	0.12	0.08	0.00	10%	40%	100%	0.01	0.03	0.00	0.05	1.70	1.74
Gopher Rockfish	--	--	--	--	--	--	--	--	--	--	0.11	0.11
Grass Rockfish	--	--	--	--	--	--	--	--	--	--	0.22	0.22
Olive Rockfish	--	--	--	--	--	--	--	--	--	--	0.10	0.10
Quillback Rockfish	0.04	0.04	0.00	10%	40%	100%	0.00	0.02	0.00	0.02	2.91	2.94
Minor shelf rockfish (North of 40°10' N. lat.)												
Bocaccio Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Shelf Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.03	0.03
Tiger Rockfish	--	--	--	--	--	--	--	--	--	--	0.29	0.29
Vermilion Rockfish	--	0.14	0.01	10%	55%	100%	--	0.08	0.01	0.09	3.97	4.06
Minor slope rockfish (North of 40°10' N. lat.)												
Blackgill Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Redbanded Rockfish	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Rougheye Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Splitnose Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Other flatfish												
Sand Sole	0.00	--	--	7%	7%	7%	0.00	--	--	0.00	--	0.00
Other groundfish												
Big Skate	0.03	--	--	7%	7%	7%	0.02	--	--	0.02	--	0.02
Kelp Greenling	1.82	1.99	0.13	7%	7%	7%	0.13	0.14	0.01	0.28	20.98	21.25
Spotted Ratfish	--	0.01	0.00	7%	7%	7%	--	0.00	0.00	0.00	--	0.00
Unspecified Skate	--	--	--	--	--	--	--	--	--	--	0.04	0.04
Sablefish (North of 36° N. lat.)	--	--	--	--	--	--	--	--	--	--	0.59	0.59
Spiny dogfish	0.03	--	--	7%	7%	7%	0.00	--	--	0.00	0.03	0.03
Widow rockfish	--	0.01	0.00	50%	90%	100%	--	0.01	0.00	0.01	0.03	0.04
Yellowtail rockfish (North of 40°10' N. lat.)	0.08	0.57	0.04	10%	30%	75%	0.01	0.17	0.03	0.21	0.72	0.93
Non-groundfish species												
California halibut	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Dungeness crab	--	0.00	0.00	100%	100%	100%	--	0.00	0.00	0.00	1.07	1.07
Other nongroundfish												
Buffalo Sculpin	0.00	0.01	0.00	100%	100%	100%	0.00	0.01	0.00	0.02	--	0.02
Red Irish Lord Sculpin	0.04	0.01	0.00	100%	100%	100%	0.04	0.01	0.00	0.05	--	0.05
Sculpin Unid	0.70	0.51	0.03	100%	100%	100%	0.70	0.51	0.03	1.25	0.00	1.25

* Discard mortality rates provided by the Groundfish Management Team (GMT). A mortality rate is applied to each gross estimated discard weight by depth.

Table 12b. Gross estimated discard (mt), discard mortality rates (provided by the Groundfish Management Team), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) for the 2011 commercial nearshore fixed gear fishery south of 40° 10' N latitude.

Nearshore Fixed Gear Fishery South of 40° 10' N lat	Gross estimated discard (mt) by depth (fm)			Discard mortality rate * by depth (fm)			Estimated discard mortality (mt) by depth (fm)			Estimated discard mortality (mt)	Fleet Landings (mt)	Estimated fishing mortality (mt)
	0-10	11-20	> 20	0-10	11-20	> 20	0-10	11-20	> 20			
Rebuilding species												
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.73	0.73
Canary rockfish	0.72	12.53	6.81	10%	55%	100%	0.07	6.89	6.81	13.78	--	13.78
Darkblotched rockfish	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Petrale sole	--	0.01	0.02	7%	7%	7%	--	0.00	0.00	0.00	--	0.00
Yelloweye rockfish	--	0.13	0.02	10%	50%	100%	--	0.06	0.02	0.09	--	0.09
Other groundfish species												
Black rockfish (South of 46°16' N. lat.)	2.78	0.41	0.01	10%	40%	90%	0.28	0.16	0.01	0.45	2.29	2.74
Cabezon (California)	4.14	0.30	0.02	7%	7%	7%	0.29	0.02	0.00	0.31	29.81	30.13
California scorpionfish (South of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	3.25	3.25
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.05	0.05
Deeper nearshore rockfish												
Brown Rockfish	0.39	0.68	0.19	10%	40%	90%	0.04	0.27	0.17	0.48	28.73	29.21
Calico Rockfish	0.01	0.08	0.05	10%	40%	90%	0.00	0.03	0.04	0.08	--	0.08
Copper Rockfish	0.06	0.18	0.04	10%	40%	100%	0.01	0.07	0.04	0.11	3.07	3.19
Nearshore Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.04	0.04
Olive Rockfish	0.05	0.31	0.06	10%	40%	90%	0.00	0.12	0.05	0.18	0.75	0.93
Quillback Rockfish	--	--	--	--	--	--	--	--	--	--	0.10	0.10
Treefish Rockfish	--	0.02	--	10%	40%	90%	--	0.01	--	0.01	1.94	1.95
Dover sole	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Lingcod (South of 42° N. lat.)	20.11	10.85	3.54	7%	7%	7%	1.41	0.76	0.25	2.42	17.22	19.64
Longnose skate	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Longspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Longspine thornyhead (South of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Minor nearshore rockfish (South of 40°10' N. lat.)												
Blue Rockfish	1.23	1.79	1.16	10%	60%	100%	0.12	1.07	1.16	2.36	1.58	3.94
Gopher Rockfish	2.41	3.70	0.47	10%	40%	100%	0.24	1.48	0.47	2.19	29.96	32.15
Minor shelf rockfish (South of 40°10' N. lat.)												
Chameleon Rockfish	--	--	--	--	--	--	--	--	--	--	0.10	0.10
Flag Rockfish	--	--	0.01	--	--	100%	--	--	0.01	0.01	0.00	0.01
Greenblotched Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Greenspotted Rockfish	--	--	--	--	--	--	--	--	--	--	0.02	0.02
Greenstriped Rockfish	--	--	0.00	--	--	100%	--	--	0.00	0.00	0.00	0.01
Rosethorn Rockfish	--	0.02	--	--	100%	--	--	0.02	--	0.02	0.01	0.03
Rosy Rockfish	--	0.09	0.21	--	100%	100%	--	0.09	0.21	0.30	0.08	0.38
Shelf Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.36	0.36
Speckled Rockfish	--	--	--	--	--	--	--	--	--	--	0.05	0.05
Starry Rockfish	--	0.00	0.03	--	100%	100%	--	0.00	0.03	0.04	0.12	0.16
Vermilion Rockfish	0.04	0.24	--	10%	55%	100%	0.00	0.13	--	0.14	7.07	7.20
Yellowtail Rockfish	--	0.29	0.44	--	30%	75%	--	0.09	0.33	0.42	0.19	0.61
Minor slope rockfish (South of 40°10' N. lat.)												
Bank Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Blackgill Rockfish	--	--	--	--	--	--	--	--	--	--	0.37	0.37
Redbanded Rockfish	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Slope Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Mixed thornyheads												
Shortspine/ Longspine Thornyhead	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Other flatfish												
Flatfish Unid	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Pacific Sanddab	0.05	0.02	0.02	7%	7%	7%	0.00	0.00	0.00	0.01	1.15	1.15
Rex Sole	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Rock Sole	--	--	0.05	--	--	7%	--	--	0.00	0.00	0.06	0.07
Sanddab Unid	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Sand Sole	0.17	0.28	0.07	7%	7%	7%	0.01	0.02	0.00	0.04	0.15	0.19

Table 12b (continued).

Nearshore Fixed Gear Fishery South of 40° 10' N lat	Gross estimated discard (mt) by depth (fm)			Discard mortality rate * by depth (fm)			Estimated discard mortality (mt) by depth (fm)			Estimated discard mortality (mt)	Fleet Landings (mt)	Estimated fishing mortality (mt)
	0-10	11-20	> 20	0-10	11-20	> 20	0-10	11-20	> 20			
Other groundfish												
Grenadier Unid	--	--	--	--	--	--	--	--	--	--	0.61	0.61
Kelp Greenling	4.97	1.86	0.95	7%	7%	7%	0.35	0.13	0.07	0.54	1.85	2.40
Leopard Shark	--	--	--	--	--	--	--	--	--	--	0.18	0.18
Soupfin Shark	--	--	--	--	--	--	--	--	--	--	0.05	0.05
Spotted Ratfish	--	0.05	--	--	7%	--	--	0.00	--	0.00	0.02	0.02
Other rockfish	--	--	--	--	--	--	--	--	--	--	0.33	0.33
Sablefish (North of 36° N. lat.)	--	--	--	--	--	--	--	--	--	--	0.83	0.83
Sablefish (South of 36° N. lat.)	--	--	--	--	--	--	--	--	--	--	8.79	8.79
Shallow nearshore rockfish												
Black and Yellow Rockfish	2.01	--	--	10%	--	--	0.20	--	--	0.20	12.25	12.45
China Rockfish	1.23	1.16	0.41	10%	50%	100%	0.12	0.58	0.41	1.11	1.53	2.64
Grass Rockfish	0.17	--	--	10%	--	--	0.02	--	--	0.02	12.11	12.13
Kelp Rockfish	0.28	--	--	10%	--	--	0.03	--	--	0.03	0.73	0.76
Nearshore Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Shortspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	0.02	0.02
Shortspine thornyhead (South of 34°27' N. lat.)	--	--	--	--	--	--	--	--	--	--	1.14	1.14
Spiny dogfish	0.18	2.40	0.82	7%	7%	7%	0.01	0.17	0.06	0.24	--	0.24
Starry flounder	--	--	--	--	--	--	--	--	--	--	0.06	0.06
Widow rockfish	--	--	--	--	--	--	--	--	--	--	0.02	0.02
Non-groundfish species												
California halibut	--	--	--	--	--	--	--	--	--	--	1.31	1.31
Dungeness crab	0.05	0.01	0.03	100%	100%	100%	0.05	0.01	0.03	0.09	0.63	0.73
Non-FMP flatfish												
Fantail Sole	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Hornyhead Turbot	--	--	--	--	--	--	--	--	--	--	0.01	0.01
Non-FMP skate												
Starry Skate	--	0.07	--	--	7%	--	--	0.01	--	0.01	--	0.01
Other nongroundfish												
Buffalo Sculpin	0.76	0.01	--	100%	100%	--	0.76	0.01	--	0.77	--	0.77
California Sheephead	--	--	--	--	--	--	--	--	--	--	30.67	30.67
Pacific Staghorn Sculpin	--	0.01	--	--	100%	--	--	0.01	--	0.01	--	0.01
Red Irish Lord Sculpin	0.07	--	--	100%	--	--	0.07	--	--	0.07	--	0.07
Rock Greenling	--	--	--	--	--	--	--	--	--	--	0.00	0.00
Sculpin Unid	0.17	0.25	0.26	100%	100%	100%	0.17	0.25	0.26	0.68	--	0.68

* Discard mortality rates provided by the Groundfish Management Team (GMT). Each mortality rate is applied to each gross estimated discard weight by depth.

Table 13. Estimated discard (mt), landings (mt), and estimated total fishing mortality (mt) of major west coast groundfish species in non-IFQ 2011 fisheries/groundfish sectors observed by the WCGOP.

	Open Access CA halibut			Pink shrimp			Non-nearshore fixed gear			Nearshore fixed gear		
Weight (mt)	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate
Rebuilding species												
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	1.57	1.57	--	0.73	0.73
Canary rockfish	--	--	--	0.03	--	0.03	0.09	--	0.09	15.49	--	15.49
Darkblotched rockfish	--	--	--	11.98	0.00	11.99	0.32	15.47	15.80	--	0.02	0.02
Pacific Ocean Perch (North of 40°10' N. lat.)	--	--	--	0.55	--	0.55	0.02	0.65	0.67	--	0.00	0.00
Petrale sole	0.07	0.06	0.13	1.77	0.00	1.77	0.06	0.61	0.67	0.00	--	0.00
Yelloweye rockfish	--	--	--	0.00	--	0.00	0.29	0.00	0.30	0.76	--	0.76
Other groundfish species												
Arrowtooth flounder	--	--	--	7.51	--	7.51	56.15	4.26	60.42	--	0.01	0.01
Black rockfish (South of 46°16' N. lat.)	--	--	--	--	--	--	--	--	--	1.15	122.90	124.05
Cabezon (California)	--	--	--	--	--	--	--	--	--	0.33	32.17	32.50
Cabezon (Oregon)	--	--	--	--	--	--	--	--	--	0.27	29.49	29.76
California scorpionfish (South of 34°27' N. lat.)	0.27	0.00	0.28	--	1.05	1.05	--	--	--	--	3.25	3.25
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	--	0.67	0.67	--	0.05	0.05
Dover sole	--	--	--	3.33	0.09	3.41	4.03	2.98	7.01	--	0.01	0.01
English sole	1.41	0.04	1.45	0.43	0.33	0.76	--	--	--	--	--	--
Lingcod (North of 42° N. lat.)	NA	NA	NA	0.58	--	0.58	1.16	16.49	17.65	2.14	30.15	32.29
Lingcod (South of 42° N. lat.)	0.22	--	0.11	0.04	--	0.04	2.11	4.05	6.16	2.50	21.18	23.68
50% discard mortality (Trawl)*	0.11											
Longnose skate	0.22	--	0.22	0.91	0.04	0.96	226.08	28.06	254.15	--	0.07	0.07
Longspine thornyhead (North of 34°27' N. lat.)	--	--	--	--	--	--	1.78	4.71	6.49	--	0.00	0.00
Longspine thornyhead (South of 34°27' N. lat.)	--	--	--	--	--	--	1.77	20.39	22.17	--	0.01	0.01
Minor nearshore rockfish (North of 40°10' N. lat.)												
Black and Yellow Rockfish	NA	NA	NA	--	--	--	--	--	--	--	0.12	0.12
Blue Rockfish	NA	NA	NA	--	--	--	--	--	--	2.83	12.37	15.20
Brown Rockfish	NA	NA	NA	--	--	--	--	--	--	--	0.03	0.03
China Rockfish	NA	NA	NA	--	--	--	--	--	--	0.11	8.43	8.55
Copper Rockfish	NA	NA	NA	--	--	--	--	--	--	0.05	1.70	1.74
Gopher Rockfish	NA	NA	NA	--	--	--	--	--	--	--	0.11	0.11
Grass Rockfish	NA	NA	NA	--	--	--	--	--	--	--	0.22	0.22
Olive Rockfish	NA	NA	NA	0.03	--	0.03	--	--	--	--	0.10	0.10
Quillback Rockfish	NA	NA	NA	--	--	--	--	--	--	0.02	2.91	2.94

Table 13 (continued).

Weight (mt)	Open Access CA halibut Discard	Open Access CA halibut Landed	Open Access CA halibut Estimate	Pink shrimp Discard	Pink shrimp Landed	Pink shrimp Estimate	Non-nearshore fixed gear Discard	Non-nearshore fixed gear Landed	Non-nearshore fixed gear Estimate	Nearshore fixed gear Discard	Nearshore fixed gear Landed	Nearshore fixed gear Estimate
Minor nearshore rockfish (South of 40°10' N. lat.)												
Black and Yellow Rockfish	--	--	--	--	--	--	--	--	--	0.20	12.25	12.45
Blue Rockfish	--	--	--	--	--	--	--	--	--	2.36	1.58	3.94
Brown Rockfish	0.00	0.00	0.00	--	0.03	0.03	--	--	--	0.48	28.73	29.21
Calico Rockfish	0.00	--	0.00	--	--	--	--	--	--	0.08	--	0.08
China Rockfish	--	--	--	--	--	--	--	--	--	1.11	1.53	2.64
Copper Rockfish	0.00	--	0.00	--	0.01	0.01	--	--	--	0.11	3.07	3.19
Gopher Rockfish	--	--	--	--	--	--	--	--	--	2.19	29.96	32.15
Grass Rockfish	--	--	--	--	--	--	--	--	--	0.02	12.11	12.13
Kelp Rockfish	--	--	--	--	--	--	--	--	--	0.03	0.73	0.76
Nearshore Rockfish Unid	--	--	--	--	--	--	--	--	--	--	0.04	0.04
Olive Rockfish	--	--	--	--	--	--	--	--	--	0.18	0.75	0.93
Quillback Rockfish	--	--	--	--	--	--	--	--	--	--	0.10	0.10
Treefish Rockfish	--	--	--	--	--	--	--	--	--	0.01	1.94	1.95
Minor shelf rockfish (North of 40°10' N. lat.)												
Bocaccio Rockfish	NA	NA	NA	0.00	--	0.00	0.02	0.18	0.19	--	0.00	0.00
Bronzespotted Rockfish	NA	NA	NA	--	--	--	0.01	--	0.01	--	--	--
Chilipepper Rockfish	NA	NA	NA	0.17	--	0.17	0.00	0.00	0.00	--	--	--
Cowcod Rockfish	NA	NA	NA	0.00	--	0.00	--	--	--	--	--	--
Greenspotted Rockfish	NA	NA	NA	--	--	--	--	0.00	0.00	--	--	--
Greenstriped Rockfish	NA	NA	NA	1.16	--	1.16	0.22	0.02	0.24	--	--	--
Halfbanded Rockfish	NA	NA	NA	0.00	--	0.00	--	--	--	--	--	--
Harlequin Rockfish	NA	NA	NA	0.02	--	0.02	--	--	--	--	--	--
Pygmy Rockfish	NA	NA	NA	0.04	--	0.04	--	--	--	--	--	--
Redstripe Rockfish	NA	NA	NA	0.00	--	0.00	0.00	0.00	0.00	--	--	--
Rosethorn Rockfish	NA	NA	NA	0.00	--	0.00	0.17	0.24	0.41	--	--	--
Shelf Rockfish Unid	NA	NA	NA	2.12	0.00	2.12	0.01	0.78	0.79	--	0.03	0.03
Silvergray Rockfish	NA	NA	NA	--	--	--	--	0.07	0.07	--	--	--
Stripetail Rockfish	NA	NA	NA	0.63	--	0.63	--	0.00	0.00	--	--	--
Tiger Rockfish	NA	NA	NA	0.00	--	0.00	0.01	0.00	0.01	--	0.29	0.29
Vermilion Rockfish	NA	NA	NA	--	--	--	--	0.04	0.04	0.09	3.97	4.06

Table 13 (continued).

Weight (mt)	Open Access CA halibut			Pink shrimp			Non-nearshore fixed gear			Nearshore fixed gear		
	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate
Minor shelf rockfish (South of 40°10' N. lat.)												
Chameleon Rockfish	--	--	--	--	--	--	--	--	--	--	0.10	0.10
Flag Rockfish	--	--	--	--	--	--	--	0.20	0.20	0.01	0.00	0.01
Freckled Rockfish	--	--	--	--	--	--	--	0.00	0.00	--	--	--
Greenblotched Rockfish	--	--	--	--	--	--	--	0.10	0.10	--	0.00	0.00
Greenspotted Rockfish	--	0.01	0.01	--	--	--	0.00	0.82	0.82	--	0.02	0.02
Greenstriped Rockfish	--	--	--	--	--	--	0.00	0.06	0.06	0.00	0.00	0.01
Honeycomb Rockfish	--	--	--	--	--	--	--	0.03	0.03	--	--	--
Rosethorn Rockfish	--	--	--	--	--	--	0.03	0.00	0.03	0.02	0.01	0.03
Rosy Rockfish	--	--	--	--	--	--	--	0.05	0.05	0.30	0.08	0.38
Shelf Rockfish Unid	--	--	--	--	--	--	--	0.18	0.18	--	0.36	0.36
Speckled Rockfish	--	--	--	--	--	--	--	0.09	0.09	--	0.05	0.05
Squarespot Rockfish	--	--	--	--	--	--	--	0.00	0.00	--	--	--
Starry Rockfish	--	--	--	--	--	--	--	0.23	0.23	0.04	0.12	0.16
Vermilion Rockfish	--	--	--	--	--	--	--	8.81	8.81	0.14	7.07	7.20
Yellowtail Rockfish	--	--	--	--	--	--	--	0.36	0.36	0.42	0.19	0.61
Minor slope rockfish (North of 40°10' N. lat.)												
Aurora Rockfish	NA	NA	NA	0.12	--	0.12	0.03	0.07	0.10	--	--	--
Bank Rockfish	NA	NA	NA	0.00	--	0.00	--	0.23	0.23	--	--	--
Blackgill Rockfish	NA	NA	NA	0.01	--	0.01	0.11	1.23	1.34	--	0.00	0.00
Blackspotted Rockfish	NA	NA	NA	--	--	--	--	0.29	0.29	--	--	--
Redbanded Rockfish	NA	NA	NA	0.06	--	0.06	1.96	15.88	17.84	--	0.01	0.01
Rougheye Rockfish	NA	NA	NA	0.01	--	0.01	0.97	39.45	40.42	--	0.00	0.00
Sharpchin Rockfish	NA	NA	NA	0.04	--	0.04	--	--	--	--	--	--
Shortraker Rockfish	NA	NA	NA	--	--	--	0.03	2.95	2.98	--	--	--
Shortraker/Rougheye Rockfish	NA	NA	NA	--	--	--	0.15	--	0.15	--	--	--
Slope Rockfish Unid	NA	NA	NA	--	0.00	0.00	0.01	2.23	2.25	--	--	--
Splitnose Rockfish	NA	NA	NA	2.03	--	2.03	0.02	0.16	0.18	--	0.00	0.00
Yellowmouth Rockfish	NA	NA	NA	--	--	--	--	0.05	0.05	--	--	--

Table 13 (continued).

Weight (mt)	Open Access CA halibut Discard	Open Access CA halibut Landed	Open Access CA halibut Estimate	Pink shrimp Discard	Pink shrimp Landed	Pink shrimp Estimate	Non-nearshore fixed gear Discard	Non-nearshore fixed gear Landed	Non-nearshore fixed gear Estimate	Nearshore fixed gear Discard	Nearshore fixed gear Landed	Nearshore fixed gear Estimate
Minor slope rockfish (South of 40°10' N. lat.)												
Aurora Rockfish	--	--	--	--	--	--	0.34	0.29	0.62	--	--	--
Bank Rockfish	--	--	--	--	--	--	--	1.10	1.10	--	0.00	0.00
Blackgill Rockfish	--	--	--	--	--	--	4.43	129.19	133.62	--	0.37	0.37
Redbanded Rockfish	--	--	--	--	--	--	0.30	0.02	0.32	--	0.00	0.00
Rougheye Rockfish	--	--	--	--	--	--	0.08	0.26	0.34	--	--	--
Slope Rockfish Unid	--	--	--	--	--	--	--	1.68	1.68	--	0.01	0.01
Mixed thornyheads												
Shortspine/ Longspine Thornyhead	--	--	--	--	--	--	0.20	0.87	1.07	--	0.00	0.00
Other flatfish												
Curlfin Turbot	0.28	--	0.28	0.00	--	0.00	0.00	--	0.00	--	--	--
Flatfish Unid	0.62	0.61	1.23	3.90	8.79	12.69	--	0.17	0.17	--	0.00	0.00
Flathead Sole	--	--	--	1.29	--	1.29	--	--	--	--	--	--
Pacific Sanddab	1.42	0.00	1.42	2.68	--	2.68	0.00	4.09	4.09	0.01	1.15	1.15
Rex Sole	--	0.00	0.00	21.22	1.07	22.29	0.00	--	0.00	--	0.00	0.00
Rock Sole	0.04	0.13	0.17	0.01	0.08	0.09	--	0.00	0.00	0.00	0.06	0.07
Sand Sole	0.69	7.76	8.45	--	--	--	--	0.00	0.00	0.04	0.15	0.19
Sanddab Unid	0.12	0.01	0.14	--	0.70	0.70	--	0.03	0.03	--	0.00	0.00
Other groundfish												
Big Skate	36.37	0.28	36.65	0.57	--	0.57	1.71	0.11	1.81	0.02	--	0.02
California Skate	6.07	--	6.07	--	--	--	--	--	--	--	--	--
Grenadier Unid	--	--	--	--	--	--	--	34.28	34.28	--	0.61	0.61
Kelp Greenling	--	--	--	--	--	--	--	--	--	0.82	22.83	23.65
Leopard Shark	5.52	0.00	5.52	--	--	--	--	0.16	0.16	--	0.18	0.18
Pacific Flatnose	--	--	--	--	--	--	2.23	--	2.23	--	--	--
Pacific Grenadier	--	--	--	--	--	--	50.22	--	50.22	--	--	--
Soupfin Shark	1.62	0.08	1.70	--	--	--	--	0.25	0.25	--	0.05	0.05
Spotted Ratfish	0.07	--	0.07	0.17	--	0.17	3.55	0.01	3.56	0.00	0.02	0.02
Unspecified Skate	2.11	0.59	2.70	--	2.66	2.66	0.17	10.19	10.36	--	0.04	0.04
Other rockfish	--	--	--	--	--	--	--	0.36	0.36	--	0.33	0.33

Table 13 (continued).

Weight (mt)	Open Access CA halibut			Pink shrimp			Non-nearshore fixed gear			Nearshore fixed gear		
	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate	Discard	Landed	Estimate
Pacific cod	--	--	--	0.04	0.03	0.07	0.17	2.20	2.37	--	--	--
Pacific hake	--	--	--	282.09	--	282.09	1.35	0.20	1.55	--	--	--
Sablefish (North of 36° N. lat.)	--	--	--	0.10	0.00	0.10	590.91	2270.98	2389.17	--	1.42	1.42
20% discard mortality (Fixed Gear)*							118.18					
Sablefish (South of 36° N. lat.)	--	0.01	0.01	--	--	--	55.32	744.63	755.69	--	8.79	8.79
20% discard mortality (Fixed Gear)*							11.06					
Shortbelly rockfish	--	--	--	0.21	--	0.21	--	--	--	--	--	--
Shortspine thornyhead (North of 34°27' N. lat.)	--	--	--	0.21	--	0.21	13.61	59.31	72.92	--	0.02	0.02
Shortspine thornyhead (South of 34°27' N. lat.)	--	--	--	--	--	--	6.10	169.61	175.71	--	1.14	1.14
Spiny dogfish	0.54	--	0.54	2.89	0.01	2.89	118.95	10.56	129.51	0.24	0.03	0.27
Splitnose rockfish (South of 40°10' N. lat.)	--	--	--	--	--	--	0.00	0.11	0.11	--	--	--
Starry flounder	4.33	3.89	8.22	--	--	--	--	0.01	0.01	--	0.06	0.06
Widow rockfish	--	--	--	0.00	0.04	0.04	0.04	0.02	0.06	0.01	0.05	0.06
Yellowtail rockfish (North of 40°10' N. lat.)	NA	NA	NA	0.27	0.00	0.28	0.87	0.34	1.21	0.21	0.72	0.93
Non-groundfish species												
California halibut	6.08	79.91	85.98	--	7.58	7.58	--	0.45	0.45	--	1.31	1.31
Dungeness crab	65.55	--	65.55	0.06	--	0.06	0.97	1.94	2.91	0.10	1.70	1.80
Non-FMP flatfish												
Bigmouth Sole	--	--	--	--	--	--	--	0.00	0.00	--	--	--
C-O (C-O Turbot) Sole	--	--	--	0.00	--	0.00	--	--	--	--	--	--
Deepsea Sole	--	0.94	0.94	--	--	--	0.00	--	0.00	--	--	--
Fantail Sole	0.48	0.14	0.62	--	--	--	--	--	--	--	0.00	0.00
Hornyhead Turbot	1.17	0.03	1.20	--	4.49	4.49	--	--	--	--	0.01	0.01
Longfin Sanddab	0.00	--	0.00	--	--	--	--	--	--	--	--	--
Slender Sole	0.00	--	0.00	118.78	--	118.78	--	0.00	0.00	--	--	--
Speckled Sanddab	0.03	--	0.03	--	--	--	--	--	--	--	--	--
Non-FMP skate												
Aleutian Skate	--	--	--	0.00	--	0.00	--	--	--	--	--	--
Black Skate	--	--	--	0.00	--	0.00	3.67	0.23	3.90	--	--	--
Deepsea Skate	--	--	--	--	--	--	0.12	--	0.12	--	--	--
Pacific Electric Ray	0.59	--	0.59	--	--	--	--	--	--	--	--	--
Pelagic Stingray	--	--	--	--	--	--	0.08	--	0.08	--	--	--
Sandpaper Skate	--	--	--	0.03	--	0.03	2.55	--	2.55	--	--	--
Shovelnose Guitarfish	2.10	--	2.10	--	--	--	--	--	--	--	--	--
Starry Skate	0.13	--	0.13	0.00	--	0.00	--	--	--	0.01	--	0.01
Thornback Skate	0.77	--	0.77	--	--	--	--	--	--	--	--	--

Table 14. Incidental landings (mt) of groundfish from shoreside commercial fisheries in 2011 by gear group. Gear groups are as follows: HKL (hook-and-lines), MSC (miscellaneous), NET (nets), POT (pots), TLS (troll) and TWL (trawl).

	Shoreside Commercial Landings (mt) Other Fisheries By Gear Group						Incidental fisheries estimate
	HKL	MSC	NET	POT	TLS	TWL	
Rebuilding species							
Bocaccio Rockfish (South of 40°10' N. lat.)	0.07	--	--	0.01	0.00	--	0.09
Canary rockfish	0.00	--	--	--	--	--	0.00
Darkblotched rockfish	0.13	--	--	--	--	--	0.13
Pacific Ocean Perch (North of 40°10' N. lat.)	0.02	--	--	--	--	--	0.02
Petrale sole	0.07	--	0.01	--	0.29	0.00	0.37
Yelloweye rockfish	0.14	0.15	--	--	0.00	--	0.29
Other groundfish species							
Arrowtooth flounder	0.98	--	--	--	--	--	0.98
Black rockfish (South of 46°16' N. lat.)	--	--	0.00	--	0.11	--	0.11
Cabezon (California)	--	0.01	0.04	--	0.03	--	0.08
California scorpionfish (South of 34°27' N. lat.)	--	--	0.24	--	--	0.00	0.24
Chilipepper Rockfish (South of 40°10' N. lat.)	--	--	--	--	0.01	--	0.01
Dover sole	0.06	--	0.00	--	--	0.02	0.08
English sole	0.00	--	--	--	--	--	0.00
Lingcod (North of 42° N. lat.)	1.39	--	--	0.00	2.26	--	3.65
Lingcod (South of 42° N. lat.)	0.46	0.02	0.02	0.20	0.23	0.00	0.94
Longnose skate	1.07	--	--	--	--	--	1.07
Longspine Thornyhead (North of 34°27' N. lat.)	0.00	--	--	--	--	--	0.00
Minor nearshore rockfish (South of 40°10' N. lat.)							
Black and Yellow Rockfish	--	0.02	--	--	--	--	0.02
Blue Rockfish	--	--	--	--	0.04	--	0.04
Brown Rockfish	--	--	--	--	0.00	--	0.00
China Rockfish	--	--	--	--	0.00	--	0.00
Copper Rockfish	--	--	0.00	--	--	0.00	0.01
Gopher Rockfish	--	0.03	--	--	0.01	--	0.05
Grass Rockfish	--	--	0.01	--	--	--	0.01
Kelp Rockfish	--	0.00	--	--	--	--	0.00
Olive Rockfish	0.01	--	--	--	0.00	--	0.01
Minor shelf rockfish (North of 40°10' N. lat.)							
Chilipepper Rockfish	0.00	--	--	--	--	--	0.00
Greenspotted Rockfish	0.03	--	--	--	--	--	0.03
Greenstriped Rockfish	0.06	--	--	--	--	--	0.06
Redstripe Rockfish	0.00	--	--	--	--	--	0.00
Rosethorn Rockfish	0.01	--	--	--	--	--	0.01
Shelf Rockfish Unid	0.02	--	--	--	0.14	--	0.16
Silvergray Rockfish	0.00	--	--	--	--	--	0.00
Stripetail Rockfish	0.01	--	--	--	--	--	0.01
Vermilion Rockfish	--	--	--	--	0.00	--	0.00
Minor shelf rockfish (South of 40°10' N. lat.)							
Flag Rockfish	0.00	--	--	0.00	--	--	0.00
Greenspotted Rockfish	0.02	--	--	0.00	--	--	0.02
Rosy Rockfish	0.00	--	--	--	--	--	0.00
Shelf Rockfish Unid	0.03	0.00	--	--	0.00	0.03	0.06
Speckled Rockfish	0.00	--	--	--	--	--	0.00
Starry Rockfish	0.02	--	--	0.00	--	--	0.02
Vermilion Rockfish	0.51	--	--	0.09	0.06	--	0.66
Yellowtail Rockfish	0.00	0.07	--	0.03	0.03	--	0.13

Table 14 (continued).

	Shoreside Commercial Landings (mt) Other Fisheries By Gear Group						Incidental fisheries estimate
	HKL	MSC	NET	POT	TLS	TWL	
Minor slope rockfish (North of 40°10' N. lat.)							
Aurora Rockfish	0.00	--	--	--	--	--	0.00
Bank Rockfish	0.00	--	--	--	--	--	0.00
Blackgill Rockfish	0.01	--	--	--	--	--	0.01
Blackspotted Rockfish	0.00	--	--	--	--	--	0.00
Redbanded Rockfish	0.07	--	--	--	--	--	0.07
Rougheye Rockfish	0.27	--	--	--	--	--	0.27
Shortraker Rockfish	0.01	--	--	--	--	--	0.01
Slope Rockfish Unid	0.05	--	--	--	0.05	--	0.09
Splitnose Rockfish	0.00	--	--	--	--	--	0.00
Minor slope rockfish (South of 40°10' N. lat.)							
Redbanded Rockfish	--	0.02	--	--	--	--	0.02
Slope Rockfish Unid	0.03	0.00	--	--	0.00	0.03	0.06
Mixed thornyheads							
Shortspine/ Longspine Thornyhead	--	--	0.02	--	--	--	0.02
Other flatfish							
Flatfish Unid	0.00	0.11	0.13	--	0.06	1.57	1.87
Pacific Sanddab	0.03	--	--	--	--	0.00	0.03
Rock Sole	0.00	--	--	--	0.05	0.00	0.05
Sanddab Unid	--	--	0.03	0.00	0.01	--	0.04
Sand Sole	0.02	--	--	--	0.00	0.42	0.44
Other groundfish							
Big Skate	0.00	--	0.00	--	--	--	0.00
Kelp Greenling	--	0.01	--	--	--	--	0.01
Leopard Shark	0.02	--	1.88	--	--	0.03	1.93
Soupfin Shark	0.12	--	1.81	--	--	0.03	1.95
Unspecified Skate	0.35	--	5.64	--	--	0.05	6.04
Other rockfish	0.02	--	--	--	0.01	--	0.03
Pacific cod	0.07	--	--	--	--	--	0.07
Sablefish (North of 36° N. lat.)	17.92	--	--	--	1.37	--	19.30
Sablefish (South of 36° N. lat.)	--	--	0.87	--	0.95	--	1.82
Shortspine thornyhead (North of 34°27' N. lat.)	0.09	--	--	--	--	--	0.09
Shortspine thornyhead (South of 34°27' N. lat.)	0.12	--	0.02	--	--	--	0.14
Spiny dogfish	0.04	--	0.04	--	--	--	0.08
Starry flounder	0.05	--	--	--	--	0.07	0.12
Widow rockfish	--	--	--	--	0.02	--	0.02
Yellowtail rockfish (North of 40°10' N. lat.)	0.01	--	--	--	0.98	--	0.99
Non-groundfish species							
California halibut	57.07	0.04	42.99	0.21	1.27	0.02	101.60
Dungeness crab	--	11.87	--	24221.42	--	--	24,233.29
Non-FMP flatfish							
Deepsea Sole	--	--	--	--	--	0.03	0.03
Fantail Sole	0.00	--	--	--	--	--	0.00
Hornyhead Turbot	--	--	0.04	--	--	0.00	0.05
Slender Sole	--	--	0.00	--	--	--	0.00

Table 15. Estimated fishing mortality (mt) of major west coast groundfish species and a subset of non-groundfish bycatch species in 2011 by sector or fishery.

	Commercial fisheries														
	IFQ/Coop Management														
	Non-tribal At-sea	Non-tribal shoreside		Non-nearshore	Nearshore fixed	OA CA	Pink	Incidental fisheries	WA tribal	WA tribal	Recreational fishing mortality				Estimated fishing
Weight (mt)	hake	hake	Non-hake IFQ	fixed gear	gear	halibut	shrimp	landings	landings	at-sea	WA	OR	CA	Research	mortality
Rebuilding groundfish species															
Bocaccio rockfish (South of 40°10' N. lat.)	--	--	5.31	1.57	0.73	--	--	0.09	--	--	NA	NA	103.17	0.92	111.79
Canary rockfish	0.53	0.85	2.85	0.09	15.49	--	0.03	0.00	11.55	0.54	0.85	3.17	15.83	0.62	52.41
Cowcod rockfish (South of 40°10' N. lat.)	--	--	0.02	--	--	--	--	--	--	--	NA	NA	0.83	0.14	0.99
Darkblotched rockfish	11.99	1.22	89.68	15.80	0.02	--	11.99	0.13	0.10	0.18	--	--	--	1.63	132.73
Pacific Ocean Perch (North of 40°10' N. lat.)	7.17	0.28	46.39	0.67	0.00	--	0.55	0.02	2.96	1.98	--	--	NA	1.94	61.97
Petrale sole	--	0.00	810.39	0.67	0.00	0.13	1.77	0.37	125.06	--	--	0.10	0.52	14.22	953.23
Yelloweye rockfish	--	--	0.06	0.30	0.76	--	0.00	0.29	0.06	--	2.35	2.10	2.09	0.84	8.85
Other groundfish species															
Arrowtooth flounder	45.20	12.69	2,473.72	60.42	0.01	--	7.51	0.98	48.59	3.77	--	0.00	--	12.97	2,665.86
Black rockfish (North of 46°16' N. lat.)	--	0.00	0.70	--	--	NA	--	--	0.01	--	207.77	NA	NA	0.00	208.49
Black rockfish (South of 46°16' N. lat.)	--	--	0.04	--	124.05	--	--	0.11	--	--	NA	220.50	178.04	0.00	522.75
Cabezon (California)	--	--	--	--	32.50	--	--	0.08	--	--	NA	NA	17.6	0.02	50.20
Cabezon (Oregon)	--	--	--	--	29.76	NA	--	--	--	--	NA	18.30	NA	--	48.06
California scorpionfish (South of 34°27' N. lat.)	--	--	--	--	3.25	0.28	1.05	0.24	--	--	NA	NA	99.56	0.06	104.44
Chilipepper rockfish (South of 40°10' N. lat.)	--	--	317.41	0.67	0.05	--	--	0.01	--	--	NA	NA	5.02	5.54	328.70
Dover sole	1.17	0.07	7,795.12	7.01	0.01	--	3.41	0.08	92.57	--	--	0.01	--	27.79	7,927.25
English sole	0.02	0.00	137.64	--	--	1.45	0.76	0.00	59.74	0.00	--	0.00	0.04	5.78	205.43
Lingcod (North of 42° N. lat.)	0.16	4.55	257.44	17.65	32.29	NA	0.58	3.65	47.56	0.16	103.44	114.29	NA	6.27	588.05
Lingcod (South of 42° N. lat.)	--	--	7.44	6.16	23.68	0.11	0.04	0.94	--	--	NA	NA	225.16	0.36	263.88
Longnose skate	0.41	0.18	861.83	254.15	0.07	0.22	0.96	1.07	3.70	0.01	--	0.10	--	10.44	1,133.13
Longspine thornyhead (North of 34°27' N. lat.)	0.39	--	943.53	6.49	0.00	--	--	0.00	0.00	0.00	--	--	--	11.03	961.44
Longspine thornyhead (South of 34°27' N. lat.)	--	--	0.39	22.17	0.01	--	--	--	--	--	NA	NA	--	0.84	23.40
Minor nearshore rockfish (North of 40°10' N. lat.)															
Black and Yellow Rockfish	--	--	--	--	0.12	NA	--	--	--	--	--	0.01	3.11	--	3.24
Blue Rockfish	--	--	0.00	--	15.20	NA	--	--	--	--	1.3	27.47	--	--	43.97
Brown Rockfish	--	--	0.01	--	0.03	NA	--	--	--	--	--	0.19	1.22	--	1.45
China Rockfish	--	--	--	--	8.55	NA	--	--	--	--	3.18	3.51	4.17	--	19.41
Copper Rockfish	--	--	--	--	1.74	NA	--	--	--	--	2.19	7.65	--	--	11.58
Gopher Rockfish	--	--	--	--	0.11	NA	--	--	--	--	--	--	3.23	--	3.34
Grass Rockfish	--	--	--	--	0.22	NA	--	--	--	--	--	1.34	--	--	1.56
Kelp Rockfish	--	--	--	--	--	NA	--	--	--	--	--	--	0.01	--	0.01
Nearshore Rockfish Unid	--	--	--	--	--	NA	--	--	0.01	--	--	--	--	--	0.01
Olive Rockfish	--	--	--	--	0.10	NA	0.03	--	--	--	--	0.06	0.84	--	1.03
Quillback Rockfish	--	--	0.06	--	2.94	NA	--	--	--	--	1.81	5.80	2.62	0.01	13.24

Note: A value is (--) when the species was neither caught nor discarded (no value). Values appear as 0.00 when a value is smaller than two decimal places.

Table 15 (continued).

	Commercial fisheries														
	IFQ/Coop Management														
	Non-tribal At-sea	Non-tribal shoreside	Non-hake	Non-nearshore	Nearshore fixed	OA CA	Pink	Incidental fisheries	WA tribal	WA tribal	Recreational fishing mortality				Estimated fishing
Weight (mt)	hake	hake	IFQ	fixed gear	gear	halibut	shrimp	landings	landings	at-sea	WA	OR	CA	Research	mortality
Minor nearshore rockfish (South of 40°10' N. lat.)															
Black and Yellow Rockfish	--	--	--	--	12.45	--	--	0.02	NA	NA	NA	NA	11.02	--	23.50
Blue Rockfish	--	--	--	--	3.94	--	--	0.04	NA	NA	NA	NA	54.3	0.02	58.31
Brown Rockfish	--	--	0.00	--	29.21	0.00	0.03	0.00	NA	NA	NA	NA	84.98	0.01	114.23
Calico Rockfish	--	--	--	--	0.08	0.00	--	--	NA	NA	NA	NA	1.91	--	1.99
China Rockfish	--	--	--	--	2.64	--	--	0.00	NA	NA	NA	NA	10.86	--	13.51
Copper Rockfish	--	--	--	--	3.19	0.00	0.01	0.01	NA	NA	NA	NA	62.07	0.08	65.35
Gopher Rockfish	--	--	--	--	32.15	--	--	0.05	NA	NA	NA	NA	67.18	0.00	99.38
Grass Rockfish	--	--	--	--	12.13	--	--	0.01	NA	NA	NA	NA	10.05	--	22.19
Kelp Rockfish	--	--	--	--	0.76	--	--	0.00	NA	NA	NA	NA	--	--	0.76
Nearshore Rockfish Unid	--	--	--	--	0.04	--	--	--	NA	NA	NA	NA	--	--	0.04
Olive Rockfish	--	--	--	--	0.93	--	--	0.01	NA	NA	NA	NA	22.49	0.01	23.45
Quillback Rockfish	--	--	--	--	0.10	--	--	--	NA	NA	NA	NA	--	--	0.10
Treefish Rockfish	--	--	--	--	1.95	--	--	--	NA	NA	NA	NA	11.68	--	13.63
Minor shelf rockfish (North of 40°10' N. lat.)															
Bocaccio Rockfish	0.39	0.97	0.33	0.19	0.00	NA	0.00	--	--	0.22	1.67	0.09	0.14	0.02	4.03
Bronzespotted Rockfish	--	--	--	0.01	--	NA	--	--	--	--	--	--	--	--	0.01
Chilipepper Rockfish	0.01	--	1.43	0.00	--	NA	0.17	0.00	--	--	--	0.01	--	0.76	2.38
Cowcod Rockfish	--	--	--	--	--	NA	0.00	--	--	--	--	--	--	0.02	0.02
Dusky Rockfish	0.01	--	--	--	--	NA	--	--	--	--	--	--	--	--	0.01
Flag Rockfish	--	--	0.00	--	--	NA	--	--	--	--	--	--	--	--	0.00
Greenspotted Rockfish	--	--	0.02	0.00	--	NA	--	0.03	--	--	--	--	--	0.08	0.14
Greenstriped Rockfish	--	0.05	8.78	0.24	--	NA	1.16	0.06	0.55	--	--	0.02	--	2.12	12.99
Halfbanded Rockfish	--	--	--	--	--	NA	0.00	--	--	--	--	--	--	--	0.00
Harlequin Rockfish	--	--	0.00	--	--	NA	0.02	--	--	--	--	--	--	--	0.02
Pygmy Rockfish	--	--	0.00	--	--	NA	0.04	--	--	--	--	--	--	0.92	0.96
Redstripe Rockfish	0.02	0.00	0.17	0.00	--	NA	0.00	0.00	--	0.01	--	0.01	--	8.16	8.38
Rosethorn Rockfish	--	0.18	1.94	0.41	--	NA	0.00	0.01	2.29	--	--	0.00	--	0.46	5.27
Rosy Rockfish	--	--	0.01	--	--	NA	--	--	--	--	--	0.00	--	--	0.02
Shelf Rockfish Unid	0.03	0.09	2.33	0.79	0.03	NA	2.12	0.16	16.65	--	--	--	--	--	24.37
Silvergray Rockfish	0.27	0.15	0.30	0.07	--	NA	--	0.00	0.01	0.01	--	0.01	--	0.21	1.03
Squarespot Rockfish	--	--	--	--	--	NA	--	--	--	--	--	--	--	0.00	0.00
Starry Rockfish	--	--	0.00	--	--	NA	--	--	--	--	--	--	0.01	--	0.01
Stripetail Rockfish	--	0.00	0.36	0.00	--	NA	0.63	0.01	--	--	--	--	--	0.69	1.69
Tiger Rockfish	--	--	--	0.01	0.29	NA	0.00	--	--	--	0.17	0.68	0.17	0.01	1.34
Vermilion Rockfish	--	--	--	0.04	4.06	NA	--	0.00	--	--	0.97	6.62	10.94	0.00	22.63

Note: A value is (--) when the species was neither caught nor discarded (no value). Values appear as 0.00 when a value is smaller than two decimal places.

Table 15 (continued).

	Commercial fisheries														
	IFQ/Coop Management										Recreational fishing mortality				
Weight (mt)	Non-tribal At-sea hake	Non-tribal shoreside hake	Non-hake IFQ	Non-nearshore fixed gear	Nearshore fixed gear	OA CA halibut	Pink shrimp	Incidental fisheries landings	WA tribal landings	WA tribal at-sea	WA	OR	CA	Research	Estimated fishing mortality
Minor shelf rockfish (South of 40°10' N. lat.)															
Chameleon Rockfish	--	--	--	--	0.10	--	--	--	NA	NA	NA	NA	--	--	0.10
Flag Rockfish	--	--	--	0.20	0.01	--	--	0.00	NA	NA	NA	NA	8.08	0.01	8.30
Freckled Rockfish	--	--	--	0.00	--	--	--	--	NA	NA	NA	NA	--	0.00	0.00
Greenblotched Rockfish	--	--	0.00	0.10	0.00	--	--	--	NA	NA	NA	NA	1.26	0.07	1.43
Greenspotted Rockfish	--	--	0.04	0.82	0.02	0.01	--	0.02	NA	NA	NA	NA	17.31	0.30	18.53
Greenstriped Rockfish	--	--	0.35	0.06	0.01	--	--	--	NA	NA	NA	NA	--	0.25	0.68
Halfbanded Rockfish	--	--	0.05	--	--	--	--	--	NA	NA	NA	NA	0.99	1.29	2.33
Honeycomb Rockfish	--	--	--	0.03	--	--	--	--	NA	NA	NA	NA	8.02	0.00	8.05
Pygmy Rockfish	--	--	0.00	--	--	--	--	--	NA	NA	NA	NA	--	0.00	0.00
Redstripe Rockfish	--	--	0.00	--	--	--	--	--	NA	NA	NA	NA	--	--	0.00
Rosethorn Rockfish	--	--	0.05	0.03	0.03	--	--	--	NA	NA	NA	NA	--	0.01	0.12
Rosy Rockfish	--	--	0.00	0.05	0.38	--	--	0.00	NA	NA	NA	NA	5.79	0.01	6.23
Shelf Rockfish Unid	--	--	0.03	0.18	0.36	--	--	0.06	NA	NA	NA	NA	--	--	0.63
Silvergray Rockfish	--	--	--	--	--	--	--	--	NA	NA	NA	NA	--	0.00	0.00
Speckled Rockfish	--	--	0.00	0.09	0.05	--	--	0.00	NA	NA	NA	NA	8.02	0.08	8.24
Squarespot Rockfish	--	--	0.00	0.00	--	--	--	--	NA	NA	NA	NA	5.51	0.02	5.53
Starry Rockfish	--	--	--	0.23	0.16	--	--	0.02	NA	NA	NA	NA	22.17	0.02	22.60
Stripetail Rockfish	--	--	2.42	--	--	--	--	--	NA	NA	NA	NA	--	1.46	3.88
Swordspine Rockfish	--	--	--	--	--	--	--	--	NA	NA	NA	NA	--	0.16	0.16
Tiger Rockfish	--	--	--	--	--	--	--	--	NA	NA	NA	NA	0.27	--	0.27
Vermilion Rockfish	--	--	--	8.81	7.20	--	--	0.66	NA	NA	NA	NA	184.28	1.94	202.89
Yellowtail Rockfish	--	--	0.03	0.36	0.61	--	--	0.13	NA	NA	NA	NA	44.49	0.46	46.09
Minor slope rockfish (North of 40°10' N. lat.)															
Aurora Rockfish	0.10	0.28	19.86	0.10	--	NA	0.12	0.00	0.05	--	--	--	--	0.14	20.66
Bank Rockfish	0.02	0.04	0.27	0.23	--	NA	0.00	0.00	0.01	--	--	--	--	0.12	0.67
Blackgill Rockfish	0.00	--	3.26	1.34	0.00	NA	0.01	0.01	0.00	--	--	--	--	0.01	4.64
Blackspotted Rockfish	--	0.12	0.65	0.29	--	NA	--	0.00	0.02	--	--	--	--	--	1.09
Red Banded Rockfish	0.00	--	--	--	--	NA	--	--	--	--	--	--	--	0.15	0.15
Redbanded Rockfish	--	0.14	5.41	17.84	0.01	NA	0.06	0.07	8.18	--	--	--	--	--	31.70
Rougheye Rockfish	78.38	2.74	66.48	40.42	0.00	NA	0.01	0.27	16.06	2.40	--	--	--	0.34	207.11
Sharpchin Rockfish	0.01	0.01	1.50	--	--	NA	0.04	--	0.00	--	--	--	--	4.92	6.48
Shortraker Rockfish	0.18	1.75	21.98	2.98	--	NA	--	0.01	1.26	--	--	--	--	0.09	28.26
Shortraker/Rougheye Rockfish	0.01	--	0.18	0.15	--	NA	--	--	--	--	--	--	--	--	0.34
Slope Rockfish Unid	--	1.35	5.14	2.25	--	NA	0.00	0.09	1.10	--	--	--	--	--	10.37
Splitnose Rockfish	11.90	3.69	9.02	0.18	0.00	NA	2.03	0.00	0.08	0.19	--	--	--	2.11	29.21
Yellowmouth Rockfish	0.07	--	0.38	0.05	--	NA	--	--	--	0.00	--	--	--	0.18	0.68

Note: A value is (--) when the species was neither caught nor discarded (no value). Values appear as 0.00 when a value is smaller than two decimal places.

Table 15 (continued).

	Commercial fisheries														
	IFQ/Coop Management														
	Non-tribal	Non-tribal		Non-	Nearshore	OA		Incidental	WA	WA	Recreational				Estimated
	At-sea	shoreside	Non-hake	nearshore	fixed	CA	Pink	fisheries	tribal	tribal	fishing mortality				fishing
Weight (mt)	hake	hake	IFQ	fixed gear	gear	halibut	shrimp	landings	landings	at-sea	WA	OR	CA	Research	mortality
Minor slope rockfish (South of 40°10' N. lat.)															
Aurora Rockfish	--	--	6.07	0.62	--	--	--	--	NA	NA	NA	NA	--	0.30	7.00
Bank Rockfish	--	--	27.82	1.10	0.00	--	--	--	NA	NA	NA	NA	0.23	0.05	29.20
Blackgill Rockfish	--	--	15.99	133.62	0.37	--	--	--	NA	NA	NA	NA	--	0.29	150.27
Pacific Ocean Perch Rockfish	--	--	0.03	--	--	--	--	--	NA	NA	NA	NA	--	--	0.03
Redbanded Rockfish	--	--	0.19	0.32	0.00	--	--	0.02	NA	NA	NA	NA	--	0.01	0.54
Rougheye Rockfish	--	--	0.02	0.34	--	--	--	--	NA	NA	NA	NA	--	--	0.36
Sharpchin Rockfish	--	--	0.01	--	--	--	--	--	NA	NA	NA	NA	--	0.39	0.40
Slope Rockfish Unid	--	--	1.92	1.68	0.01	--	--	0.06	NA	NA	NA	NA	--	--	3.68
Spotted Rockfish Unid	--	--	0.01	--	--	--	--	--	NA	NA	NA	NA	--	--	0.01
Mixed thornyheads															
Shortspine/ Longspine Thornyhead	0.13	--	4.68	1.07	0.00	--	--	0.02	--	--	--	--	--	--	5.90
Other flatfish															
Butter Sole	--	--	0.85	--	--	--	--	--	--	--	--	0.01	--	0.04	0.90
Curlfin Turbot	--	--	1.40	0.00	--	0.28	0.00	--	--	--	--	--	--	0.09	1.78
Flatfish Unid	0.00	0.00	6.51	0.17	0.00	1.23	12.69	1.87	0.97	--	1.82	0.00	--	0.07	25.33
Flathead Sole	0.00	--	6.37	--	--	--	1.29	--	--	--	--	--	--	0.28	7.94
Pacific Sanddab	0.00	0.00	231.74	4.09	1.15	1.42	2.68	0.03	--	--	--	0.07	78.61	9.32	329.12
Rex Sole	5.86	0.85	378.99	0.00	0.00	0.00	22.29	--	29.86	0.01	--	--	--	6.20	444.07
Rock Sole	--	--	2.67	0.00	0.07	0.17	0.09	0.05	3.23	--	--	0.00	1.3	0.12	7.70
Sand Sole	--	--	70.09	0.00	0.19	8.45	--	0.44	0.03	--	--	0.33	1.08	0.04	80.65
Sanddab Unid	--	--	4.44	0.03	0.00	0.14	0.70	0.04	18.44	--	--	--	--	--	23.79
Other groundfish															
Big Skate	0.17	0.24	34.62	1.81	0.02	36.65	0.57	0.00	--	0.08	--	0.04	--	3.97	78.16
Cabezon	--	--	0.00	--	--	--	--	--	--	--	6.79	--	--	--	6.79
California Skate	--	--	3.14	--	--	6.07	--	--	--	--	--	--	--	0.38	9.58
Grenadier Unid	0.13	--	89.82	34.28	0.61	--	--	--	--	--	--	--	--	--	124.84
Groundfish Unid	--	0.28	0.00	--	--	--	--	--	--	--	--	--	--	7.88	8.17
Kelp Greenling	--	--	0.06	--	23.65	--	--	0.01	--	--	2.03	26.16	22.63	0.03	74.57
Leopard Shark	--	--	0.09	0.16	0.18	5.52	--	1.93	--	--	--	--	13.38	--	21.26
Pacific Flatnose	--	--	3.48	2.23	--	--	--	--	--	--	--	--	--	--	5.71
Pacific Grenadier	0.03	--	61.19	50.22	--	--	--	--	--	--	--	--	--	3.94	115.38
Roundfish Unid	0.01	--	0.02	--	--	--	--	--	--	--	--	--	--	--	0.03
Soupfin Shark	0.12	0.51	0.50	0.25	0.05	1.70	--	1.95	--	--	--	0.03	--	--	5.11
Spiny dogfish	725.07	181.04	394.97	129.51	0.27	0.54	2.89	0.08	127.72	58.45	0.23	0.11	9.26	31.52	1,661.66
Spotted Ratfish	--	0.00	70.76	3.56	0.02	0.07	0.17	--	--	--	--	--	--	--	74.58
Unspecified skate	0.00	0.58	277.60	10.36	0.04	2.70	2.66	6.04	34.12	--	--	--	--	--	334.09
Other rockfish	--	--	0.00	0.36	0.33	--	--	0.03	--	--	--	--	--	0.01	0.74

Note: A value is (--) when the species was neither caught nor discarded (no value). Values appear as 0.00 when a value is smaller than two decimal places.

Table 15 (continued).

	Commercial fisheries														
	IFQ/Coop Management														
	Non-tribal	Non-tribal		Non-	Nearshore	OA		Incidental	WA	WA	Recreational				Estimated
	At-sea	shoreside	Non-hake	nearshore	fixed	CA	Pink	fisheries	tribal	tribal	fishing mortality				fishing
Weight (mt)	hake	hake	IFQ	fixed gear	gear	halibut	shrimp	landings	landings	at-sea	WA	OR	CA	Research	mortality
Pacific cod	0.01	6.59	251.36	2.37	--	--	0.07	0.07	338.96	0.03	1.58	0.02	--	5.47	606.52
Pacific hake	121,572.29	90,758.68	219.77	1.55	--	--	282.09	--	11,756.35	6,343.63	--	--	--	1,061.88	231,996.22
Sablefish (North of 36° N. lat.)	4.98	30.39	2,363.53	2,389.17	1.42	--	0.10	19.30	535.77	0.08	--	0.49	0.03	16.91	5,362.16
Sablefish (South of 36° N. lat.)	--	--	452.61	755.69	8.79	0.01	--	1.82	NA	NA	NA	NA	--	1.07	1,219.99
Shortbelly rockfish	--	0.00	10.55	--	--	--	0.21	--	--	--	--	--	--	1.45	12.21
Shortspine thornyhead (North of 34°27' N. lat.)	13.28	2.18	714.90	72.92	0.02	--	0.21	0.09	19.48	0.00	--	--	NA	4.31	827.40
Shortspine thornyhead (South of 34°27' N. lat.)	--	--	6.12	175.71	1.14	--	--	0.14	NA	NA	NA	NA	--	0.41	183.53
Splitnose rockfish (South of 40°10' N. lat.)	--	--	39.53	0.11	--	--	--	--	NA	NA	NA	NA	--	2.10	41.74
Starry flounder	--	--	11.67	0.01	0.06	8.22	--	0.12	0.02	--	--	3.03	1.24	0.07	24.45
Widow rockfish	36.90	123.07	14.52	0.06	0.06	--	0.04	0.02	35.98	1.46	--	0.53	1.34	2.20	216.20
Yellowtail rockfish (North of 40°10' N. lat.)	81.24	424.33	314.25	1.21	0.93	NA	0.28	0.99	440.51	19.81	37.97	12.38	1.45	16.57	1,351.92
Non-groundfish species															
California halibut	--	--	12.00	0.45	1.31	85.98	7.58	101.60	--	--	--	0.09	--	--	209.01
California sheephead	--	--	--	--	30.67	--	--	0.20	--	--	--	--	40.91	--	71.78
Dungeness crab	0.00	0.03	203.86	2.91	1.80	65.55	0.06	24,233.29	1,815.27	--	--	--	--	0.02	26,322.79
Non-FMP flatfish															
Bigmouth Sole	--	--	--	0.00	--	--	--	--	--	--	--	--	--	--	0.00
C-O (C-O Turbot) Sole	--	--	0.00	--	--	--	0.00	--	--	--	--	--	--	--	0.00
Deepsea Sole	--	--	20.20	0.00	--	0.94	--	0.03	--	--	--	--	--	--	21.17
Diamond Turbot	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	0.00
Fantail Sole	--	--	--	--	0.00	0.62	--	0.00	--	--	--	--	--	--	0.62
Hornyhead Turbot	--	--	0.06	--	0.01	1.20	4.49	0.05	--	--	--	--	--	--	5.81
Longfin Sanddab	--	--	--	--	--	0.00	--	--	--	--	--	--		--	0.00
Slender Sole	0.03	--	19.67	0.00	--	0.00	118.78	0.00	--	--	--	--	--	--	138.49
Speckled Sanddab	--	--	--	--	--	0.03	--	--	--	--	--	--	--	--	0.03
Non-FMP skate															
Aleutian Skate	--	--	1.66	--	--	--	0.00	--	--	--	--	--	--	--	1.66
Banded Guitarfish	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	0.00
Black Skate	--	0.01	24.73	3.90	--	--	0.00	--	--	--	--	--	--	--	28.64
Butterfly Ray	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--	0.00
Deepsea Skate	--	--	0.96	0.12	--	--	--	--	--	--	--	--	--	--	1.08
Flathead Skate	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	0.01
Pacific Electric Ray	0.01	--	0.75	--	--	0.59	--	--	--	--	--	--	--	0.02	1.37
Pelagic Stingray	--	--	--	0.08	--	--	--	--	--	--	--	--	--	--	0.08
Roughshoulder/Broad Skate	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--	0.03
Sandpaper Skate	0.00	--	31.38	2.55	--	--	0.03	--	--	--	--	--	--	--	33.96
Shovelnose Guitarfish	--	--	--	--	--	2.10	--	--	--	--	--	--	--	--	2.10
Starry Skate	--	--	0.07	--	0.01	0.13	0.00	--	--	--	--	--	--	--	0.20
Thornback Skate	--	--	0.03	--	--	0.77	--	--	--	--	--	--	--	--	0.79
White Skate	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	0.01

Note: A value is (--) when the species was neither caught nor discarded (no value). Values appear as 0.00 when a value is smaller than two decimal places.

Table 16. Estimated fishing mortality (mt) of major west coast groundfish species in 2011 and corresponding management reference points (harvest specifications).

		Management reference points (harvest specifications)					
	Estimated fishing mortality (mt)	**ACL** (mt)	Estimated mortality (% of ACL)	**ABC** (mt)	Estimated mortality (% of ABC)	**OFL** (mt)	Estimated mortality (% of OFL)
Rebuilding species							
Bocaccio (South of 40°10' N. lat.)	112	263	43%	704	16%	737	15%
Canary rockfish	52	102	51%	586	9%	614	9%
Cowcod (South of 40°10' N. lat.)	1	3	33%	10	10%	13	8%
Darkblotched rockfish	133	298	45%	485	27%	508	26%
Pacific ocean perch (North of 40°10' N. lat.)	62	180	34%	981	6%	1026	6%
Petrale sole	953	976	98%	976	98%	1021	93%
Yelloweye rockfish	9	17	52%	46	19%	48	18%
Non-rebuilding species							
Arrowtooth flounder	2666	15174	18%	15174	18%	18211	15%
Black rockfish (North of 46°16' N. lat.)	208	426	49%	426	49%	445	47%
Black rockfish (South of 46°16' N. lat.)	523	1000	52%	1163	45%	1217	43%
Cabezon (California)	50	179	28%	179	28%	187	27%
Cabezon (Oregon)	48	50	96%	50	96%	52	92%
California scorpionfish (South of 34°27' N. lat.)	104	135	77%	135	77%	141	74%
Chilipepper rockfish (South of 40°10' N. lat.)	329	1981	17%	1981	17%	2073	16%
Dover sole	7927	25000	32%	42436	19%	44400	18%
English sole	205	19761	1%	19761	1%	20675	1%
Lingcod (North of 42° N. lat.)	588	2330	25%	2330	25%	2438	24%
Lingcod (South of 42° N. lat.)	264	2102	13%	2102	13%	2523	10%
Longnose Skate	1133	1349	84%	2990	38%	3128	36%
Other flatfish	921	4884	19%	7044	13%	10146	9%
Other groundfish	2521	5575	45%	7742	33%	11150	23%
Minor rockfish (North of 40°10' N. lat.)	526	2227	24%	3363	16%	3767	14%
Nearshore	99	99	100%	99	100%	116	85%
Shelf	85	968	9%	1940	4%	2188	4%
Slope	341	1160	29%	1324	26%	1462	23%
Unspecified remaining rockfish							
Minor rockfish (South of 40°10' N. lat.)	964	2341	41%	3723	26%	4302	22%
Nearshore	436	1001	44%	1001	44%	1156	38%
Shelf	336	714	47%	1885	18%	2238	15%
Slope	191	626	31%	836	23%	907	21%
Unspecified remaining rockfish							
Pacific cod (North of 43° N. lat.)	607	1600	38%	2222	27%	3200	19%
Pacific hake	231996	290903	80%	NA	NA	719370	32%
Sablefish (North of 36° N. lat.)	5362	5515	97%	8418	78%	8808	75%
Sablefish (South of 36° N. lat.)	1220	1298	94%				
Shortbelly rockfish	12	50	24%	5789	0%	6950	0%
Splitnose rockfish (South of 40°10' N. lat.)	42	1461	3%	1461	3%	1529	3%
Starry flounder	24	1352	2%	1502	2%	1802	1%
Thornyheads							
Longspine thornyhead (North of 34°27' N. lat.)	961	2119	45%	2981	33%	3577	28%
Longspine thornyhead (South of 34°27' N. lat.)	23	376	6%				
Shortspine thornyhead (North of 34°27' N. lat.)	827	1573	53%	2279	44%	2384	42%
Shortspine thornyhead (South of 34°27' N. lat.)	184	405	45%				
Mixed thornyheads	6						
Widow rockfish	216	600	36%	4872	4%	5097	4%
Yellowtail rockfish (North of 40°10' N. lat.)	1352	4364	31%	4364	31%	4566	30%

NOAA FISHERIES
Northwest Fisheries Science Center

Groundfish Science Report

Michelle McClure and John Stein

November 4, 2012

Overview

- **Data-Moderate Assessments – Overview**
- **Process Straw Dog Using Data-Moderate Assessments**
- **Groundfish Total Mortality Report**

Data-Moderate Assessments

What is a data-moderate assessment?

Council Assess. **Tier**	Assessment type	Data types; **Model attributes**	Catch Buffer (OFL-ABC)
3	Data Poor (DCAC; DB-SRA; SSS)	Catch, basic life history	Highest
2	Data Moderate (XDB-SRA; exSSS)	Catch, basic life history, abundance indices; No recruitment/selectivity estimation	Medium
1	**Full** Stock Synthesis (SS)	Catch, detailed life history, indices, length/age comps, environmental indices; Complex structure poss.	Lowest

Why Use a Data-Moderate Assessment

- Data Availability -- often not there

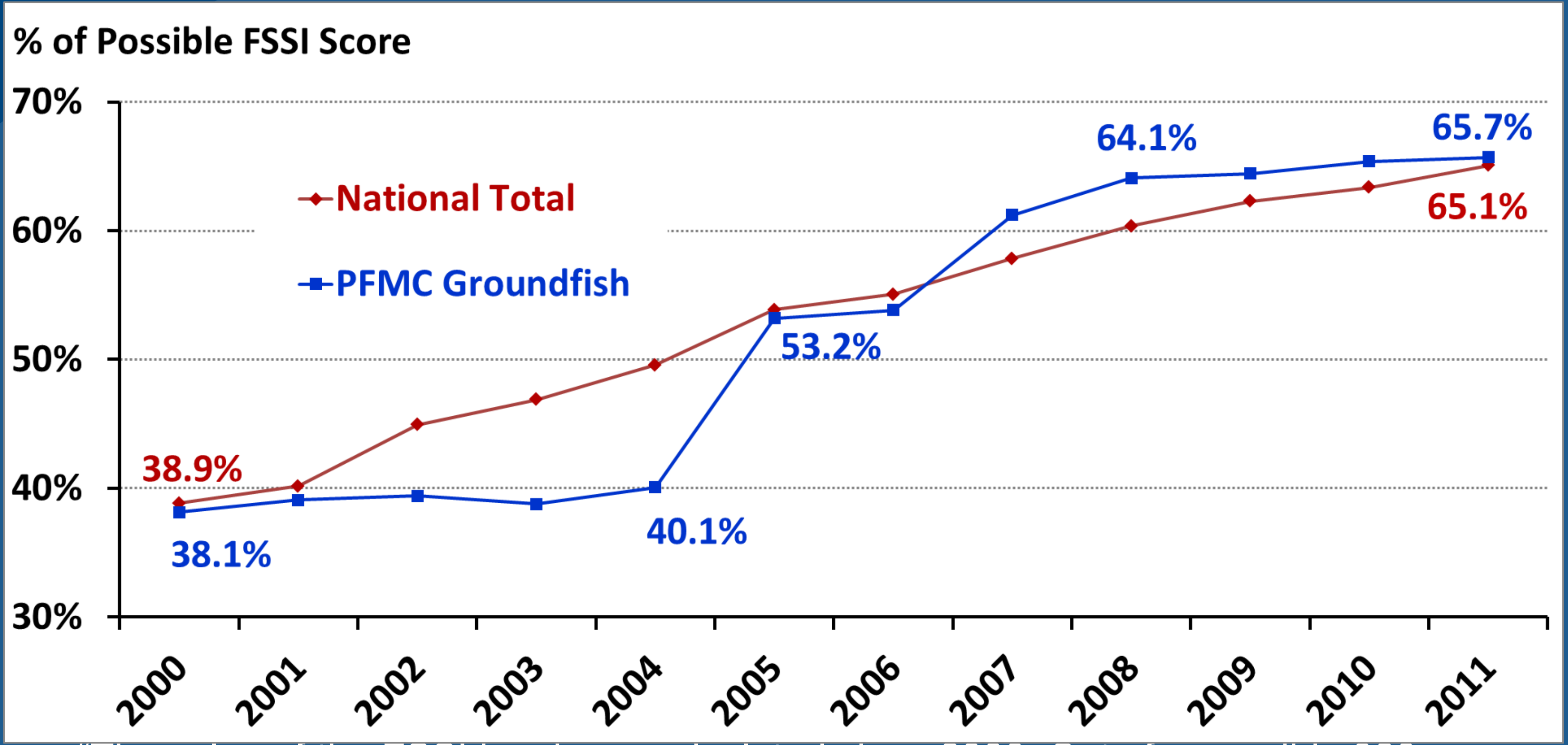
- Meet National requirements
  - More adequate assessments

FSSI – Fishery Stock Sustainability Index

- Tracks a fixed list of species over time
  - Includes 39 stocks from PFMC Groundfish FMP
- Points are awarded based on knowledge of stock and fishing status, and the level of status, based on adequate assessments less than 6 years old:

SCORING	Stock Condition	Pts	Fishery Condition	Pts
Points are cumulative	"Overfished" status is known	0.5	"Overfishing" status is known	0.5
A total of 4 points are possible for each stock	Stock biomass is above the defined "overfished" level	1.0	"Overfishing" is not occurring	1.0
	Stock biomass >= 80% of B_{MSY} target	1.0		

FSSI in Annual Report to Congress: A scorecard for measuring performance



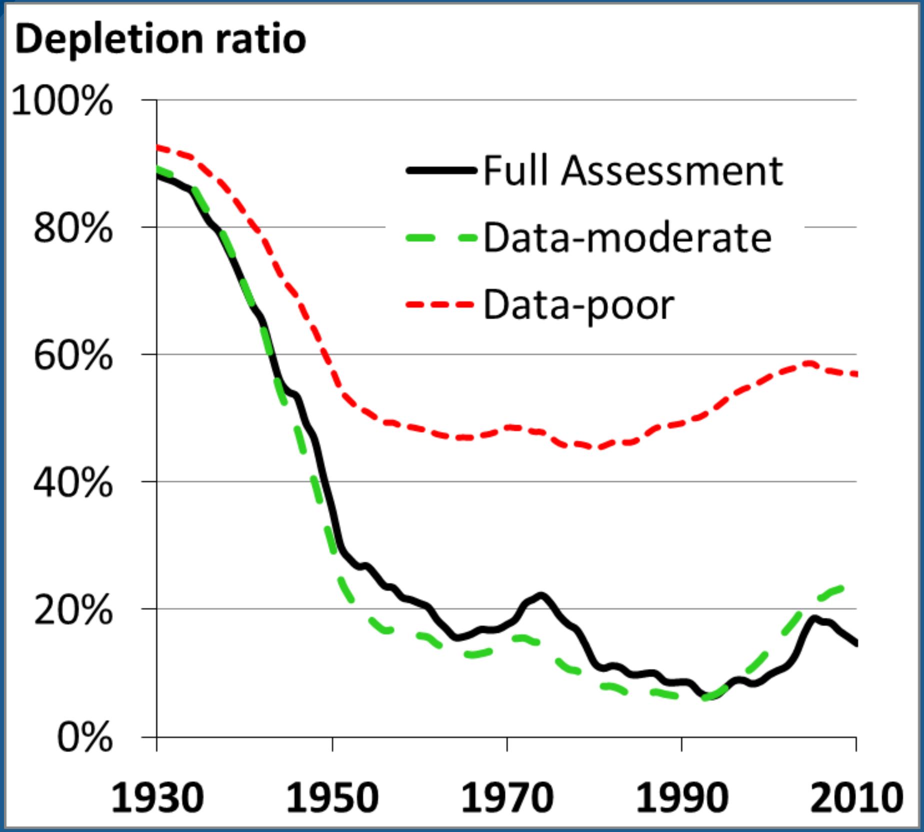
"The value of the FSSI has been calculated since 2000. Out of a possible 920 points, the index has increased from 357.5 in 2000 to 598.5 in 2011. This 67 percent increase represents significant progress in managing our fisheries sustainably."

– 2011 Report to Congress

Examples of good Data-Moderate Performance

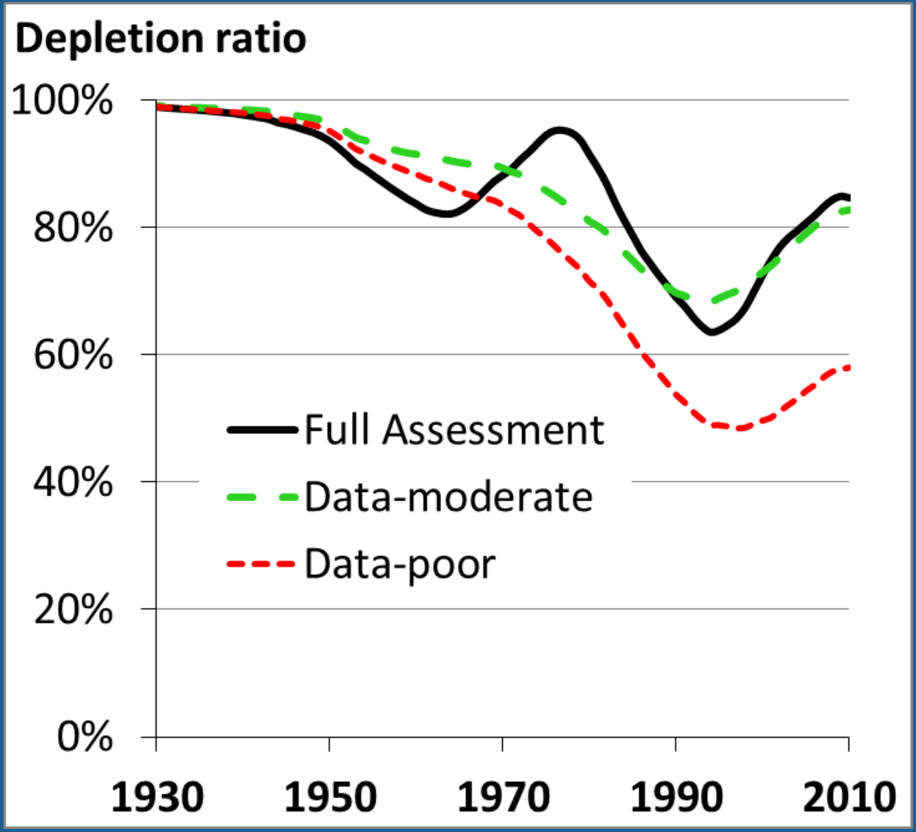
Petrale sole

Data-poor <u>over</u>estimates status.



Dover sole

Data-poor <u>under</u>estimates status.



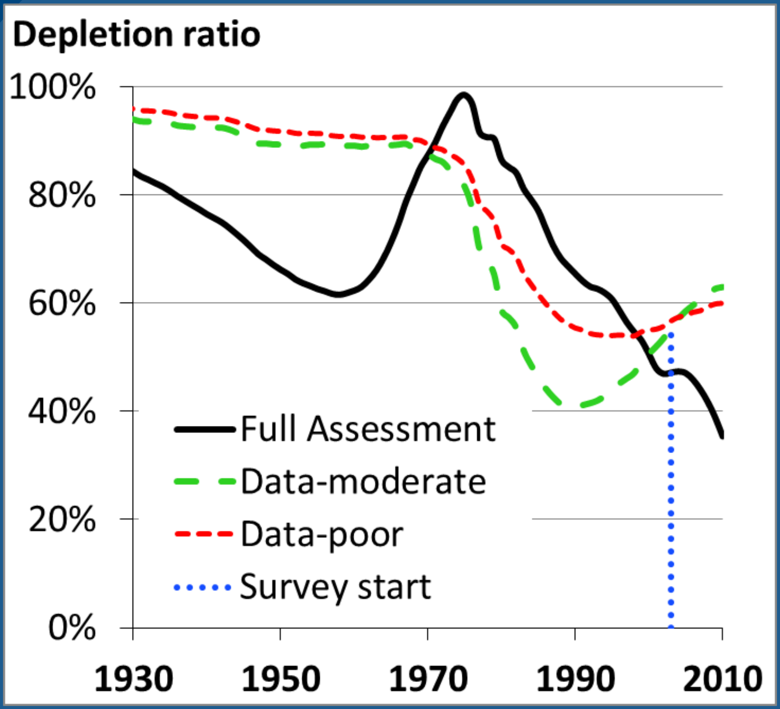
Data-Moderate Assessments

Data-moderate assessments are easier to conduct and review than full assessments, because the required assumptions and restrictions on data types:

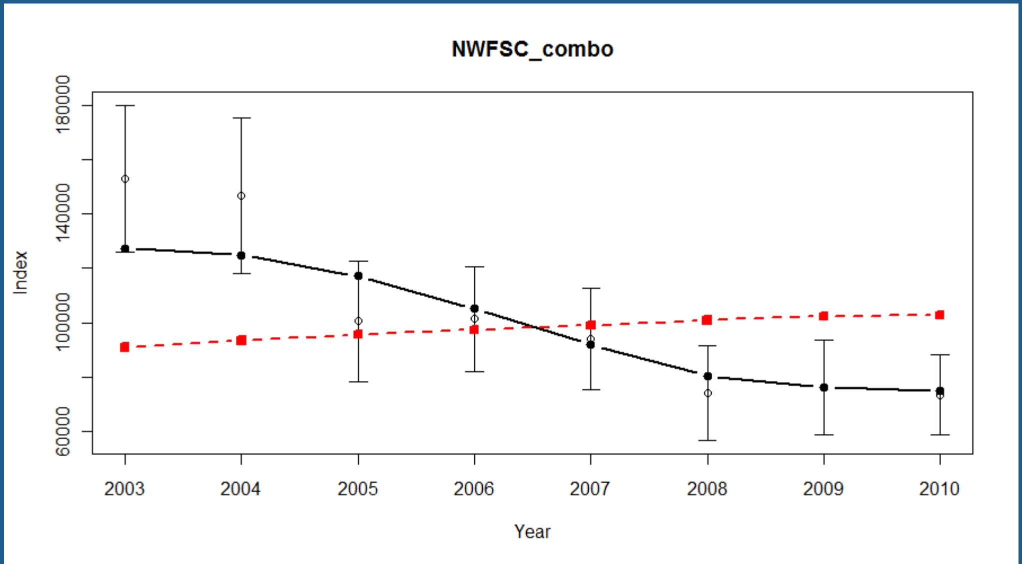
- Limit the number of alternative model structures and sensitivities that can be explored.
- Reduce the time needed to review the model and its performance diagnostics
- Provide fewer review-panel options for model exploration between acceptance and rejection, expediting the review process

Determining whether a data-moderate assessment “fits”

Sablefish



Mis-match between survey index and data-moderate assessment for sablefish



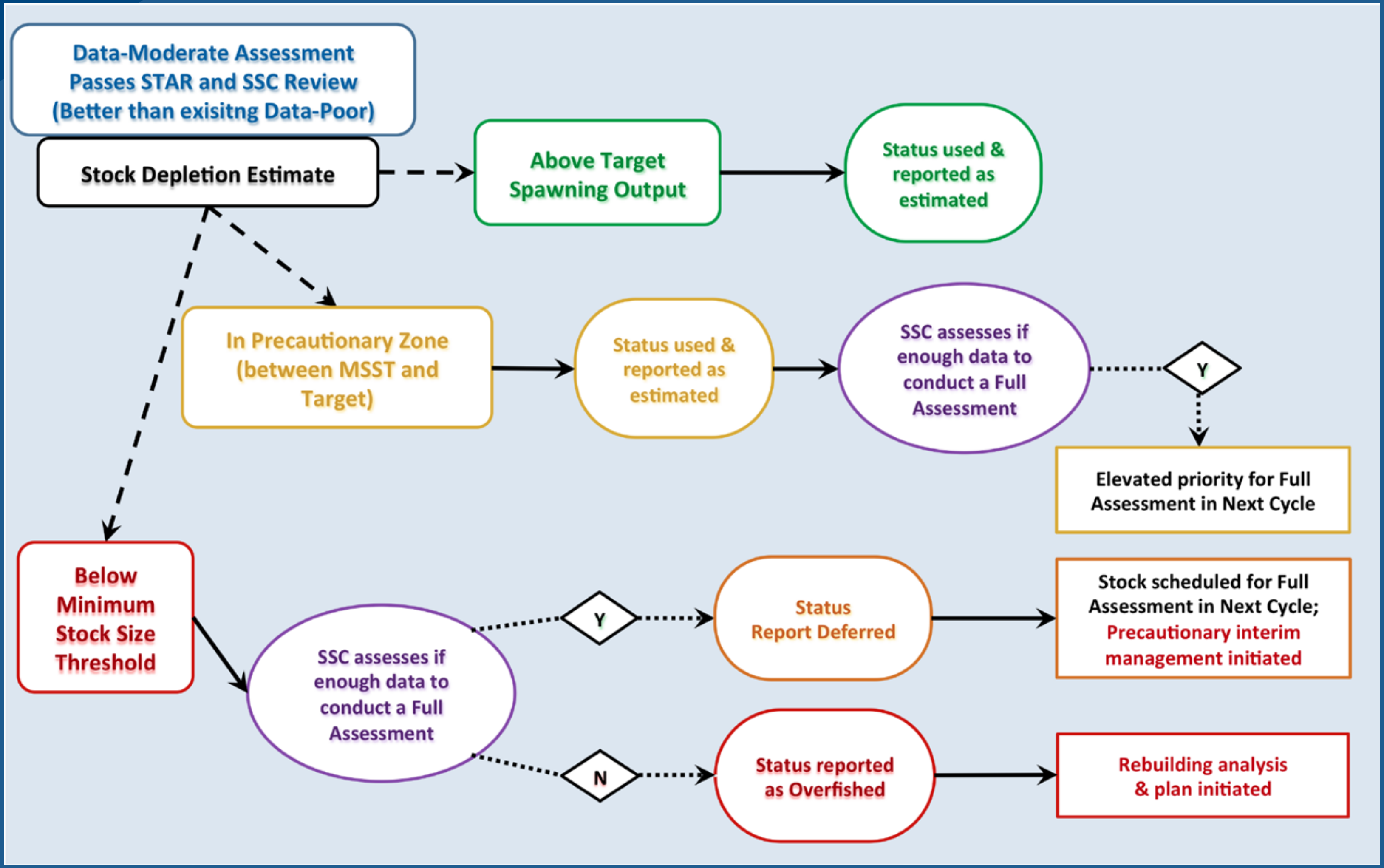
Data-Moderate Assessments

- Improve FSSI score, with limited resources
  - Indicate progress; Show return on investment for past increases in assessment funding
  - PFMC Groundfish score has stagnated, due to:
    - Limitations imposed by the STAR process
    - Focus on rebuilding species
    - Reduction in non-NMFS participation in assessments
- Provide the Council with improved information for management
  - Improved OFL estimates and smaller uncertainty reductions used in setting ABCs
  - Estimates of depletion that do not rely on *assumptions* about the current depletion level

Proposal for a Process –
Using Data-Moderate Assessments in Status Determinations.

For more work by committee

Proposed Approach for Use of Stock-Status Estimates from Data-Moderate Assessments



Groundfish Total Mortality Report

Estimated Discard and Catch of Groundfish Species in the 2011 US West Coast Fisheries

- Report and Excel tables (Bellman et al. 2012)

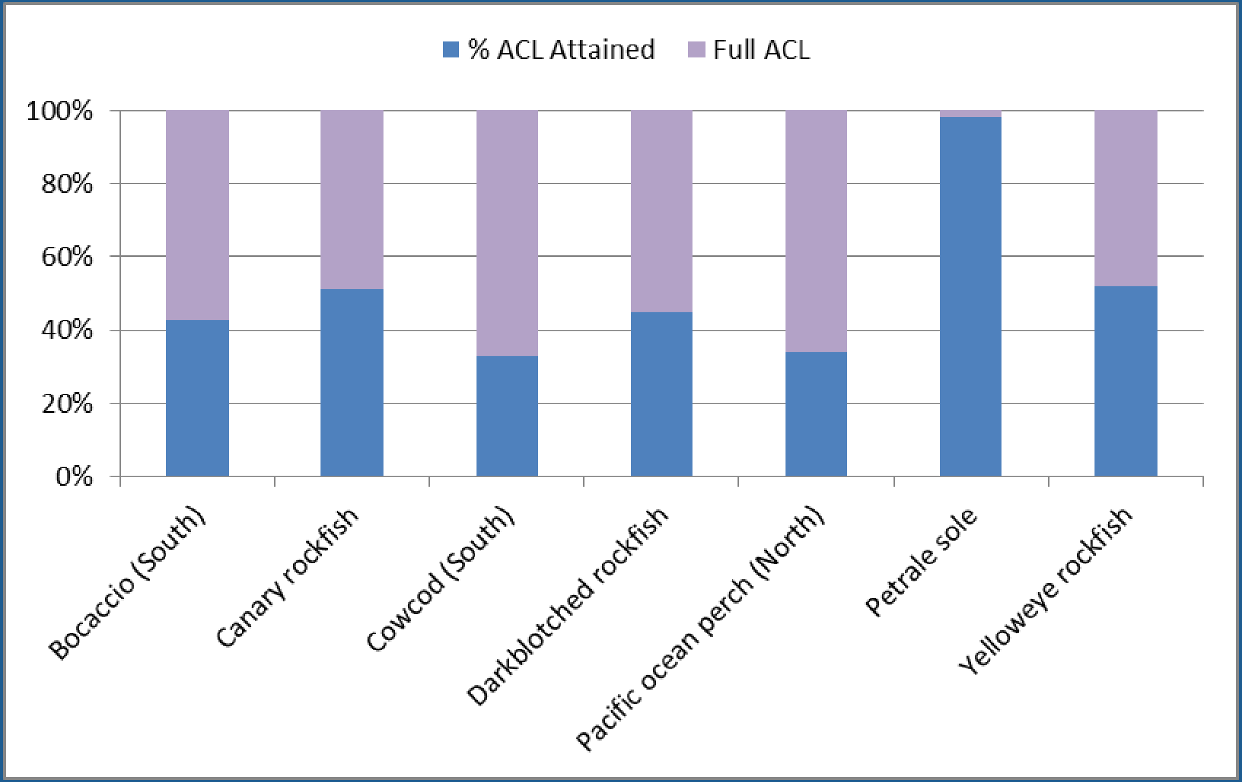
http://www.nwfsc.noaa.gov/research/divisions/fram/observer/species_management.cfm

- Major updates:
  - Harvest guidelines (ACL, OFL vs. old OY, ABC)
  - Species-specific reporting
  - IFQ/Coop management and methods

Groundfish - 2011 US West Coast Fisheries

Estimated fishing mortality – rebuilding spp.

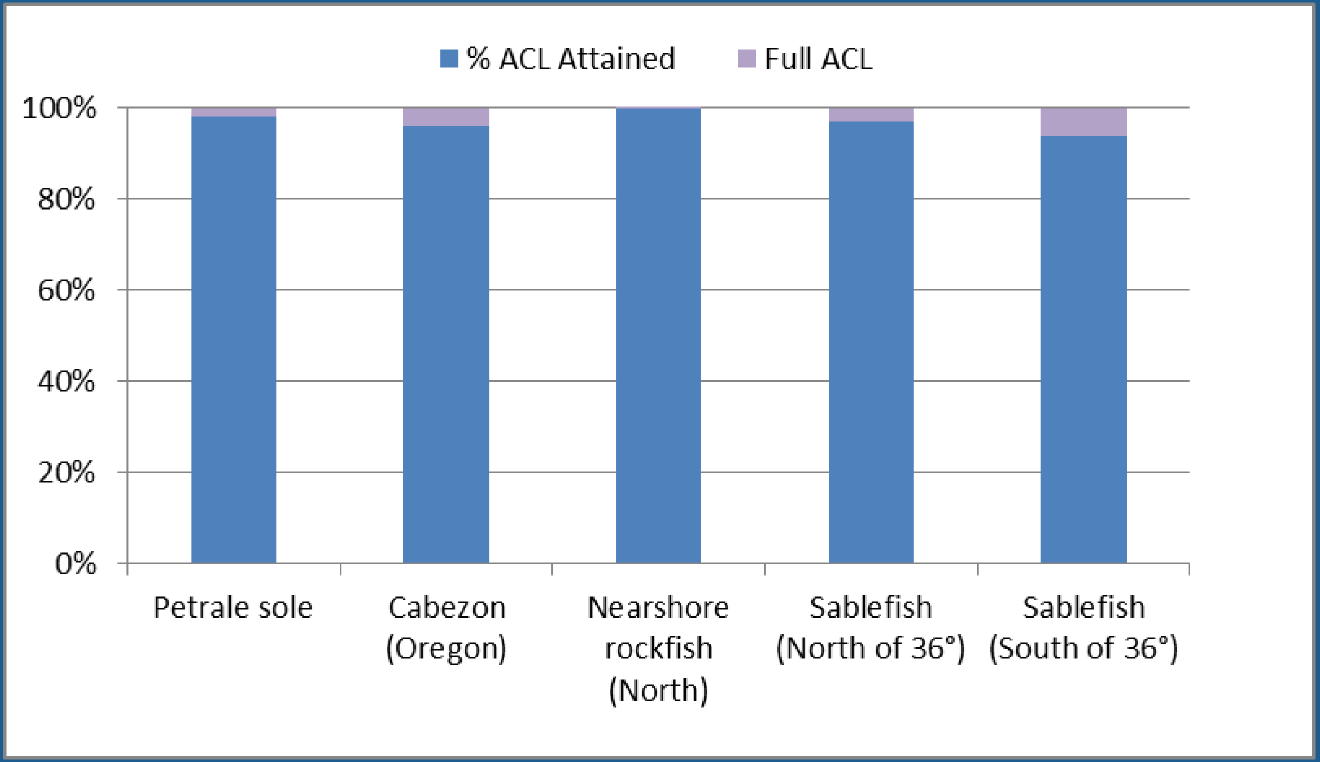
- All species within 2011 harvest guidelines



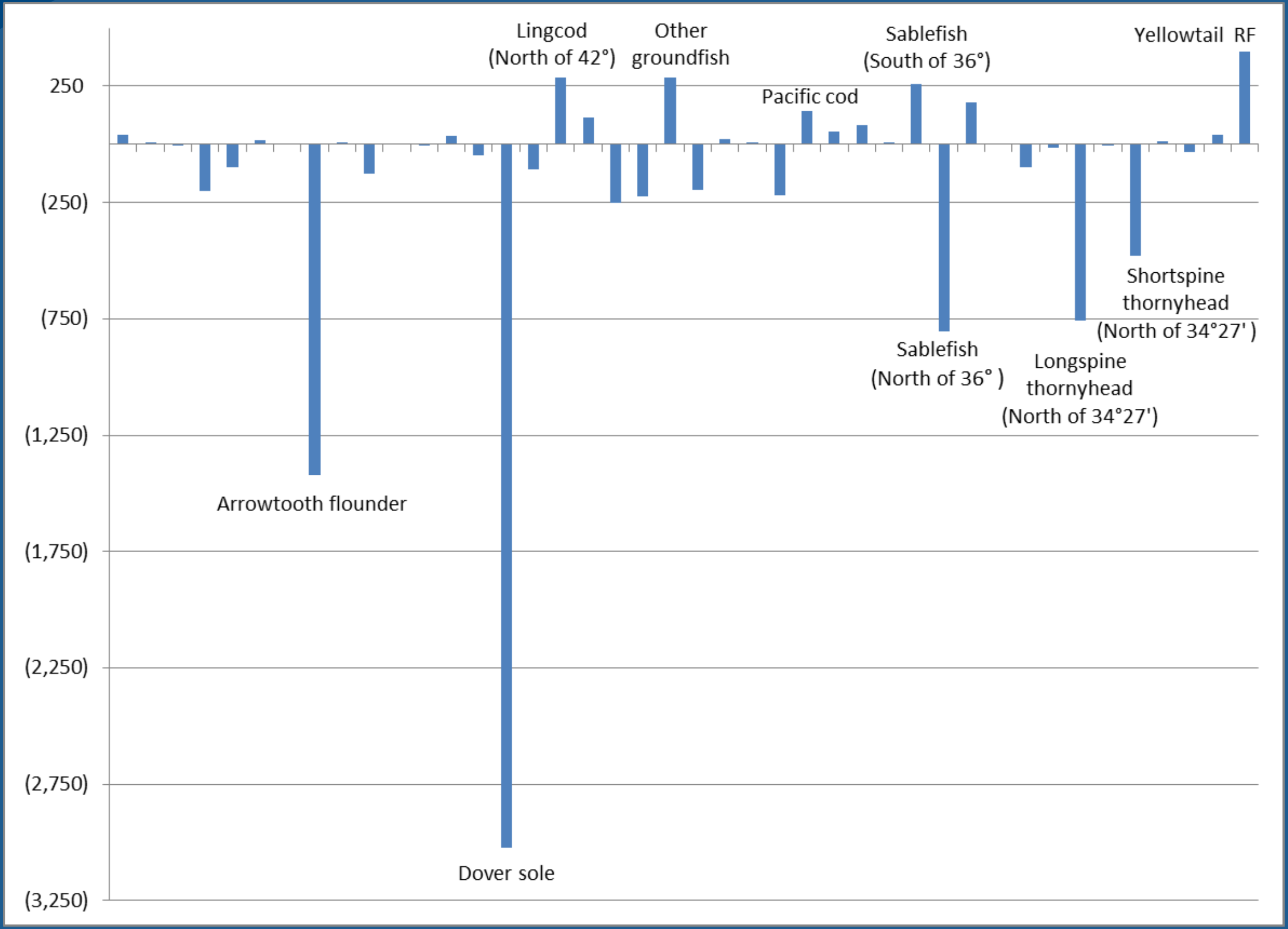
Groundfish - 2011 US West Coast Fisheries

Estimated fishing mortality

- Species within 90% of ACL



2011 versus 2010 (mt)



Alternate values with new mortality rates

		Without GMT Discard Mortality Rates	With Discard Mortality Rates
Longnose Skate			
Mortality		1133	969
ACL	1349	84%	72%
ABC	2990	38%	32%
OFL	3128	36%	31%
Spiny Dogfish (component of Other Groundfish)			
Mortality		2521	2448
ACL	5575	45%	44%
ABC	7742	33%	32%
OFL	11150	23%	22%

Alternate values with new mortality rates

		Without GMT Discard Mortality Rate	With GMT Discard Mortality Rate
Longnose Skate (mt)			
2011 Mortality		1133	969
ACL	1349	84%	72%
ABC	2990	38%	32%
OFL	3128	36%	31%
Spiny Dogfish (mt)			
2011 Mortality		1662	1589
(Species Contribution to Other Fish Complex)			
ABC	1100	76%	72%
OFL	2200	76%	72%

Original slide (#19) and presentation did not fully explain that spiny dogfish contribution was included in the numbers for the 'Other Groundfish' OFL/ABC/ACL. This slide separates out spiny dogfish mortality only and demonstrates that this species did not reach management targets.

2011 WCGOP Observer Coverage

IFQ Fishery	Coverage Rate (Hauls)
Trawl Gear	94.8% (of catch)
Hook-and-Line Gear	99.9% (of catch)
Pot Gear	99.7% (of catch)
Shoreside Hake	99.9% (of Pacific hake catch)
LE California Halibut	99.0% (of CA halibut landings)

100% of IFQ fishing trips in 2011 carried an observer.

Fishery	Coverage Rate (% Fleet Landings)	Trend (relative to 2010)
LE Sablefish Primary	25%	Lower, but landings down
LE Non-sablefish Fixed Gear	10%	Higher, but landings increase
Nearshore Fixed Gear	6%	Higher, but landings increase
Pink Shrimp Trawl	14%	Higher, but landings increase
OA California Halibut	14%	Higher, but landings down
OA Fixed Gear	6%	Higher, but landings down

NOAA FISHERIES

NWFSC

Presentation and Discussion—
Joint Survey 2012 (Hake-Sardine)

Emerald Bay II

Monday, Nov. 5, 7 pm.

Agenda Item I.1.d
Supplemental SSC Report
November 2012

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON THE NATIONAL MARINE FISHERIES SERVICE REPORT

The (SSC) was asked to comment on the timing for implementation of discard mortality rates for longnose skate and spiny dogfish, adopted by the Council at the March 2012 meeting, in producing estimates for groundfish mortality reports.

Stock assessments for both species assume less than 100 percent discard mortality. At the March 2012 meeting, the SSC recommended that discard mortality assumptions be consistent between assessments and management. The assessment discard mortality assumptions are based on limited information, but they represent the best information available.

The SSC agrees that the best available scientific information should be used for catch accounting now. Moreover, ideally the recommended discard mortality rates should be applied retrospectively to longnose skate and spiny dogfish mortality estimates in groundfish mortality reports.

PFMC
11/03/12

AMENDMENT 24 (IMPROVEMENTS TO THE GROUNDFISH MANAGEMENT PROCESS)

At its March 2012 meeting the Council reviewed a staff white paper (Agenda Item F.4.a, Attachment 1) outlining different ways to address problems that have become apparent in the current biennial process for developing and implementing harvest specifications and management measures pursuant to the Council's Pacific Coast Groundfish Fishery Management Plan (Groundfish FMP). Presuming such changes would require an amendment to the Groundfish FMP, the Council formed the Ad Hoc Amendment 24 Workgroup and directed it to draft a purpose and objectives statement and develop a preliminary range of alternatives for the Council to consider at this meeting. The Workgroup met August 1-2 in Seattle, Washington, and held a teleconference on August 31 to draft and review a report in response to the Council's request. Attachment 1 is the Workgroup's report.

Ms. Gretchen Harrington, the NMFS NEPA Coordinator from the Alaska Region, participated in the Workgroup's August meeting and described the process used to set annual harvest specifications for groundfish in that region. There, a Programmatic Environmental Impact Statement (PEIS) was produced in 2007 evaluating the harvest specifications process. Since that time, the harvest specifications are evaluated in reference to whether the existing PEIS needs to be supplemented in light of criteria from Council on Environmental Quality regulations at 40 CFR 1502.9(c): whether there are substantial changes in the proposed action and/or significant new circumstance or information relevant to environmental concerns. Since then, a supplemental information report (SIR) has been prepared annually to address these questions and thus far the agency has concluded that the original PEIS need not be supplemented.

The Workgroup's first key recommendation for changing the current process is based on Ms. Harrington's description of the Alaska groundfish harvest specifications process. This would entail developing a comprehensive NEPA document evaluating the impacts of periodically adjusting harvest specifications and associated management measures over several biennial cycles for up to 10 years. The objective of preparing such a "Tier 1" NEPA document is to reduce the scope of subsequent analyses needed every 2 years when harvest specifications are changed. The Workgroup identified two possible approaches for subsequent biennial NEPA analyses. One, like the Alaska Groundfish model, would use the supplementation questions outlined above. The second approach would use the concept of "tiering" described in NEPA regulations: narrowly focused analyses are tiered from a previous broader NEPA analysis at the policy or program level, which in this case would evaluate impacts over the longer time period of up to 10 years.

To facilitate the longer-term Tier 1 impact evaluation, and to simplify periodic Council decisionmaking, the Workgroup's second key recommendation is for the Council to adopt default policies and procedures for determining annual catch limits (ACLs). These default policies and procedures would be used to compute allowable biological catch (ABC) values every 2 years without an explicit Council recommendation. The ABCs then serve as the "maximum permissible values" for determining ACLs. As part of the default policies and procedures, the Council would also identify upfront what additional factors would be used if the ACL were to be reduced from the ABC threshold. If circumstances warrant, the Council could depart from the default policies and procedures to determine ACLs; but this could trigger additional subsequent analysis if Council decisions are expected to result in environmental impacts outside the scope of those identified in the Tier 1 impact evaluation.

The third key Workgroup recommendation hinges on the difference between "routine" management measures and "new" management measures, as described in the Groundfish FMP. Routine measures are those that need frequent adjustment, have temporary effect, and have been previously analyzed. The Council is familiar with these in the context of "inseason" management. Since impacts have been analyzed previously, the scope of analysis required when they are adjusted is narrower. The Workgroup recommends the Council normally consider adjusting such routine measures as part of the biennial process so that the adopted ACLs are achieved but not exceeded. However, new management measures (to be classified as routine) could be considered if they are required to ensure ACLs are achieved but not exceeded. Otherwise, new management measures would be considered in a separate process occurring in the year following. These new measures are typically more permanent program improvements.

The Workgroup concluded that these changes to the biennial process likely could be implemented without an FMP amendment. Instead, these process changes could be described in Council Operating Procedures. Proceeding without amending the FMP would free up staff time to begin developing the Tier 1 NEPA document, which likely would need to be drafted in the first half of 2013, because harvest specifications decisionmaking for the 2015-16 biennial period begins in the second half of 2013. On the other hand, an FMP amendment could be used to reduce the scope of biennial decisionmaking by specifying procedures for setting harvest specifications. This could reduce the analytical burden associated with the current, very flexible management framework.

The Workgroup Report describes two alternatives: 1) status quo, based on the process used for the 2013-14 biennial process, and 2) a Workgroup recommended alternative with options for proceeding either with or without an FMP amendment.

Council Action:

1. **Decide whether or not an FMP amendment should be adopted to implement changes to the current biennial process.**
2. **Adopt range of alternatives and preliminary preferred alternative for public review.**
3. **Provide guidance on the process and decisionmaking schedule for implementing changes to the biennial process.**

Reference Materials:

1. Agenda Item I.2.a, Attachment 1: Amendment 24 Workgroup Report on Proposed Changes to the Groundfish Biennial Harvest Specifications and Management Measures Process.

Agenda Order:

a. Agenda Item Overview — Kit Dahl
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Adopt Range of Alternatives and Preliminary Preferred Alternative for Public Review

PFMC 10/15/12

Amendment 24 Workgroup Report: Proposed Changes to the Groundfish Biennial Harvest Specifications and Management Measures Process

Summary of Workgroup Recommendations

- The current biennial process needs to be modified in order to more efficiently carry out the Council's responsibilities under applicable law.
- It would be possible to change the biennial process without adopting a fishery management plan (FMP) amendment, although an amendment would provide a clearer statement of policy and procedures. At the November meeting the Council should decide whether or not to proceed with the development of an FMP amendment.
- To address National Environmental Policy Act (NEPA) requirements the Workgroup recommends developing a "Tier 1" NEPA document that evaluates the environmental impacts of periodically adjusting harvest specifications over a period of 6 to 10 years. Biennial adjustments would then be subject to more focused analysis to address NEPA and other applicable laws.
- Recommendations for "new" management measures should be developed in a periodic process separate from the biennial process for adjusting harvest specifications. Normally, only routine measures would be adjusted in the biennial process as required to ensure that annual catch limits are achieved but not exceeded.
- To simplify decisionmaking the Council should consider amending the FMP or otherwise adopting a commitment to default procedures for determining annual catch limits and associated allocations of fishing opportunity. If circumstances warrant, the Council could still depart from these procedures within the limits imposed by the Magnuson-Stevens Act.
- Overfished species rebuilding plans should only be revised when new projections show a substantially later target year for the harvest control rule in the current rebuilding plan. Otherwise, the current harvest control rule should be maintained until enough information (e.g., more than one stock assessment) shows that stock conditions have meaningfully changed.

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Introduction

The Ad Hoc Amendment 24 Workgroup was created by the Council in March 2012; met August 1-2, 2012, in Seattle, Washington; and held a teleconference on August 31 to review a draft of this report.

The Council directed the Workgroup to gather information and develop recommendations to support the Council's choice of alternatives for improving the current biennial harvest specifications and management measures process described in the Pacific Coast Groundfish Fishery Management Plan (Groundfish FMP). Briefing materials for Agenda Item F.4, March 2012, provide background information about the Council's rationale for considering improvements to this process.

This report describes the Workgroup's recommendations for improving the biennial process. The report is divided into the following sections:

- Proposed action, purpose and need: What the Council intends to do and why
- Findings: The main factors influencing the biennial process.
- Workgroup recommendations: Process and decisionmaking changes the Workgroup recommends the Council and NMFS adopt to improve the biennial process.
- Alternatives: Status quo and Workgroup Recommendation

The Rationale for Changing the Current Harvest Specifications Process

The Workgroup recommends improvements to the process for periodic specification and apportionment of harvest levels (described in Groundfish FMP Chapter 5) and implementation of related fishery regulations (described in Groundfish FMP Section 6.2), as needed, so that it is more efficient while incorporating the best available scientific information and complying with applicable law.

When considering a more efficient process the fact that periodic adjustments regularly recur needs to be recognized. The environmental impacts of biennial changes should be evaluated in this context. This would mean an initial evaluation of the range of impacts expected over a longer time horizon followed up with focused evaluation when regulations are periodically adjusted.

This action is needed to streamline the administrative and regulatory processes involved in setting specifications for the Pacific Coast groundfish fishery, while, at the same time, maintaining consistency with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and other applicable law.

Any changes to the biennial process should meet the following objectives:

- Maintain or improve the timeliness of scientific input into the decisionmaking process.
- Articulate and apply adaptive management principles, which are embodied in the Groundfish FMP, when evaluating the effects of periodic changes.
- Build workload assessment and priority setting into the process for identifying and recommending management measures, consistent with administrative resources and conservation objectives.
- Incorporate guidance on preparing efficient and timely National Environmental Policy Act (NEPA) reviews including tiering of environmental documents and incorporation by reference.[1]
- Include decisionmaking procedures for setting harvest specifications that allow reasonably accurate forecasts of impacts for a period longer than 2 years. This could involve the Council

[1] See the March 6, 2012 Memorandum from Nancy H. Sutley, Chair, Council on Environmental Quality, on this topic.

adopting default procedures for setting harvest specifications (which the Council could override if circumstances warrant).
- Present information to decisionmakers and the public in an effective and usable format.
- Ensure a transparent process where decisions and their rationale are clearly explained to the public and the public has the opportunity to provide meaningful input.
- Build an administrative record that effectively explains the rationale for the decision.

Findings

Statutory Requirements

Regulatory actions such as the biennial adjustment of harvest specifications and management measures must address requirements in a variety of laws. The principal laws that drive the current biennial process are the MSA, NEPA, and the Administrative Procedure Act (APA). Each of these laws contains substantive and procedural requirements that must be met. NEPA provides an organizational umbrella for addressing many of the analytical requirements of these mandates. Since the biennial process culminates in the implementation of regulations, the substantive and procedural requirements of the APA also come into play, although only after the Council has finished decisionmaking and transmitted a recommendation to the Secretary. Overall, the administrative record must demonstrate the rationale for the decision and the way in which it complies with applicable law.

Management Frameworks

NMFS Operational Guidelines, May 1, 1997 describe the "framework" concept. Frameworks facilitate relatively rapid real-time fishery management because they allow periodic changes to the management program without amending the FMP. "The essence of the framework concept is the adjustment of management measures within the scope and criteria established by the FMP and implementing regulations. This is distinguished from revision of a management program by FMP amendment."

The biennial harvest specifications and management measures framework is described in the Pacific Coast Groundfish FMP in Chapters 4 (harvest specifications policies and procedures), 5 (decisionmaking and implementation procedures), and 6 (types of management measures and regulatory classification).

Frameworks may be "closed" or "open." "A 'closed' framework describes with great specificity the circumstances under which a particular management action is to be taken." These actions are nondiscretionary (no decisionmaking is involved) and the effects of these actions are evaluated as part of the adoption of the framework. In contrast, open frameworks allow "more latitude in choosing the specification or management measure, in response to a less well defined set of circumstances." If the effects of actions taken under an open framework are not reasonably forecast in a previous analysis then additional analysis is necessary when the action is taken. Full notice and comment rulemaking is usually necessary to satisfy the requirements of the APA.

The groundfish biennial process is an open framework that gives the Council discretion in periodically recommending adjustments to the management program. As a result, a higher standard of analysis, as required by applicable law, is applied. The tradeoff between discretion in periodic decisionmaking and the need for more comprehensive analysis and public comment opportunity influences procedural efficiency.

Types of Management Measures Implemented Through the Groundfish Framework

Measures considered as part of the biennial process fall into three broad categories: adjustments to and allocations of annual catch limits (ACLs), adjustments to routine management measures, and adoption of new management measures. According to the Groundfish FMP "Routine management measures are those that the Council determines are likely to be adjusted on an annual or more frequent basis. The Council will classify measures as routine through either the specifications and management measures or rulemaking processes..." "New" management measures include those that are

1. Highly controversial or directly allocate the resource; or
2. Intended to have permanent effect and are discretionary, and for which the impacts have not been previously analyzed; or
3. Those being newly classified as routine.

Routine management measures are by and large catch control methods used to attain but not exceed ACLs. Historically, adjusting catch control measures could indirectly affect fishing opportunity and thus have resource allocation effects. However, a suite of fixed allocations for several species are now incorporated in the FMP and the trawl fishery is principally managed under a limited access privilege program. These changes have reduced the number of routine measures adjusted during the biennial process as well as the indirect effect on fishing opportunity, although 2-year allocations still must be set for several key overfished species. With respect to regulatory classifications in the Groundfish FMP routine measures are 'notice actions requiring at least one Council meeting and one Federal Register notice.' Council members are familiar with adjusting routine measures as "inseason adjustments" considered at Council meetings.

Because the effects of routine management measures have been previously analyzed at the time of their classification, subsequent adjustment of these measures does not require as much evaluation. Nonetheless, even if the environmental and socioeconomic effects of adjusting a measure have been evaluated, the administrative record needs to document the rationale for making the change and demonstrate that it is reasonable and supported by the facts available to the decisionmaker.

Alternative Approaches for Addressing Analytical Requirements under an Open Framework

The Workgroup benefited from the participation in their meeting of Ms. Gretchen Harrington, NEPA Coordinator for the NMFS Alaska Region. Ms. Harrington briefed the Workgroup on the programmatic EIS and subsequent supplemental information reports (SIRs) used to document the annual adjustment of groundfish harvest specifications in the Bering Sea/Aleutian Islands and Gulf of Alaska FMPs. The process and rationale is outlined in Agenda Item F.4.a, Attachment 1, March 2012 and discussed below with respect to modifying the Pacific Coast Groundfish FMP specifications process. Conceptually, this process frontloads the evaluation of longer-term effects (covering more than one biennial management period) for adjustments to the management program. Subsequent adjustments are evaluated in the context of this analysis.

The Need for an FMP Amendment

The Workgroup considered whether an FMP amendment would be necessary to implement the types of changes they identified. The Workgroup concluded that the Groundfish FMP framework is flexible enough so that the majority of recommended changes could be implemented without an FMP amendment, although amending the FMP may provide more durable guidelines and rationale.

The FMP is the Council's guiding policy document; it identifies the core conservation and management policies and outlines the processes followed to reach specific types of decisions. Therefore, when the Council drafts an FMP it is committing itself to following those policies and processes. If there is a desire to deviate from them, then an FMP amendment is required. As described above relative to different types of management frameworks, describing policies and processes specifically and in detail in the FMP can simplify subsequent decisionmaking. If that is the objective, then an FMP amendment might be the most appropriate avenue. For example, the FMP could describe the Council's intent to adopt default P* values that would not normally be modified as part of the biennial process. (As discussed in more detail below, P* is a quantity used in computing allowable biological catch, which would serve as a "maximum permissible value" for annual catch limits.)

On the other hand, amending the FMP raises some practical considerations related to implementation. One of the objectives identified by the Council is to use the improved process for the 2015-16 biennial cycle. The Council decisionmaking schedule for 2015-16 begins in the second half of next year (2013). The resources needed to prepare and implement an FMP amendment might be better used laying the groundwork for a changed process.

Instead of amending the FMP, the Council could revise Operating Procedure 9, which outlines the biennial process in greater detail than the FMP. Operating Procedures are less binding than the FMP and more easily changed. This is a two-edged sword. On the one hand it preserves a modicum of flexibility but by the same token imposes fewer obligations on the Council.

The Workgroup seeks guidance on whether the Council wants to develop an FMP amendment as part of implementing changes to the current harvest specifications process. If so, recommended FMP changes would be presented to the Council at the March 2013 meeting.

Workgroup Recommendations

Use Tiering and/or Supplementation to Address NEPA Requirements

The time and workload involved in evaluating and documenting the proposed action in an environmental impact statement (EIS) has had a major impact on the efficiency of the biennial process.

The Workgroup found that NEPA could be addressed more effectively and efficiently by recognizing that the adoption and adjustment of regulations for managing the fishery is an ongoing, adaptive process. Changes in the type and intensity of environmental impacts tend not to differ substantially from one period to the next. With this view in mind it would be possible to prepare a NEPA document evaluating the impacts of the ongoing action over a longer time period than 2 years. Biennial changes to the management program would then be subject to more focused analyses, as described below. Conceptually, either one of two approaches could be used: supplementation or "tiering."

The first approach focuses on whether it would be necessary to supplement a previously prepared NEPA document. This evaluation would address the following questions: (1) Has the agency made substantial changes in the proposed action that are relevant to environmental concerns; (2) Are there significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts? These questions are derived from Section 1502.9(c)(1) in the Council on Environmental Quality (CEQ) regulations describing when an agency must supplement an existing EIS for a proposed action. If the answer to these questions is "no," then no additional NEPA analysis is needed. Of course, the rationale for the agency's "no" finding must be adequately documented in the administrative record. Agencies, including NMFS, have used an SIR format to document these findings.

The second approach would be to use the tiering concept described in CEQ regulations (40 CFR 1502.20): "Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action." A "Tier 1" NEPA document would be prepared to evaluate the environmental effects of applying and adjusting management measures more generically in the context of all elements of the management program. When harvest specifications and management measures are periodically adjusted, a "Tier 2" NEPA document would be prepared. The Tier 2 document would be more narrowly focused on those aspects of the proposal that may have environmental impacts different from those identified in the Tier 1 document. It is likely that the Tier 2 document could be an environmental assessment (EA)[2] supporting a "finding of no significant impact" (FONSI), depending on whether the action would have significant impacts.

The Tier 1 document should describe—at least qualitatively, if quantitative information is unavailable—the types of circumstances that would dictate supplementation and/or prevent the agency from reaching a FONSI. When new information becomes available (primarily stock assessments and updates but also data on fishery performance such as West Coast Groundfish Observer Program reports) staff would engage in internal scoping based on this information. This would need to occur relatively early in the decisionmaking process for harvest specification adjustments, because if a supplemental EIS (SEIS) must be prepared, sufficient time must be allocated for the task.

To Develop the Tier 1 Document, as Appropriate, Rely on Incorporation by Reference from Previous NEPA Documents and Other Sources

The Tier 1 NEPA document must adequately forecast the effects of periodically adjusting harvest specifications and management measures over a longer period covering three to five biennial cycles (6 to 10 years).[3]

Periodic changes to harvest specifications and management measures have been evaluated in seven EISs to date, beginning with the 2003 annual period. (Amendment 17 implemented the biennial period beginning in 2005-06.) These EISs provide a lot of information on the scope and intensity of the environmental and socioeconomic effects resulting from periodic adjustments. The Tier 1 NEPA document should incorporate information by reference from these EISs, to the extent that the information is up-to-date and still represents the best information available, and focus on any gaps in the scope of these evaluations that may be identified. [4]

In addition to previous harvest specifications EISs other documents should be reviewed and considered for incorporation by reference. These include NEPA documents prepared for recent Groundfish FMP amendments, Endangered Species Act biological opinions and other analyses evaluating the effects of the action on protected species, and documents produced in conjunction with the development of the Council's Fishery Ecosystem Plan. As a start, the development of a Tier 1 document would benefit from a

[2] An EA is "a concise public document … that serves to: 1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. 2) Aid an agency's compliance with the Act when no environmental impact statement is necessary. 3) Facilitate preparation of a statement when one is necessary." 40 CFR 1508.9.
[3] The Tier 1 document should evaluate effects over a defined time period, likely within this range. The actual time period used in the Tier 1 document would be based on the need for supplementation described above.
[4] CEQ regulations, 40 CFR 1502.21, state that incorporated material "shall be cited … and its content briefly described."

comprehensive assessment of available information on the environmental impacts of managing groundfish fisheries in these documents.

Produce an Annual or Biennial SAFE Document Containing Baseline Information Supporting Evaluation of Periodic Adjustments to Harvest Specifications

The EISs that have been prepared to evaluate periodic adjustments to harvest specifications and management measures effectively serve as the SAFE (stock assessment/fishery evaluation) document. This fact is reflected in Section 5.2 of the Groundfish FMP: "For the purpose of providing the best available scientific information to the Council for evaluating the status of the fisheries relative to the MSY [maximum sustainable yield] and overfishing definition, developing OFLs, determining the need for individual species or species group management, setting and adjusting numerical harvest levels, assessing social and economic conditions in the fishery, and updating the appendices of this FMP; a SAFE document or a NEPA document (e.g., EIS or EA) is prepared every other year when biennial harvest specifications and management measures are decided." However, under the supplementation or tiering processes described above it may be preferable to prepare a SAFE document containing the baseline information useful in the NEPA process. The SAFE document could be finalized early in the biennial process (as suggested below, perhaps in October or November of the odd year) for use by decisionmakers and the public. Any subsequent NEPA document prepared for Council final action on harvest specifications and management measures could then incorporate by reference from the SAFE document.

Use a Different Process for Implementing New Management Measures

As discussed above, from a regulatory/procedural standpoint management measures fall into two categories: routine measures and new measures (noting that routine management measures are "new" when first classified and implemented). Once classified as such, routine measures may be adjusted through an abbreviated process, because questions about their environmental impact and consistency with the MSA have already been evaluated. New measures require more thorough analysis and a longer rulemaking process (in which public comment is solicited on a proposed rule, a final rule is then published and only becomes effective 30 days later). If the new measure is being classified as routine, the public process and related analysis must support the rationale for future adjustments. This allows abbreviated rulemaking to occur.

One of the reasons the biennial process has become so complicated is that it combines the adjustment of harvest specifications, adoption of new management measures, and the adjustment of routine measures in a single process. However most, if not all, new management measures considered in the biennial process are not directly tied to achieving, but not exceeding, ACLs (because catch control measures are already classified as routine); rather they are improvements to the management program to meet various conservation and socioeconomic objectives. Furthermore, these new measures need more-or-less standalone analyses not directly tied to the evaluation of harvest specifications.[5]

<u>Adjusting Harvest Specifications in a Standalone Process</u>

The Workgroup recommends changing the process so the Council takes final action on harvest specifications at the April meeting and drafting of necessary regulatory language beginning thereafter. At the June and November meetings the Council would then develop recommended adjustments to routine commercial and recreational management measures for the next fishing year (starting January 1) for

[5] The inclusion of Appendix C in the 2013-14 EIS, which evaluates proposed new measures individually in an alternatives-type analysis, demonstrates this.

incorporation, as appropriate, in the harvest specifications rulemaking stemming from Council final action in April. Additional adjustments to the routine management measures proposed at the June meeting could be made at the November meeting and also incorporated into the ongoing rulemaking process, as appropriate. This would build on current practice, where the Council usually recommends additional adjustments to routine management measures at its November meeting, based on the latest data provided by the West Coast Groundfish Observer Program (WCGOP). Any changes in the rulemaking process must be consistent with the primary objective of ensuring that the new regulations are effective on January 1 of the next year (i.e., the start of the next biennial period).

Considering New Management Measures

The Council would prioritize the development of new management measures based on workload considerations and the timing of implementation. The trawl rationalization program improvement and enhancement ("PIE") decisionmaking and rulemaking process provides a template for addressing new measures for the management program. The Council has acted strategically under the PIE process to prioritize and sequence decisionmaking and implementation through successive rulemaking processes. This approach could be adapted or expanded to incorporate the new management measures usually considered as part of the biennial process.

In some cases, new measures may be needed to achieve, but not exceed, ACLs. Such new measures would likely be those being classified as routine and used to control catch. These measures would need early consideration, probably at the November Council meeting when preliminary preferred harvest specifications are adopted. Criteria for these measures would have to be defined narrowly to match workload to staff capacity.

For program improvement measures, the prioritization exercise should occur at the June Council meeting following the adoption of harvest specifications with the expectation that decisionmaking on these new measures would occur in the first half of year 1 of the next biennial period (keeping in mind that the process of adjusting harvest specifications for the next biennial period begins in the second half of year 1 of the current period). The Council's prioritization exercise could determine the sequencing of the development of new measures over several years based on need, workload, and competing priorities.

Adopt Default Policies and Procedures for Determining Harvest Specifications and Adjustments to and Allocations of ACLs

General Procedures

Chapter 4 in the Groundfish FMP describes the policies and procedures for establishing and adjusting harvest specifications. The Council identifies an ACL value for each management unit (a stock, geographic subdivision of a stock, or stock complex) based on a Scientific and Statistical Committee (SSC)-recommended overfishing limit (OFL), which is then reduced to the allowable biological catch (ABC) to account for scientific uncertainty. The ACL may equal the ABC or be a further reduction from it in response to various other factors (such as overfished species' rebuilding objectives). A variety of methods may be used to determine the ABC depending on available scientific information.[6] In general, the methodology involves applying an SSC-recommended value to account for variance in estimates of stock status (σ, sigma) and a Council-recommended value identifying the level of risk tolerance for exceeding the OFL (i.e., overfishing) due to scientific uncertainty (P*). Alternatively, a fixed reduction (e.g., 25% or 50%) may be used for stocks that have not been fully assessed. The Workgroup discussed

[6] The FMP describes methods in relation to three categories of scientific information: fully assessed stocks, data-limited assessments, and stocks for which there is insufficient information to assess status.

narrowing Council descisionmaking scope by having the SSC determine ABC values based on purely scientific criteria.[7] Currently, the risk quantity, P*, is determined by the Council, and can include other factors in addition to scientific uncertainty about stock status (such as the economic value of the subject stock or the effectiveness of management measures).

The Workgroup recommends that the SSC recommend ABC values, using sigma and default P* values adopted by the Council for ongoing use. The Council could still apply a further precautionary reduction (for reasons other than scientific uncertainty and overfishing-related risk tolerance, such as management uncertainty) to arrive at the ACL. In other words, from the Council perspective, the default ABC would serve as a "maximum permissible value" for the ACL. This could help clarify the Council's rationale for choosing an ACL different from the ABC (for reasons other than scientific uncertainty and related risk tolerance).

Procedures for Stocks Below the Precautionary Threshold Including Overfished Stocks

Stocks whose biomass is below the precautionary threshold are somewhat of a special case where an additional reduction is applied to the ABC to determine the ACL. The precautionary threshold is defined in the FMP as B_{MSY}; stocks whose biomass is below this level are managed to allow biomass to increase to the target level. If a stock falls below the minimum stock size threshold (MSST), it is considered overfished and managed based on objectives identified in the corresponding rebuilding plan. The FMP identifies default methods for determining the ACLs for stocks in the "precautionary zone" (between B_{MSY} and the MSST).

When a stock is declared overfished the MSA requires councils to "specify a time period for rebuilding" that is as short as possible, taking into account specific factors. A framework for determining this time period is elaborated in National Standard 1 guidelines (50 CFR 600.310) and a stochastic modeling platform implemented through software developed by A.E. Punt, a member of the Council's SSC. Using stock assessment results as an input, this model provides a probability distribution for when the stock will be rebuilt given a particular spawning potential ratio (SPR)-based harvest rate or alternative harvest control rule (e.g., the 40-10 rule). The "median rebuilding year," or the year associated with a 50% probability that the stock will be rebuilt, is typically identified as the target year for the given harvest rate. The Council initially identifies the rebuilding objective (the target rebuilding year) and associated harvest control rule as the key components of the rebuilding plan. When stocks are periodically assessed, the subsequent rebuilding analysis can produce a different estimate of the rebuilding probability associated with the adopted target year/harvest control rule combination. According to the FMP, if the recomputed probability of achieving T_{TARGET} under the existing harvest control rule exceeds 50%, there is no need to change the objectives (the target year/harvest control rule combination). If the recomputed probability is less than 50%, the Council has been obligated to either adjust the harvest control rule so that the rebuilding probability is at least 50% or change the target to the later year associated with the 50% probability for that harvest rate.

Furthermore, a target year must fall within two limits: a minimum time period if no fishing mortality occurred for the remaining duration of the rebuilding period (initially T_{MIN}, $T_{F=0}$ for subsequent rebuilding plan revisions) and a maximum time period (T_{MAX}), which is based on the biology of the stock. In addition to adjustments related to the rebuilding probability described above, the Council has been forced to change the target year, because new scientific information shows that the stock cannot rebuild by the target year with at least a 50% probability even in the absence of fishing (i.e., the current target year is earlier than $T_{F=0}$).

[7] This is similar to the process used for North Pacific groundfish specifications.

Figure 1 shows target years chosen for six overfished stocks over the course of several assessment cycles beginning with the 2005-06 biennial period. In addition to adjustments to the target year, the graphs show the estimates of the minimum and maximum time limits ($T_{F=0}$ and T_{MAX}). At least one rebuilding plan target year has been changed in every management cycle and, for some stocks, such as canary rockfish, the Council has changed the target year in every assessment cycle. These changes have mainly been a result of the variability in assessment results.

The need to revise rebuilding objectives (target year and/or harvest rate) has been a major contributor to the complexity of biennial decisionmaking and supporting analyses because the implications for short-term tradeoffs in yield[8] leads to a wider range of considerations. In addition, court rulings have focused on the tradeoff between the socioeconomic benefits of increased yield and any associated delay in rebuilding. This has become a factor in evaluating rebuilding plan revisions.

The Workgroup discussed reconsidering the necessity that when the probability of achieving the target year falls below 50% the objectives must be immediately revised.[9] For example, rebuilding plan guidelines could be revised so that the objectives need only be changed when the probability falls below 50% in the second of two successive assessment cycles. At the same time, the Council could identify more explicit decision rules for changing rebuilding plan objectives. The Workgroup recommends further consideration of these issues, in consultation with NOAA GC and NMFS and in light of the current agency reconsideration of the National Standard 1 Guidelines.[10]

Overall, these methods should be revised to recognize that target year estimates are inherently uncertain. The Council has favored maintaining a constant harvest control rule; variability in successive target year estimates should be recognized and integrated into evaluations in a way that narrows the scope of alternative objectives (harvest control rule/target year combinations). Decisionmaking for 2013-14 offers a good example. The target years for canary rockfish and Pacific ocean perch had to be revised because they could not be achieved with at least a 50% probability, even in the absence of fishing. In both cases the Council chose to maintain the current harvest rate and adopt a revised target year. To do so, however, six alternative objectives were evaluated for canary rockfish and five for Pacific ocean perch. A more general evaluation of alternative strategies, in a Tier 1 NEPA document, could support a rationale applied to subsequent adjustments of the same type.

Example of Default Procedures and Policies for OFLs, ABCs, and ACLs

Table 1 shows the methods used to decide 2013-14 OFLs, ABCs, and ACLs as an example of the default policies and procedures the Council may want to consider adopting.

Using default policies and procedures, which could be specified in the Groundfish FMP, harvest specifications can be computed and implemented without explicit Council action. Anticipated impacts of the application of default policies and procedures are evaluated in the Tier 1 document. If in subsequent years the Council and NMFS were to depart from the default harvest control rules, the potential effects

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[8] i.e., a change in the ACL due to the choice of a different harvest control rule or the application of the same harvest control rule to re-estimated biological parameters.

[9] For example, the 2009 rebuilding analysis for yelloweye rockfish revealed that the probability of rebuilding by the then current target year (2084) at the previously adopted harvest rate was slightly more than 46%. The SSC recommended that "no redefinition of T_{TARGET} or adjustment to the rebuilding harvest rate is necessary" (Agenda Item G.2.b, Supplemental SSC Report, November 2009). Nonetheless, the Council recommended a harvest rate consistent with rebuilding with a 50% probability by 2084 (SPR harvest rate of 72.8% versus the previous SPR harvest rate of 71.9%).

[10] Advanced notice of proposed rulemaking, consideration of revision to National Standard 1 Guidelines, at 77 FR 26239, May 3, 2012.

would be evaluated within the NEPA process established under the Tier 1 document. This analysis would focus on those stocks or stock complexes where a change from the default rules is contemplated.

Default ACL Adjustments and Allocations

The process for determining fishing opportunity for different harvester groups has two general components:

- Deductions from the ACL ("set-asides") to account for catch in fisheries other than commercial fisheries (i.e., recreational, tribal, research, and exempted fishing permit fishing).
- Allocations of the resulting amount (the fishery harvest guideline) according to the allocation framework described in Section 6.3 of the Groundfish FMP.

Set-asides must be determined during the biennial process based on available information, including input from the tribal representative on the Council. A range of allocations are specified in the FMP while others are determined as part of the biennial process. For the 2013-14 biennial period the Council made the following allocation-related decisions:

- Set-asides
- Change to the within-trawl allocation of widow rockfish specified in the FMP (requiring an FMP amendment to change; the Council ultimately did not propose a change)
- Two-year trawl and non-trawl allocations for five overfished stocks and one non-overfished stock
- Harvest guidelines for three stocks

This list shows that the range of allocation decisions is fairly narrow. The biennial process could be further simplified if changes to the allocation framework requiring an FMP amendment were taken up in a separate process. Such changes could be considered as part of the strategic process outlined above for new management measures. The effects of the remaining allocation decisions could be forecast in the Tier 1 document, particularly if the scope of changes in trawl-nontrawl allocations could be anticipated.

Table 1. Example of default harvest control rules for actively managed stocks and stock complexes in the west coast groundfish FMP based on 2013-14 harvest specifications.

Stock or Stock Complex	OFL control rule	ABC control rule (default P*) a/	ACL control rule
OVERFISHED STOCKS			
BOCACCIO S. of 40^{0}10’	50% SPR	0.45	77.7% SPR
CANARY	50% SPR	0.45	88.7% SPR
COWCOD S. of 40^{0}10’	50% SPR	0.45	82.7% SPR (Con), ACL=ABC (Mon)
DARKBLOTCHED	50% SPR	0.45	64.9% SPR
PACIFIC OCEAN PERCH	50% SPR	0.45	86.4% SPR
PETRALE SOLE	30% SPR	0.45	25-5 rule
YELLOWEYE	50% SPR	0.45	76% SPR
NON-OVERFISHED STOCKS			
Arrowtooth Flounder	30% SPR	0.40	ACL=ABC
Black Rockfish (OR-CA)	50% SPR	0.45	1,000 mt constant catch
Black Rockfish (WA)	50% SPR	0.45	ACL=ABC
Cabezon (CA)	45% SPR	0.45	ACL=ABC
Cabezon (OR)	45% SPR	0.45	ACL=ABC
California scorpionfish	50% SPR	0.45	ACL=ABC
Chilipepper S. of 40^{0}10’	50% SPR	0.45	ACL=ABC
Dover Sole	30% SPR	0.45	25,000 mt constant catch
English Sole	30% SPR	0.45	ACL=ABC
Lingcod N. of 40º10'	45% SPR	0.45	ACL=ABC
Lingcod S. of 40º10'	45% SPR	0.45	ACL=ABC
Longnose skate	45% SPR	0.45	2,000 mt constant catch
Longspine Thornyhead (coastwide)	50% SPR	0.45	NA
Longspine Thornyhead N. of 34°27'	NA	NA	ACL=(79% of OFL)*.75
Longspine Thornyhead S. of 34°27'	NA	NA	ACL=(21% of OFL)*.5
Pacific Cod	3,200 mt	0.40	ACL=OFL*.5

Stock or Stock Complex	OFL control rule	ABC control rule (default P*) a/	ACL control rule
Sablefish (coastwide)	45% SPR	0.40	NA
Sablefish N. of 36°	NA	NA	73.6% of ABC w/ 40-10 adj.
Sablefish S. of 36°	NA	NA	26.4% of ABC w/ 40-10 adj.
Shortbelly	6,950 mt	0.40	50 mt constant catch
Shortspine Thornyhead (coastwide)	50% SPR	0.45	NA
Shortspine Thornyhead N. of 34°27'	NA	NA	ACL=66% of OFL
Shortspine Thornyhead S. of 34°27'	NA	NA	ACL=(34% of OFL)*.5
Splitnose S. of $40^{0}10$’	50% SPR	0.45	ACL=ABC
Starry Flounder	30% SPR	0.40	ACL=ABC
Widow	50% SPR	0.45	1,500 mt constant catch
Yellowtail N. of $40^{0}10$’	50% SPR	0.45	ACL=ABC
STOCK COMPLEXES			
Minor Nearshore Rockfish North b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=ABC
Minor Shelf Rockfish North b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=968 mt
Minor Slope Rockfish North b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=1,160 mt
Minor Nearshore Rockfish South b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=990 mt
Minor Shelf Rockfish South b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=714 mt
Minor Slope Rockfish South b/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.45	ACL=ABC
Other Flatfish c/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.40	ACL=4,884 mt
Other Fish d/	Summed contribution of component OFLs	Summed contribution of component ABCs; P*=.40 except dogfish; P*=0.3 for dogfish	ACL=ABC

a/ SSC determines sigma for each stock category.

b/ Component OFLs based on 50% SPR for assessed stocks, DBSRA or DCAC for unassessed stocks.

c/ Component OFLs based on DBSRA or DCAC for unassessed stocks.

d/ Component OFLs based on 45% SPR for dogfish, DBSRA or DCAC for unassessed stocks.

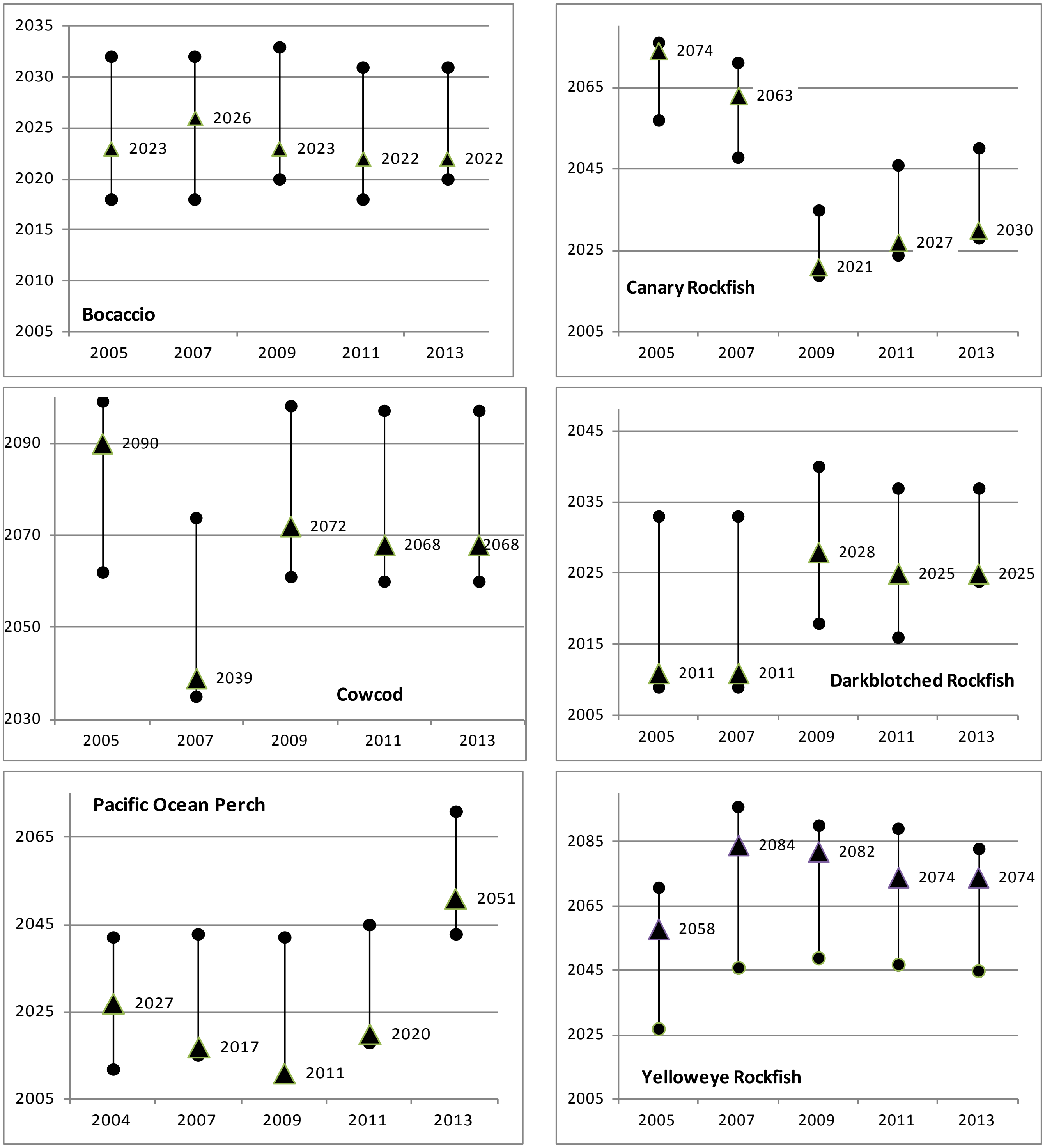

Figure 1. Variation in target years for six overfished species from the 2005-06 biennium to 2013-14 biennium. Years on horizontal axis are the start of the biennial period when the target was used. Upper circles (T_{MAX}) and lower circles ($T_{F=0}$) represent the range of potential target years open to consideration. Triangles indicate the adopted target year.

Alternatives

Two alternatives are described below in schematic form, showing the timing of Council decisionmaking and associated statutory requirements. Council decisions fall into the following categories:

- Harvest specifications for non-overfished species (OFLs, ABCs, ACLs)
- Development of rebuilding plans for species recently declared overfished and revisions to existing overfished species rebuilding plans, as necessary, and resulting harvest specifications (OFLs, ABCs, ACLs)
- Adjustments to and allocations of ACLs
- Adjustment of routine management measures, consistent with the allocation framework, so that ACLs are achieved but not exceeded
- Recommendations for new management measures, including measures to be classified as routine

Status Quo

The process for developing harvest specifications and management measures for the 2013-14 biennial period serves as the basis for describing status quo.

Council Decisionmaking Schedule

Year -2 (2011)

- September and November: Adopt new stock assessments for use in management
- November (the first of three meetings required by the FMP): Develop proposed harvest specifications and scope the list of potential new management measures including adjustments to and allocations of the ACLs

Year -1 (2012)

- April (second meeting): Adopt preliminary preferred harvest specifications, 2-year allocations, and associated routine management measures for catch control
- April (second meeting): Identify preliminary preferred list of new management measures
- June (third meeting): Make final preferred recommendation on the complete harvest specifications and management measures biennial management package

NEPA/APA

Year -2 (2011)

- August-September: Internal scoping to determine the type of NEPA document that will be prepared (to date the NEPA document for biennial decisions has been an EIS)
- May-September: Planning for the NEPA document (contents, structure of alternatives, range of environmental components evaluated, analytical methods, etc.)
- November-January: Initial EIS preparation

Year -1 (2012)

- January-May: Internal review and revision of EIS document
- June: DEIS is published for public comment (Notice of Availability in Federal Register)
- July-August: Incorporation of June Council final action into FEIS
- August-September: Final revisions to FEIS including addressing public comments, and internal review
- October: FEIS published

- November: ROD signed
- July-August: Agency drafts proposed regulations and Council Executive Director deems proposed regulations consistent with Council intent
- September-December: Agency rulemaking and decisionmaking occurs

Year +1 (2013)
- January: Regulatory adjustments become effective

Workgroup Recommended Alternative

The Workgroup recommends the following alternative harvest specifications setting process for 2015 and thereafter. This process incorporates the recommendations described in the previous section. Implementation options are then summarized.

This alternative relies on the preparation of a Tier 1 NEPA document in advance of the next biennial period (2015-16). The proposed action evaluated in the Tier 1 document would be the adoption of default policies and procedures for: 1) determining harvest specifications, 2) revising (or adopting) rebuilding plans, and 3) the application of routine management measures to achieve, but not exceed, ACLs. If the Council decides not to amend the Groundfish FMP then the Tier 1 document would also evaluate the 2015-16 harvest specifications as a specific application of the default policies and procedures. Otherwise, the Tier 1 document would be tied to the FMP amendment.

Council Decisionmaking Schedule

Year -2 (2013)
- September and November: Adopt new stock assessments for use in management
- September (the first of three meetings required by the FMP): Provide comments and guidance on the application of default policies and methods for determining harvest specifications
- November (second meeting): Adopt preliminary preferred harvest specifications based on default policies and procedures with any modifications identified in September and any additional adjustments below the ABC to determine ACLs
- November (second meeting): Determine set-asides, adopt preliminary preferred 2-year allocations including harvest guidelines
- November (second meeting): Scope new management measures to be classified as routine and needed to attain, but not exceed, proposed ACLs

Year -1 (2014)
- April (third meeting): Adopt final preferred harvest specifications, 2-year allocations, and any new measures to be classified as routine
- June: Prioritize development of new management measures and FMP amendments for program improvement; recommend adjustments to routine fishery management measures so that ACLs for the next year are attained but not exceeded
- November: As needed, recommend additional adjustments to routine fishery management measures so that ACLs for the next year are attained but not exceeded

Year +1 (2015)
- March: Council adopts preliminary preferred new program improvement measures according to prioritization in June of Year -1 (2014)
- June: Council adopts final preferred new program improvement measures

NEPA/APA

Prior to next biennial period (2015-16):

Year -2 (2013)

- March: Council provides guidance on identification of default policies and procedures for determining harvest specifications and takes final action on FMP amendments, if needed, or adopts changes to Operating Procedure to implement changes to the biennial process (see below)
- January-July: Initial development of Tier 1 NEPA document evaluating the range of potential impacts of adjusting harvest specifications within a specified decision framework and during a defined time period in the range of 6-10 years (three to five biennial management periods)
- August-December: Incorporate evaluation of preliminary preferred harvest specifications into Tier 1 document in relation to the range of potential impacts normally expected from harvest specification adjustments

Year -1 (2014)

- March-June: Publish Tier 1 NEPA document
- September: Tier 1 document NEPA process finalized (e.g., FONSI or ROD signed)
- June-July: Council Executive Director deems proposed regulations consistent with Council intent
- May-December: Rulemaking on adjustments to harvest specifications and routine management measures, and conforming action by States on adjustments to recreational management measures (Council decisions in April, June, and November meeting incorporated as appropriate)

Year +1 (2015)

- February: Make available draft of Tier 2 NEPA document for prioritized new program improvement management measures.
- July-August: Tier 2 NEPA document finalized
- July-August: Council Executive Director deems proposed regulations consistent with Council intent
- August-December: Rulemaking on regulations

Year +2 (2016)

- January-March: Program improvement regulatory changes become effective

For subsequent biennial periods (2017-18 and beyond):

Year -2

- August-November: Preliminary assessment of whether circumstances may trigger the need to supplement the Tier 1 document and/or ability to reach a FONSI with Tier 2 document(s)
- October: SAFE document completed with summaries of stock status, default harvest specifications, baseline socioeconomic data, and other information relevant to harvest specification adjustments

Year -1

- June: SIR addressing questions related to supplementation of previously prepared EIS or Tier 2 NEPA document evaluating the impacts of harvest specification adjustments made available; if new measures (to be classified as routine) necessary to achieve but not exceed ACLs are identified, they are also evaluated in the Tier 2 NEPA document
- July-August: NEPA process concluded (e.g., FONSI signed)

- October: SAFE document completed with summaries of stock status, default harvest specifications, baseline socioeconomic data, and other information relevant to harvest specification adjustments
- June-July: Council Executive Director deems proposed regulations consistent with Council intent
- May-December: Rulemaking on adjustments to harvest specifications and routine management measures, and conforming action by States on adjustments to recreational management measures (Council decisions in April, June, and November meeting incorporated as appropriate)

Year +1

- As above for Year -2

Options for Council Consideration

Default Harvest Specifications Policies and Procedures

Option 1: Describe and evaluate default policies and procedures in the Tier 1 Document

Specifying OFLs, ABCs and ACLs

The Workgroup does not have a specific recommendation on default policies and procedures for harvest specifications but notes that Table 1 provides a starting point for such consideration. There are two main decisions for the Council. First, the Council would pre-specify P* for stocks or groups of stocks associated by the same level of risks tolerance. Second, the Council would need to identify additional factors (aside from stock status) used in the decision to choose an ACL below the ABC "maximum permissible threshold."

Revising Rebuilding Plans

In consultation with NMFS and NOAA GC, the Council develops a default policy based on maintaining the harvest control rule (SPR harvest rate) unless there is clear evidence that stock conditions have changed such that the current target year cannot be achieved with continued application of the current harvest control rule. If new information determines that the rebuilding plan target year cannot be achieved even in the absence of fishing, the default policy would be to maintain the default harvest control rule and re-specify the target year as the median year determined based on new information as long as there is sufficient evidence that this represents a rebuilding period "as short as possible" consistent with MSA 304(e) . This situation would likely require a focused, tiered analysis.

Subsequent NEPA analysis would also likely be required if a stock were declared overfished, necessitating the development of a new rebuilding plan. The type of NEPA document required would largely depend on whether the agency anticipates significant impacts as a result of the proposed action.

Rationale

As discussed above, the Groundfish FMP provides enough flexibility so that the Council could adopt default policies and procedures without an FMP amendment. This applies both to harvest specifications and rebuilding plan revisions. In the case of rebuilding plans, FMP Section 4.6.3.4 (Updating Key Rebuilding Parameters) states "If the variation between the stock assessments and rebuilding analyses for a particular species do not show significant differences in the rebuilding trajectory for that species, they are mathematically considered to be essentially the same." It should only be necessary, therefore, to provide sufficient rationale that some range below the 50% probability does not represent a "significant difference" for a single assessment cycle.

Without an FMP amendment to narrow discretion, the Council would need to commit to a fixed, specified process going forward. The environmental impacts and rationale for this decision would be evaluated in the Tier 1 NEPA document (and any associated rulemaking) described above. If, at some future time, the Council were to depart from the adopted default policies and procedures it would trigger the requisite supporting analyses under applicable law.

Option 2: FMP Amendment describing the use of default policies and procedures

This option would incorporate into the FMP a description of the Council's intent to identify default policies and procedures and the circumstances that could trigger a departure from the defaults. Describing the Council's intent in the FMP has the advantage of making the policy framework more explicit and transparent.. This would both create a stronger obligation for the Council to follow the outlined procedures and could provide a stronger defense in the event of litigation since courts are more likely to rely on the FMP as a testament of Council policies and procedures. The disadvantage of proceeding with an FMP amendment is that the time and staff resources needed could detract from developing the proposed Tier 1 NEPA document in time for use with the 2015-16 harvest specifications.

Option 3: FMP amendment specifying default policies and procedures

This option would incorporate the description outlined above under Option 2 and also an enumeration, similar to Table 1, of the default policies. The Council could still depart from the default policies and procedures in specified circumstances but their inclusion in the FMP would likely lend greater weight to the Council's intent to use them. Overall, the advantages of incorporating this information into the FMP are as described for Option 2.

Council Decisionmaking Schedule

Option 1: Revise Council Operating Procedures

As discussed above, the Workgroup concluded that the description of the biennial process in the Groundfish FMP provides sufficient latitude to use the Workgroup-recommended process. The Workgroup recommendation meets the basic requirements of the FMP in terms of a three Council meeting process for decisionmaking on biennial harvest specifications and a two meeting process for regulatory adjustments. Full notice and comment rulemaking would still be employed for harvest specifications and new management measures (including those classified as routine). The details of the recommended process would be described in a revised Council Operating Procedure 9.

Option 2: FMP Amendment

Amend Chapter 5 (principally sections 5.1 and 5.4, and also other sections with specific references to the timing of Council decisions) and section 6.2 (describing the relationship between Council decisionmaking and Federal rulemaking) of the Groundfish FMP to describe the process outlined above. The advantage of an FMP amendment is that it would be a more explicit statement of how the Council will conduct the biennial process.

Alternatively, the Council could follow the process recommended above without amending the FMP to evaluate whether it increases efficiency and is consistent with Council objectives. At the end of the evaluation period (perhaps two or three biennial periods) the FMP would be amended to describe the process with any modifications of the recommended process gained from experience.

Amendment 24 Workgroup Recommendations

Improvements to the Groundfish Biennial Harvest Specifications and Management Measures Process

Major Recommendations

- **Programmatic or "Tier 1" NEPA document**
  - Covers biennial actions over about 10 years
  - Incorporates information from other groundfish NEPA documents to **summarize** conditions and likely effects of groundfish harvest specifications
  - Uses "default" policies and methods for determining ACLs and adopting and revising OFS rebuilding plans to assess impacts
  - Subsequent biennial adjustments evaluated with focused NEPA analyses
- **Separate Processes for Different Regulatory Objectives**
  - Measures necessary for achieving ACLs (catch control)
  - Measures for long-term program improvement

Classifying Management Measures and Regulations

Practical Classification of Management Measures

- ❖ “Catch Control ”— Measures necessary to achieve but not exceed ACLs in the next two years: E.g., Trip limits, RCA boundaries, recreational bag limits, recreational seasons, size limits
- ❖ “Program Improvement ”— Measures with longer-term objectives for fishery performance, information flow, etc.: E.g., long-term allocations (e.g. widow rockfish), logbooks for CPFVs, ownership & control rules for LE sablefish tier limit fishery

Groundfish FMP Classification of Regulatory Actions

- ➢ “New” measures: Not previously analyzed, permanent effect, directly allocate the resource or otherwise controversial
- ➢ “Routine” measures: Previously analyzed, adjusted frequently (“routine” measures are “new” when first proposed)

Proposed Biennial Council Process

Harvest Specifications

Odd Years (2013, 2015, etc.)

Sept./Nov. meetings: Adopt new stock assessments for management

September meeting: Provide guidance on the use of "default policies" for calculating ABCs/ACLs

November meeting: Adopt preliminary preferred ACLs, set asides, and allocations; if needed, preliminary action on new OFS rebuilding plans and/or existing plan revisions

Even Years (2014, 2016, etc.)

April meeting: Adopt final preferred ACLs, set asides, allocations, and rebuilding plan changes

Note that the biennial management period (new specifications and management measures) starts on ***January 1*** *of each* ***odd year****.*

Management Measures

Odd Years (2013, 2015, etc.)

November meeting: Scope new management measures necessary to achieve but not exceed ACLs (new catch control measures)

Even Years (2014, 2016, etc.)

April meeting: new catch control measures (to be classified as routine)

June meeting: 1) Adjust (routine) catch control measures including recreational measures for state conforming regulations 2) Identify new "program improvement“ measures for Council action in the next year;

November meeting: Adjust routine catch control measures for first part of next year as needed based on new data (e.g., WCGOP total mortality report)

Odd Years (2015, 2017, etc.)

March/June meetings: Analysis and Council action for new "program improvement" management measures

Council Decisions under this Agenda Item

- FMP amendment?
- Preliminary preferred alternative:
  - Default procedures for deciding harvest specifications and OFS rebuilding plans
  - Biennial Council process
- Final action in March 2013?

Proposed Biennial Council Process

Odd year (*2013*, 2015, 2017, 2019, etc.)

- January 1: Biennial management period starts (new harvest specifications and management measures in place)
- *March/June meetings: Analysis and Council action for new "program improvement" management measures*
- Sept./Nov. meetings: Adopt new stock assessments for management
- September meeting: Provide guidance on the use of "default policies" for calculating ABCs/ACLs
- November meeting: Adopt preliminary preferred ACLs, set asides, and allocations; scope new management measures necessary to achieve but not exceed ACLs (new catch control measures); if needed, preliminary action on new OFS rebuilding plans and/or existing plan revisions

Even year (2014, 2016, 2018, etc.)

- Stock assessments conducted
- April meeting: Adopt final preferred ACLs, set asides and allocations, and new catch control measures (to be classified as routine); adopt rebuilding plan changes
- June meeting: Identify new "program improvement" management measures for Council action in the even year (see above); adjust (routine) catch control measures including recreational measures for state conforming regulations
- November meeting: Adjust routine catch control measures as needed based on new data (e.g., WCGOP total mortality report)

GROUNDFISH ADVISORY SUBPANEL REPORT ON AMENDMENT 24 (IMPROVEMENTS TO THE GROUNDFISH MANAGEMENT PROCESS)

The Groundfish Advisory Subpanel (GAP) received a presentation on the Amendment 24 Workgroup report (Agenda Item I.2.a, Attachment 1) and discussed the recommendations made by the Workgroup. The GAP offers the following comments on those recommendations.

NEED FOR AN AMENDMENT

The purpose for convening the Amendment 24 Workgroup was to explore ways to streamline the groundfish management process and reduce workload, thereby expediting the development and approval of implementing regulations under the biennial specifications process. Developing an amendment to the Pacific Coast Groundfish Fishery Management Plan (FMP) would seem to defeat this purpose, especially when the same goals can be accomplished through other means. Further, if an amendment is used, the Council potentially will be limiting its flexibility if future process changes are needed, as the Council will then have to develop and adopt another amendment. A better alternative would be to develop an FMP "appendix," similar to what is done with rebuilding plans. This would allow changes to be made in a two-meeting process.

NEPA REQUIREMENTS

The GAP agrees with the Workgroup recommendations on the use of tiering, supplementation, and incorporation by reference to meet the requirements of the National Environmental Policy Act (NEPA). Following these recommendations should result in less time and effort being spent on producing large and complex environmental impact statements every two years.

DEVELOPMENT OF MANAGEMENT MEASURES

In general, the GAP agrees with the Workgroup recommendation to bifurcate management measure development between "new" and routine measures but with some cautions:

- There needs to be a clear distinction of what constitutes "new" and "routine" measures so that we do not inadvertently slow down the management process. For example, there was a question raised as to whether a change in Rockfish Conservation Area (RCA) line coordinates would be "new" – and thus need to be handled under a separate process – or "routine" so that the change can be handled either as part of the biennial process or even as an in-season measure. The GAP understands that the Groundfish Management Team (GMT), Council groundfish staff, and NMFS staff are examining past management measures to provide examples of how the process would work and encourages this examination.
- Treating new measures separately, similar to what the Council has been doing with trawl rationalization Program Improvements and Enhancements (PIE) rule, requires prioritization and the willingness to follow those priorities. The GAP is encouraged that this has worked well with the PIE rules and believes it can work well with other groundfish management measures.

DEFAULT PROCEDURES FOR DEVELOPING ANNUAL CATCH LIMITS (ACL)

The GAP does not support establishing default P* values or other harvest control rules to be used by the Scientific and Statistical Committee (SSC) in recommending acceptable biological catches. The Council has already established a cap on P* of .45 as a precautionary buffer. Given the variability in fisheries and stock assessments and the uncertainty in data, the risk of overfishing (which P* represents) can change from one biennial process to the next. Other harvest control rules can change as the fisheries change. For example (using Table 1 on page 13 of Agenda Item I.2.a, Attachment 1), the Council has set a constant catch for Dover sole from 2011 through 2014. This was done primarily for perceived market conditions, not for biological reasons. Under the Workgroup proposal, this control rule would remain in effect and become part of the SSC recommendation to the Council. Since this Council has an excellent record of following SSC recommendations and separating science and management, we do not want to put the Council in a position to ignore a management change if it is warranted.

REVISION OF REBUILDING PLANS

The GAP understands that the GMT and the SSC are discussing how to incorporate variability in rebuilding analyses into rebuilding plans and ACL recommendations. The GAP encourages examining how to avoid sharp changes in ACLs based on relatively small changes in the probability of rebuilding.

OTHER ISSUES

The GAP believes that the Council should re-examine its harvest policies in regard to overfished and rebuilding species, along with adoption of a "red light, green light" policy that reflects positive developments in rebuilding to replace the current "red light, red light" policy that only recognizes negative developments. The GAP notes that NMFS has a policy of not identifying species that have rebuilt above the overfished level as being "overfished" (boccacio and darkblotched are good examples), yet the Council is held to using the rebuilding plan in place until a stock exceeds $B_{40\%}$. Moving to a simpler harvest policy will help alleviate workload over time. The GAP recognizes that this is a longer term and more complex discussion and that it should not interfere with the streamlining process being considered under this agenda item. However, it is a discussion that should be held in the future.

PFMC
11/04/12

GROUNDFISH MANAGEMENT REPORT ON AMENDMENT 24 (IMPROVEMENTS TO THE GROUNDFISH MANAGEMENT PROCESS)

The Groundfish Management Team (GMT) reviewed the Amendment 24 Workgroup report and thank the Workgroup for the excellent report. The Workgroup participants on the GMT reported that the discussions were productive and constructively focused on how improvements could be made.

Our recommendation to the Council remains to be that we should continue to move ahead with the general approach recommended in the Workgroup report. However, there are some issues within that general approach that we do not think can be answered now. Our recommended next step would be for the Council to task the Workgroup to continue working on certain issues discussed below and to bring more detail back in March. Progress toward the new approach in time for the 2015-16 cycle would still be possible, depending, of course, on the answers the Workgroup and others might bring back.

In this report we aim to give enough detail to explain why that additional attention is needed. To do so, we first break the issues involved into three main pieces:

1. Structuring National Environmental Policy Act (NEPA) analysis so that a Tier 1 Environmental Impact Statement (EIS) covers multiple biennial cycles.
2. Considering the analysis and review requirements for making changes under the Tier 1 EIS.
3. In light of those requirements, assessing workload and prioritizing how much can be done each biennial cycle.

In other words, the approach involves building a Tier 1 NEPA analysis that evaluates the environmental impacts expected from making biennial adjustments over a number of years. Each biennial cycle then proceeds largely as it did in 2013-14 in terms of the Council's consideration of stock assessments and management measures. The major differences will be that the Council more directly considers how proposed changes from the prior cycle fit within the scope of the Tier 1 analysis, and then also uses a separate process for prioritizing and considering certain management measures.

What the Process Might Look Like?

GMT discussions were marked by some confusion about what the new process might look like. As we now understand it, with a Tier 1 EIS, the biennial process itself would not need to change much. The path forward, from the Council's perspective, looks a lot like the approaches started with the 2013-14 and the program improvement and enhancement (PIE rule) processes for follow up to Amendments 20 and 21.

Two main features of the 2013-14 process serve as foundations of the new approach. First, the pre-standing harvest policy/rationale stays in place unless the Council chooses to change it (e.g. maintain same p-star value). Leaving those policies in place may result in new overfishing limits, allowable biological catch, annual catch limits (OFLs-ABCs-ACLs) after stock assessments are updated, yet the Council does not need to consider a full suite of alternatives for each stock. If the Council wishes to make changes for a stock, then more extensive analysis would be needed. Spiny dogfish, longnose skate, and sablefish are examples from 2013-14 of where the Council chose to consider changes from the 2011-12 policies and for which more extensive analysis and review was needed and conducted.

The second feature of the Council's 2013-14 process focused on maintaining a narrow scope to the changes, including limiting the number of management measure changes that were considered. With the new process, discussions on how to keep the scope "narrow" could be changed to discussions on how to keep the scope "manageable." In addition, the GMT supports the Workgroup recommendation that the Council consider a separate process for management measures that are less directly related to harvest specifications. This process, like the one used for the PIE rule process, would be used to assess workload and set priorities. With all sectors involved instead of just the trawl sector, the priority setting would likely be more difficult than with the PIE process. Nonetheless, it may be the best way to have transparent and direct discussion about workload and priorities across all the Council's groundfish conservation and management objectives. Without such discussions, priorities are likely to be set implicitly or, perhaps, inconsistently.

Is an Fishery Management Plan (FMP) amendment needed?

This is another question that arose quickly in the GMT's discussions. The Workgroup report explains that an amendment would not be necessary, yet could be beneficial. It concluded that the Groundfish FMP framework is flexible enough so that the majority of recommended changes could be implemented without an FMP amendment. Before deciding on whether or not to pursue an FMP amendment, we think more discussion is needed on the specific areas that would possibly benefit from a FMP amendment. It is essentially a question at the center of issue #2: what it takes to make changes and how to determine whether changes fall within or beyond the scope of the Tier 1 EIS. We discuss this issue more below.

We also note that the Council will likely be considering an FMP amendment as part of the stock complex evaluation that is scheduled for the upcoming year. The 2015-16 process itself might be used as a "learn as you go" approach on what is and what is not needed in terms of an FMP amendment. If such an approach were followed, there would of course be limits to the changes that could be made to the FMP, while possibly applying those changes at the same time. **Again, this is an area we highlight for additional attention.**

Building the NEPA approach – Looking at Environmental Impact

The approach we recommend pursuing—i.e. an approach like that of the North Pacific Fishery Management Council (NPFMC)—is based on a Tier 1 EIS and then an evaluation, each time harvest specifications are adjusted, of how information or circumstances have changed relative to environmental impacts. If changes of some level have occurred, then a supplemental EIS is needed before harvest specifications can be adjusted. Being able to gauge what changes require supplementation will therefore be very important to the approach. **More attention is needed on the standards and criteria that will be used to gauge change.**

We recommend that the standards and criteria be identified and grounded in the best available science and ecosystem based fisheries management. NEPA's focus is on impacts to the environment and includes considerations of socioeconomic aspects of the environment. An EIS is supposed to explore and disclose direct, indirect, and cumulative impacts. Consideration of those same impacts is a large part of what is meant by ecosystem based fisheries management. In Agenda Item K.3 tomorrow, the Council will consider how to continue advancing its approach to ecosystem-based fisheries management in the California Current. We would point to the discussion in Chapter 4 of the draft Fishery Ecosystem Plan (FEP) and its connections to NEPA. That chapter broadly outlines our understanding of where direct, indirect, and cumulative impacts arise in the California Current. In addition, the indicators displayed in the Draft Annual State of the California Current Ecosystem Report might also be used to help evaluate how the expected ecosystem level impacts have or have not changed from biennial cycle to biennial cycle. **The connections to the FEP should be another area of additional exploration.** Time allowing, we may address these issues more under Agenda Item K.

The major benefit of taking a close look at how we have analyzed direct, indirect, and cumulative impacts over recent cycles, and how we might better ground those in the best available science, is that doing so will help differentiate between minor changes and major changes and between minor impacts and major impacts. Such perspective could be very valuable for gauging the level of analysis that is necessary. With such context, the smaller impact of something like a change in bag limits can be differentiated from more significant impacts that arise from the choice of where to set the harvest specifications.

Such perspective can also help keep a common thread going between analyses and decisions over time. That common thread focuses on the changes in our understanding from last time and speaks to a more explicit and direct definition of what we mean by direct, indirect, and cumulative impacts to the environment.

What do we need to produce a Tier 1 EIS

Council staff, National Marine Fisheries Service (NMFS), and others have produced and contributed to several NEPA analyses related to this FMP over the past decade. Biological opinions are being considered now on how the fisheries impact protected species. The 5-year essential fish habitat (EFH) review going on now is another example. A lot of analysis on the environmental impact of the groundfish fisheries has been done and is being done. **Another question for additional attention is what it takes in terms of additional analysis—i.e. a gap analysis—to produce an adequate Tier 1 EIS.** Many people associate Tier 1 documents as very large documents. It may be that the groundfish library of analysis already in existence has answered many of the questions needing to be answered. We cannot say for sure until the gap analysis is produced.

Gauging the import of considering changes

Once a Tier 1 EIS is established, then a key question becomes what type of changes can be made in subsequent biennial cycles. The Council may wish to consider a change because of conservation and management need. With the Tier 1 approach, the question of whether the change falls within the scope of the Tier 1 analysis is added to the analysis the Council needs to consider in evaluating whether the change is desirable under the goals and objectives of the FMP and acceptable under the Magnuson-Stevens Act.

The Workgroup report and discussions focused a lot on following default rules as a way of maintaining the scope of the Tier 1 analysis. There have been vigorous discussions among the Workgroup members, the GMT, and the Scientific and Statistical Committee (SSC) about that question. Part of the problem is that default rules are viewed at different levels of generality, from the broad "prevent overfishing and achieve optimum yield" of National Standard 1 to the specific policy of setting p-star at 0.45. The tradeoff involved with default rules is that it may or may not also limit the discretion of the Council to make changes and achieve policy goals. How default rules meet the standards that govern the question of what changes are within and beyond the Tier 1 analysis is something that is not clear to all of us at this time and will not likely be clear to the Council at this point. **This too is an area for additional discussion and report back in March.**

Additional discussions that need to take place

As discussed in the Workgroup report, considering changes in rebuilding plans has been a major effort over recent biennial cycles. It is a specific instance of the general issue involving how changes should be analyzed under a Tier 1 EIS approach. In listening to the SSC discussion on this matter, we understand SSC members will scope what analysis is available and may be realistically achievable in time to inform the 2015-16 process. **The GMT requests to be part of the discussion the SSC holds on this issue at its March meeting.**

Summary

In summary we recommend that the Council request additional consideration and advice from the Amendment 24 Working Group or other appropriate experts on the following matters:

- Specific areas of the FMP where amendments might be beneficial and provide details on those benefits.
- More attention is needed on the standards and criteria that will be used to gauge acceptable changes.
- Feasibility of a "learn as you go" approach during the 2015-16 process on what is and what is not needed in terms of an FMP amendment and on identifying criteria for gauging acceptable changes under a Tier 1 EIS.
- The connections to the FEP, IEA, annual ecosystem reports, and other NEPA analyses produced at the Council.
- Specific needs for producing an adequate Tier 1 EIS (i.e. a gap analysis).

In addition, the GMT:

- Requests to be part of the SSC's March discussion on evaluating changes in rebuilding plans.
- Supports the Workgroup recommendation that the Council consider a separate process for management measures that are less directly related to harvest specifications.
- Recommends continued progress toward the new approach.

PFMC
11/05/12

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON AMENDMENT 24 (IMPROVEMENTS TO GROUNDFISH MANAGEMENT PROCESS)

The Scientific and Statistical Committee (SSC) reviewed the report of the Ad Hoc Amendment 24 Workgroup (Agenda Item I.2.a, Attachment 1), which was tasked by the Council to develop alternatives and recommendations on how to improve the process for setting groundfish biennial harvest specifications and associated management measures. Dr. Kit Dahl provided an overview of the report and was present to answer questions.

The Workgroup report proposed that National Environmental Policy Act (NEPA) requirements could be addressed more effectively and efficiently by developing a Tier 1 framework that specifies the Council's routine actions (e.g., setting annual catch limits [ACLs], adjusting routine management measures) and analyzes the impacts of those actions over an extended time period (e.g., 10 years). Biennial actions or adjustments to management measures would require less burdensome Tier 2 documents (Environmental Assessments or Supplemental Information Reports) if impacts of the actions or adjustments are within the range of outcomes previously analyzed in the Tier 1 NEPA document and could support a "finding of no significant impact." To implement this new harvest specification process, the Council's suite of routine actions and management measures would need to be fully detailed in either an amendment to the Groundfish Fishery Management Plan (FMP) or by means of revisions to the Council's Operating Procedure 9, which outlines the biennial process more completely than the FMP and which the Council can more easily change.

The SSC agrees that it would be advantageous to develop a set of default harvest specification policies. The SSC recommends that the process continue to include a biennial cycle of stock assessments to allow the regular infusion of new scientific information. A Tier 1 document could specify default P* values for deriving acceptable biological catches and a process for adjusting sigma based on additional information on scientific uncertainty. Developing a process and set of rules for the automatic revision of rebuilding plans for overfished stocks is more problematic. Given that assessment estimates are subject to considerable uncertainty, a new stock assessment of an overfished stock is likely to result in a changed estimate of the probability of rebuilding. Further, the pace of rebuilding will depend on the actual sequence of annual recruitment events, whereas a previous rebuilding analysis will reflect the median trajectory of random recruitment events. How to automatically adjust a rebuilding plan when new stock assessment information becomes available is not clear at present and will require additional analyses to establish appropriate mechanisms to accommodate changes in rebuilding parameters that new stock assessments would be likely to generate. If the Council would like to take an automatic approach to making revisions to rebuilding plans, analyses should be conducted, similar to the ones conducted by Punt and Ralston (2007), to explore different options and the trade-offs that would likely be required.

Punt, A.E. and Ralston, S. (2007). A management strategy evaluation of rebuilding revision rules for overfished rockfish stocks. Pages 327- 351 in *Biology, Assessment, and Management of North Pacific Rockfishes*, Alaska Sea Grant College Program, AK-SG-07-01.

PFMC
11/04/12

Natural Resources Defense Council
111 Sutter Street, 20th Floor
San Francisco, CA 94104
Tel: (415) 875-6100
Fax: (415) 875-6161

November 5, 2012

Mr. Dan Wolford, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

RE: Agenda Item I.2, Amendment 24 to the Groundfish Fishery Management Plan

Dear Chairman Wolford and Council Members:

Please accept the following comments on behalf of the Natural Resources Defense Council (NRDC), in regard to proposed Amendment 24 to the Groundfish Fishery Management Plan (FMP).

NRDC believes Amendment 24 offers a chance to improve the harvest specifications process, and we support the Council moving forward with an FMP amendment. In particular, we believe the Council should focus on developing rebuilding control rules in Amendment 24.

Currently, the Groundfish FMP contains only general language on the topic of revising rebuilding plans. We believe it would be very productive for the Council and stakeholders to hammer out specific procedures for revising rebuilding plans in Amendment 24. The amendment should provide quantitative control rules for determining when a rebuilding plan must be revised, versus when the plan simply can be kept as is. For rebuilding plans that must be revised, Amendment 24 should also provide specific rules for deciding how the plan is to be revised, including sideboards on potential outcomes and criteria for determining the outcome within those sideboards.

There are several reasons why rebuilding control rules are a good idea. First, by developing specific policies for these situations, the Council can avoid the free-for-all that typically ensues when a new assessment comes out and finds that a rebuilding target can no longer be met. For example, if the Council had had rebuilding control rules in place, the arguments and general chaos surrounding Canary Rockfish this past April could have been avoided. As we saw in April, without control rules, it takes a huge amount of time and effort, as well as a lot of ruffled feathers, just to arrive at a common-sense outcome. Nobody benefits from having the same arguments all over again, every time a new stock assessment comes out showing that rebuilding is behind schedule.

Second, and related to the first, rebuilding control rules would provide more certainty in outcomes for all stakeholders. From the conservation side, knowing that rebuilding decisions will be handled in specific, defined ways in the future would add a lot to our confidence that rebuilding will actually happen under Council management in the long term. And from the side of industry, knowing that harvest levels will be determined within specific parameters would likely help in making business decisions into the future.

Third, rebuilding control rules provide a method for avoiding rebuilding-related litigation in the future. By bringing in scientists and stakeholders to hash out quantitative control rules, and reviewing these control rules for compliance with the Magnuson-Stevens Act, the Council can ensure that future rebuilding decisions made pursuant to these control rules fall within a legally-defensible space. This would help prevent litigation and court orders from disrupting the harvest specifications process.

Fourth, as noted in the Amendment 24 Workgroup report, narrowing the decision down by using control rules could potentially reduce the NEPA analysis required for each biennial specs cycle. NRDC does not offer an opinion as to what the appropriate NEPA documentation would be, at this point, but we do agree that it is a well-established principle in the law that narrowing the scope of a decision allows for a correspondingly narrower NEPA analysis. A more streamlined NEPA process, as well as a faster decision-making process for rebuilding plans, would help get regulations in place by January 1st each year, which is an important goal.

For all these reasons, NRDC supports moving forward with Amendment 24, and focusing on rebuilding control rules as a method of streamlining the groundfish harvest specifications process. We would urge the Council to use a full FMP amendment as the vehicle for making these improvements, as an amendment will provide the most flexibility and the most durable outcomes.

We would also urge the Council to schedule a workshop for early 2013, composed of scientists, stakeholders, and NMFS and Council staff, to start hashing out potential rebuilding control rules. NRDC would be very interested in attending such a workshop, and we would come prepared with concrete proposals for discussion. We appreciate the example of a control rule presented in the Workgroup report—that is, revising rebuilding plans only after 2 stock assessments in a row have shown that rebuilding targets cannot be met—and while we don't necessarily agree with this particular control rule, we are ready to discuss this example as well as others at a workshop. We also appreciate the SSC's comments suggesting an approach similar to Punt and Ralston's 2007 North Pacific work, which attempted to evaluate when new information represents a truly new scientific understanding of a stock, versus when it does not. Again, we look forward to the opportunity to discuss this concept in depth at a rebuilding control rule workshop.

As a final note, we believe rebuilding control rules offer an area where the Pacific Council can get out in front of an issue and develop best practices for use nationwide. As you know, NMFS recently issued an Advance Notice of Proposed Rulemaking requesting comments on various issues related to the National Standard 1 Guidelines, and this precise issue—how rebuilding plans should be revised in light of new information—was among them. NRDC believes that in Amendment 24, the Pacific Council can set important precedent for how rebuilding control rules should be constructed, and our efforts out here will inform the ways that other Councils approach these situations. NRDC would encourage the Council to take this opportunity to be a leader, by including rebuilding control rules within the scope of Amendment 24, and by scheduling a workshop of scientists and stakeholders on the topic for early 2013.

We hope these comments are helpful, and we look forward to engaging further on Amendment 24 in the future.

Sincerely,

Seth Atkinson
Oceans Program Attorney
Natural Resources Defense Council
111 Sutter Street, 20th Floor
San Francisco, CA 94104
(415) 875-6100

Agenda Item I.3
Situation Summary
November 2012

PROGRESS REPORT ON USING DESCENDING DEVICES TO MITIGATE BAROTRAUMA IN RECREATIONAL FISHERIES

Rockfish that are brought up quickly from depth suffer barotrauma caused by expansion of gasses, which causes tissue damage and a high rate of mortality. In June, the Council discussed methods that can be employed to increase survival of rockfish released in recreational fisheries. The Council was briefed on improved survival of released rockfish by the use of descending devices that enable fish to be released at depth. This allows recompression of expanded gasses that cause barotrauma in fish species that cannot quickly acclimate to the change in depth. Studies have shown there is both short and long term survival of some of these fish when they are released at depth using descending devices.

The Council heard proposals for a survival credit for rockfish releases in the recreational fishery; currently a high mortality rate is presumed for rockfish released at the surface in recreational fisheries. In June, the Council tasked the Groundfish Management Team (GMT) with examining information and proposals on the use of descending devices to mitigate barotrauma in cowcod and yelloweye towards consideration of an adjusted mortality rate (i.e., a survival credit) and developing a progress report for this Council meeting. The progress report is provided as Agenda Item I.3.b, GMT Report and provides the research results the GMT believes best inform the mortality rates associated with the use of descending devices for these two species and alternatives for adjustments to mortality rates. The Scientific and Statistical Committee (SSC) will review the progress report and will report their recommendations to the Council on the science informing alternative mortality rates using descending devices that were developed by the GMT.

The Council task at this meeting is to provide guidance on further development and refinement of information necessary to establish survival credit for using descending devices when releasing cowcod and yelloweye in recreational fisheries. The Council should consider the advice of the SSC on the science that informs this issue and GMT, Groundfish Advisory Subpanel, and public advice on issues associated with refining recreational fishery discard mortality rates for these two species.

Council Action:

1. **Provide guidance on further development and refinement of information necessary to establish survival credit for using descending devices when releasing cowcod and yelloweye in recreational fisheries.**

Reference Materials:

1. Agenda Item I.3.b, GMT Report: Groundfish Management Team Progress Report on Developing Mortality Rates for Rockfish Released Using Descending Devices.

Agenda Order:

a. Agenda Item Overview John DeVore
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Provide Guidance on Further Development and Refinement of Information Necessary to Establish Allowable Credits

PFMC
10/15/12

Agenda Item I.3.b
GMT Report
November 2012

GROUNDFISH MANAGEMENT TEAM PROGRESS REPORT ON DEVELOPING MORTALITY RATES FOR ROCKFISH RELEASED USING DESCENDING DEVICES

Contents

A subgroup of the Groundfish Management Team (GMT) has been working on the issue of accounting for the use of descending devices in catch accounting since the June 2012 Council meeting, as time and other duties allowed. Additionally, the entire team worked on this issue at the September 2012 Council meeting and at the October GMT work session. This document is a progress report on this work as of the October 11, 2012 briefing book deadline, some sections are still being worked on, and in those sections there may just be bullet points of the GMT's thoughts so far. These thoughts are incomplete and require more discussion and work; however the Team wanted to include them to show the nature of the discussions and issues that have arisen.

Robert Boyle, 1627-1691

Executive Summary

The Groundfish Management Team (GMT) considered published research, unpublished information, and personal communications with researchers working on barotrauma effects on rockfish and ways to mitigate barotrauma when releasing rockfish using recreational hook-and-line gear. The GMT used that data to begin developing methodologies for determining mortality rates for rockfish released with descending devices. We present some strawman methodologies here not only for review by the Scientific and Statistical Committee (SSC) but also to give the Pacific Fishery Management Council (Council) a sense of the data available, some of the considerations in using that data, and data gaps that need to be filled to more appropriately account for increased survival of rockfish released with descending devices. The GMT is not recommending any methodology at this time. Likewise, application of any method approved by the SSC and the Council would require additional work to incorporate it into state recreational sampling protocols and catch statistics.

Proposed discard mortality rates for yelloweye rockfish and cowcod released with descending devices are based on results of rockfish recompression and tagging studies. In the recompression studies, observations of rockfish mortality were made by researchers who returned fish to the bottom in cages (Jarvis and Lowe 2008 (Hannah, *et al.* 2012; Jarvis and Lowe 2008) or subjected fish to equivalent bottom pressures in hyperbaric chambers (Parker, *et al.* 2006; Pribyl, *et al.* 2012; Smiley and Drawbridge 2007). In a tagging study, mortality of yelloweye rockfish after release at the bottom was estimated with a mark-recapture model (Hochhalter and Reed 2011). In an acoustic tagging study undertaken by the National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center (SWFSC), rockfish including cowcod were released using descending devices following tagging. Tagged fish that showed movement after release were assumed to be live fish, whereas continuously stationary tags were assumed to be dead fish (Wegner, Pribyl, and Hyde, in prep.). Though the sample sizes for each of these studies may be limited for cowcod and yelloweye rockfish and only applicable to equal or shallower depths in which the studies were conducted, they provide a basis for direct estimates or proxies based on other shelf rockfish sampled in the studies. Basing descending device discard mortality rates on telemetry movement data may result in overestimation due to possible mortality occurring from the tagging event and since tag losses from live fish would appear as mortalities.

Summary of Alternatives

The GMT had lengthy discussions about short term vs. long term mortality and how to account for that mortality. A similar framework to that employed in estimating surface mortality rates can be applied in estimating mortality rates expected for fish released using a descending device by the simple modification of replacing the short term surface mortality rate with the two or four day mortality rates estimated from research projects discussed below. When determining surface release mortality rates for cowcod there was not a sufficient number of samples available to provide a direct estimate and, as a result, a proxy estimate from other members of the deep demersal guild was used. Direct estimates for cowcod are also lacking from two day cage studies, but estimates from other deep demersal guild species are available. As with surface release mortality rates, the three factors can be combined to estimate mortality rates for fish released using descending devices comprised of 2-4 day (short term) mortality, short term bottom mortality (8.3%, Albin and Karpov 1996), and a long term bottom mortality (5%/10 fm).

An alternative method of estimating mortality rates would involve combining discard mortality rates for two day cage studies with long term three to ten day mortality rates. The combination of the two day tagging study data depends on the species to which it is being applied and the depth in which the data was collected. Data was also available from the acoustic tagging study to inform a single total mortality rate for 0-10 days providing a complete estimate of total mortality for a limited number of samples for comparison to the composite estimates from the combination of 2-4 day mortality from recompression studies combined with long-term mortality rates.

The proportion of fish released using the devices and the proportion of catch by depth will determine the magnitude of the difference in mortality when the rates reflecting use of descending devices are applied instead of surface release. Greater reductions in mortality are expected in deeper depths where the surface release mortality rate approaches 100 percent due to the inability of fish to escape the surface subjecting them to predation by avian and pinniped predators as well as sun exposure and thermal shock. To account for uncertainty surrounding long term mortality, an additional mortality rate may be added to the discard mortality rates to provide a precautionary buffer.

Specific Questions for the SSC

1. Are the research results cited sufficient to develop mortality rates for cowcod and yelloweye released using descending devices at the depths provided in this progress report?

2. What are the research and data needs to better inform the development of mortality rates of cowcod and yelloweye using descending devices?

3. Given the uncertainty in mortality rates from barotrauma studies conducted to date, what level of precaution should be considered for applying a survival rate credit for anglers using descending devices?

4. If survival credit is given, there will be necessary changes to recreational surveys to document the proportion of rockfish by species released using descending devices. Are the current sampling rates sufficient to gain a representative sample of the use of descending devices by fleet?

Questions that Council Members Need to Consider

1. With the mortality rates from barotrauma studies conducted to date, apparent reduction in mortality relative to surface release, and uncertainty associated with the estimates, what level of precaution should be considered for accounting for the reduction in mortality resulting from the use of descending devices in generating mortality estimates for management?

2. If use of descending devices are accounted for in mortality estimates, there will be necessary changes to recreational surveys to document the proportion of rockfish by species released using descending devices that will entail costs (e.g., lower sample rates) and benefits (e.g., potentially greater fishing opportunities). The Council needs to carefully consider costs and benefits associated with this initiative.

3. Should alternatives for other constraining rockfish species (e.g., canary) be developed?

Introduction

At the June 2012 meeting, the Council tasked the GMT with developing a report on how to integrate recreational angler use of descending devices into the management system for cowcod and yelloweye rockfish caught with rod-and-reel gear, with the goal of applying a discard mortality rate that reflects use of a descending devices in the release of fish rather than surface release beginning in 2013. Accounting for the use of descending devices in mortality estimates for additional rockfish species and for the commercial nearshore groundfish fishery may occur in the future, but only cowcod and yelloweye rockfish released by recreational fisheries were requested for immediate review due to GMT workload constraints and because regulations used to limit discard mortality of these species are most restrictive relative to other overfished species.

Although current catch accounting practices account for depth-dependent recreational rockfish discard mortality for fish released at the surface, the assumed discard mortality rates are based on simply throwing fish overboard and onto the surface. Applying these estimates to all discarded rockfish may result in an overestimate of total discard mortality used in management because some recreational fishermen release rockfish at the depth of capture with descending devices. Discard mortality rates are lesser for rockfish released at the bottom, as accomplished with descending devices, than at the surface (Hannah, *et al.* 2012; Hochhalter and Reed 2011; Jarvis and Lowe 2008). Applying lesser discard mortality rates to rockfish released with descending devices could allow greater opportunities for these fisheries since regulations are crafted in rod-and-reel fisheries to keep overfished species impacts within relatively low harvest guidelines.

To incorporate alternative mortality rates accounting for descending device use, the proportion of fish released with devices must be estimated and discard mortality rates for rockfish released with devices must be developed, which is the objective of this report. Since calculations to determine the proportion of fish released with devices may vary among the state recreational fisheries due to different catch accounting methods, the Council may consider whether agencies should independently calculate proportions of fish released with devices for their respective fisheries, or whether a uniform method should be applied to all states and fisheries. Calculations for determining both mortality rates and proportions of rockfish released with descending devices for the recreational fisheries should be reviewed by the SSC Groundfish Subcommittee. In addition, the methods of applying the mortality rates should be reviewed by the RecFIN Technical Committee.

Surface Discard Mortality Estimate

Currently all fish released from recreational fisheries are assumed to be discarded at the surface. The GMT developed a depth-dependent mortality matrix that is applied to those surface released fish (Table 1). The GMT evaluated three specific components of total mortality to develop a mortality proxy: a) short term surface mortality, b) short term bottom mortality, and c) long term delayed mortality (PFMC 2008). In developing these rates, the GMT considered "surface" mortality, one that is observable when a fish is brought to the surface, handled on deck, and thrown back. Short term surface mortality was estimated using the correlation of rockfish discarded onboard party boats with depth of capture in 10 fm increments using a generalized linear model (GLM). Second, the GMT considered short term, below surface mortality that had been documented by research at the time. The short term bottom mortality rate was derived from a study in which rockfish were vented and held at the surface in a live well from one to five days (Albin and Karpov 1996) resulting in a mortality rate of 8.3 percent. Lastly, the GMT took into consideration longer-term, below surface mortality that is essentially unobservable in the field and for which there was little information at the time (PFMC 2008). This precautionary long term delayed mortality rate of 5 percent per 10 fm of depth was applied as a buffer against uncertainty about the long term loss of fitness and delayed mortality on released fish that appeared to be alive when they returned to the bottom after five days.

These estimates of the components of mortality were combined using Equation 1. Details of the development of the surface mortality estimates in Table 1 can be found in Section 4.5.1.6, pages 276-290, of the 2009-2010 Groundfish Fishery Final Environmental Impact Statement (PFMC 2008). This method was approved at the March 2008 Council meeting for application in 2009-2010. These mortality rates are then applied to the number of released fish by species and depth bin on a monthly basis to determine the total discard mortality.

Equation 1. M = 1 – ((1 - short term surface mortality from GLM) x (1 - short term bottom mortality) x (1 - long term delayed mortality))

Table 1. Discard mortality rates, by depth bin (fm) of groundfish released at the surface (Table 4-56 in PFMC 2008).

Species Group	Species	Depth Bins (fm)			
		0-10	11-20	21-30	>30
Rockfish	Black	11%	20%	29%	63%
	Black and Yellow	13%	24%	37%	100%
	Blue	18%	30%	43%	100%
	Bocaccio	19%	32%	46%	100%
	Brown	12%	22%	33%	100%

Species Group	**Species**	**Depth Bins (fm)**			
		0-10	**11-20**	**21-30**	**>30**
	Calico	24%	43%	60%	100%
	Canary	21%	37%	53%	100%
	China	13%	24%	37%	100%
	Copper	19%	33%	48%	100%
	Cowcod	21%	35%	52%	100%
	Gopher	19%	34%	49%	100%
	Grass	23%	45%	63%	100%
	Kelp	11%	19%	29%	100%
	Olive	34%	45%	57%	100%
	Quillback	21%	35%	52%	100%
	Tiger	20%	35%	51%	100%
	Treefish	14%	25%	39%	100%
	Vermilion	20%	34%	50%	100%
	Widow	21%	36%	52%	100%
	Yelloweye	22%	39%	56%	100%
	Yellowtail	10%	17%	25%	50%
Other Fish	Cabezon	7%	7%	7%	7%
	California Scorpionfish	7%	7%	7%	7%
	Kelp Greenling	7%	7%	7%	7%
	Lingcod	7%	7%	7%	7%
	Pacific Cod	5%	32%	53%	97%
General Category	Flatfish	7%	7%	7%	7%
	Sharks and Skates	7%	7%	7%	7%
	Dogfish	7%	7%	7%	7%

An analysis was also conducted to estimate surface mortality for groups of species ('guilds') that have similar distribution in the water column (pelagic vs. demersal) and differences in depth distribution (deep vs. shallow; Table 2). Guilds were based on published information regarding depth distribution and orientation in the water column (Love, *et al.* 2002) and collective experience of team members at the time (PFMC 2008).

Table 2. Species composition of guilds based on depth distribution and orientation in the water column (Table 4-50 in PFMC 2008).

Guild	Rockfish Species Included in Guild
Shallow Pelagic	Black, Olive, Yellowtail
Shallow Demersal	Brown, Grass, Kelp, Treefish
Deep Pelagic	Bocaccio, Widow, Canary, Blue
Deep Demersal	Vermilion, Copper, Yelloweye, Gopher

During 2012, the GMT, in consultation with the Recreational Fisheries Information Network (RecFIN), did additional work to assign rockfish species currently not included in the matrix (Table 1) to guilds (Table 2) to determine the appropriate discard mortality rate to apply (Table 3). This allowed discard mortality to be calculated for all species encountered in the recreational fisheries.

Table 3. Guild based depth-dependent mortality rates for species not included in the original discard mortality rate table (Table 1).

Guild	Depth Bins (fm)			
	0-10	11-20	21-30	>30
Deep Demersal[1]	21%	35%	52%	100%
Deep Pelagic[2]	18%	30%	45%	100%
Other Fish[3]	7%	7%	7%	7%

[1] Deep demersal rockfish species are: Aurora, bank, blackgill, bronzespotted, chameleon, cowcod, darkblotched, dusky, dwarf red, flag, freckled, greenblotched, greenspotted, greenstriped, halfbanded, harlequin, honeycomb, Mexican, Pacific Ocean perch, pink, Puget Sound, pygmy, redbanded, redstriped, rosethorn, rosy, rougheye, semaphore, sharpchin, shortbelly, shortraker, silvergray, speckled, splitnose, squarespot, starry, stripetail, swordspine, whitebelly (copper), and yellowmouth.

[2] Deep pelagic rockfish species are: chilipepper,

[3] Other fish species are: longspine thornyhead, shortspine thornyhead, rainbow scorpionfish, and scorpionfish family

Potential Methods for Establishing Mortality Rates for Yelloweye Rockfish and Cowcod

Data Available to Inform Discard Mortality Rates Reflecting the Use of Descending Devices

Table 4. Information in this table is summarized from the actual reports described in Appendix 1. Estimates of mortality are taken directly from the studies.

Authors	Study Focus	Species Studied	Sample Size	Depth Range	Device Used	Results
Jarvis and Lowe, 2008	Effects of barotrauma on initial capture survival (10 min.) Study area: S. CA October 2004-March 2006	Nearshore and shelf rockfish, targeting demersal rockfish	168 rockfish representing 21 species. Vermilion (n=35, 19-52 fm); greenspotted (n=19, 41-103 fm); olive (n=16, 13-29 fm); halfbanded (n=15, 29-35 fm), rosy (n=12, 30-83 fm) and honeycomb (n=12, 25-42 fm) rockfish comprised the majority of the catch.	10-52 fm	Hook and line	Initial capture survival was 68% overall but varied by species. In general, fish caught at deeper depths showed higher numbers of trauma however, species caught at shallower depths showed relatively similar survival proportions as species caught in deeper depths. Short term survival varied across species, external signs of barotrauma weren't a good predictor of capture survival but surface holding time was.

Authors	Study Focus	Species Studied	Sample Size	Depth Range	Device Used	Results
Jarvis and Lowe, 2008	Short term (2-day) post recompression survival. S. California during the summer of 2004 & 2005	Nearshore and shelf rockfish	257 rockfish representing 17 species. Five species comprised the majority of the catch: Vermilion (n=73, 30-47 fm), bocaccio (n=64, 31-49 fm), flag (n=29, 30-49 fm), squarespot (n=28, 30-45 fm), honeycomb (n=17, 31-46 fm), Others: Copper (n=2, 31-46 fm) and Canary (n=1, 49 fm).	30-44 fm (avg 39).	Hook and line, coated wire mesh cage.	Rapid recompression significantly reduced discard mortality. Fish held at the surface for 10 min. or less had a 78% probability of survival from analysis in a Generalized Linear Model. Direct estimates of mortality for all species combined resulted in a 29% mortality rate. There was a significant difference in species survival among the five most abundant species. Bocaccio (31-49 f m, 80% survival); flag (30-49 fm, 80% survival); honeycomb (31-46 fm, 65% survival); squarespot (30-45 fm, 35% survival); vermilion (30-47 fm, 70% survival). Species specific differences in external signs of barotraumas appear to be related to species differences in body morphology and to the degree of movement within the water column. For example, species such as bocaccio, squarespot, and halfbanded rockfish with relatively elongated bodies and that occur in schools off the seafloor showed few signs of barotrauma. Fish such as vermilion, honeycomb, flag and starry with relatively deep bodies and are more demersal, showed a high degree of

Authors	Study Focus	Species Studied	Sample Size	Depth Range	Device Used	Results
						barotrauma. The odds of mortality 2 days after recompression increased 1.7 times for every 10 min increase in surface holding time and almost 2 times for every 1 °C increase in seafloor-surface temp. Fish with a thinner swim bladder (olive) may be more prone to severe rupture than a robust swim bladder (vermilion, copper and brown). 3% of the fished released alive were recaptured by anglers.
Hannah et al. 2012 and Hannah unpublished data	Used a cage system to measure 2 and 4 day, post recompression survival for common recreational rockfish in N. CA, OR and WA (NCOW) as a function of capture depth. Study area: Oregon coast	Nearshore and shelf rockfish in NCOW	288 rockfish, including 24 yelloweye rockfish (published) 49 yelloweye rockfish (unpublished) 73 total yelloweye rockfish	< 45 fm	Novel cage	With the exception of three blue rockfish, the condition of surviving fish after being in the cage was excellent. At capture depths up to 30 fm, survival was 100 % for yelloweye, quillback, canary, and copper rockfish, 90 % for black rockfish, and 78 % for blue rockfish. Combined mortality including all species was 7%. Results of additional trials (4 day holding periods instead of 2) for yelloweye rockfish (unpublished data): 25-35 fm = 100% survival (n=24) 35-40 fm = 93% survival (n=14) 40-45 fm = 100% survival (n=11)

Authors	Study Focus	Species Studied	Sample Size	Depth Range	Device Used	Results
						To model the relationship between survival post-recompression and depth, additional trials will occur in deeper depths Time on deck average less than 3 minutes.
Hochhalter and Reed, 2011	Effectiveness of deepwater release to improve the survival of yelloweye rockfish. Study area: Alaska Mark- recapture study to generate maximum likelihood estimate of the 17-day survival probability of yelloweye rockfish.	Yelloweye rockfish in Prince William Sound, Alaska	182 yelloweye	10-39 fm	Hook and line, inverted weighted hook	The average survival probability for yelloweye rockfish released at depth was 95% and positively correlated with individual length. Survival probability was not significantly influenced by the range of capture depths or exposure to barotraumas. The submergence success of yelloweye rockfish released at the surface was 22%. Evidence that the average 17 day survival of discarded yelloweye can be increased more than 4 times through the use of deepwater release compared to surface release. Lower survival for smaller fish could be due to increased predation compared to larger fish.
Wegner, Pribyl, Hyde (in prep.aration)	Used acoustic tags to study the survival and behavior of deep-	Shelf rockfish off southern California	50 rockfish including; bank (n=12), bocaccio	44-98 fm Mean = 73.6	Hook and line, weighted cage,	Over time fish emigrated from the study-site, the numbers presented reflect fish within detection range. 39 of the 42 fish (92.9%) detected at day 2 survived, 23 of

Authors	Study Focus	Species Studied	Sample Size	Depth Range	Device Used	Results
	dwelling rockfish captured and released back to depth with descending devices over a four month period.		(n=13), cowcod (n=9); starry (n=3) and sunset rockfish (n=13)	fm	SeaQualizer	the 30 fish (76.7%) detected at 10 days survived. 100% of the cowcod survived after 2-days, 4 of the 4 cowcod detected at day 10 survived, 5 cowcod emigrated from the study area between days 6-9 and their fate is unknown. All emigrants were actively swimming when last detected so loss of detection is not assumed to indicate mortality.
Smiley and Drawbridge, 2007	Used a specially designed hyperbaric chamber to quickly recompress rockfish captured with hook and line and allow decompression slowly to keep rockfish alive to hold as brood stock	Rockfish off southern California	16 cowcod	49-80 fm	Hook and line, hyperbaric chamber	69% (11/16) of the captured cowcod survived to feed following capture, recompression and decompression.

Yelloweye Rockfish

The two-day mortality rates from Hannah et al. (2012) were estimated for 24 yelloweye rockfish sampled from 0-30 fm in which 100 percent of fish returned to the bottom in a barrel survived in all depths after two days. Further, in recent four-day barrel trials (Hannah unpublished data), post-recompression survival of yelloweye rockfish was 100 percent from 25-35 fm (n=24), 93 percent from 35-40 fm (n=14), and 100 percent from 40-45 fm (n=11). In total, 72 of 73 (98.6 percent) yelloweye rockfish survived in depths < 50 fm.

Hannah et al. (2012) also observed 100 percent survival for canary (n = 41), copper (n = 10), and quillback rockfish (n = 28). Results for blue (n = 36) and black rockfish (n = 144) showed a significant correlation of mortality with depth which may reflect a greater sensitivity of species in the subgenus *Sebastosomus* of which these species are members, to barotrauma, potentially due to thin-walled swim bladders. In addition, no correlation of mortality with depth was found for the demersal non-*Sebastosomus* species. Recent additional sampling by Hannah (unpublished data) provided data for 49 more yelloweye rockfish subjected to the same methods but with a four day study period in depths between 25 and 45 fm. There was no apparent increase in mortality with depth, with only one mortality between 35 and 40 fm. Combining these samples with the samples from depth from the Hannah et al. (2012) the resulting survival rate was 99 percent (92.7-99.9, 95 percent Confidence Interval), validating expansion of the 1 percent mortality rate for application in 30 to 50 fm.

Confirming these results, the mark-recapture study conducted by Hochhalter and Reed (2011), on yelloweye rockfish caught at depths shallower than 40 fm, and released near the bottom, yielded an estimated average survival of 98.8 percent (95% CI=52.2 - 99.9 percent) after 17 days. The authors concluded that depth did not affect survival among the ranges of depths sampled in the study (< 40 fm). However, only 5 percent of their yelloweye rockfish were caught deeper than 30 fm and no tags were recovered from those fish.

The average mortality rate from these studies (~1 percent) is used as the discard mortality rate for only yelloweye rockfish caught in depths shallower than 30 fm and released with descending devices. One percent mortality is also used for depths bins from 30-50 fm in accordance with the results from the unpublished barrel trials, despite a mortality occurring from 35-40 fm (within the proposed 8.3 percent mortality rate for hooking-related injury; further explained below). An estimate of mortality of 7 percent was also calculated combining all species in the Hannah et al. (2012) study including blue and black rockfish in order to reflect uncertainty in the estimates for any one species since the sample size was relatively low for yelloweye rockfish alone. Inclusion of blue rockfish and black rockfish in this estimate may bias an estimate of mortality for yelloweye rockfish using this estimate high since mortality for the *Sebastosomus* appeared to be higher than others. The addition of short term bottom mortality and long term mortality is a further reflection of the expectation that some additional mortality is likely to result from hooking and handling as well as barotrauma.

There may be sufficient data from recompression studies to estimate discard mortality rates for yelloweye rockfish caught in depths shallower than 50 fm, and released with descending devices. Until survival of yelloweye rockfish caught in depths greater than 50 fm and released at depth is studied, speculative mortality rates for fish caught beyond this depth and released with descending devices may have to be used. The Council may consider a more conservative approach by applying a 100 percent discard mortality rate to yelloweye rockfish caught deeper than 50 fm, whether they were released with a descending device or not. However, survival studies (e.g., Hannah et al. 2012, etc.) demonstrate that it is unlikely that 50 fm is a "knife-edged" threshold depth beyond which all yelloweye rockfish die, when released with a descending device. Due to a lack of data beyond 50 fm, methods with varying assumptions, uncertainty and risk of underestimating mortality were used to project potential discard mortality rates for deeper waters using data from two day cage studies conducted by Jarvis and Lowe (2008) between 30 and 50 fm for comparison and acoustic tagging studies conducted by Wegner et al. (in prep.) to inform mortality between 50 and 100 fm described further below.

Cowcod

For cowcod released with descending devices, one alternative is to replace the surface mortality rate component used in calculating the surface release mortality rates with the 29 percent discard mortality rate, based on a study by Jarvis and Lowe (2008). In this study, a GLM was fit to mortality data for 306 shelf rockfish taken with rod and reel gear in 30 - 50 fm and returned to the bottom in cages for two days resulting in a survival probability of 78 percent or conversely, a 22 percent probability of mortality. Direct calculation of mortality rates from all species included in the two day mortality rate estimation resulted in an estimate of 29 percent mortality rate. No significant correlation of mortality with depth was found in this study over the sampled range of depths. With the exception of squarespot rockfish, no significant differences in mortality rates between species were found between bocaccio, vermilion, honeycomb, and flag rockfish. A longer duration of time on deck prior to release for sampled squarespot rockfish may account for the higher mortality in this species. The aggregate mortality rate of 29 percent was estimated while including squarespot rockfish and the other sampled species released within 10 minutes of capture. Given the lack of significant difference in mortality rates between species other than squarespot rockfish in this study and between non-*Sebastosomus* species in Hannah et. al. (2012), results from other shelf rockfish species provided in this study may provide a potential proxy for cowcod mortality rates in the sampled depths.

The 29 percent mortality rate may also be applied to shallower depths, though mortality rates for surface release are lower between 0 and 20 fm and could continue to be applied in these depths since release using descending devices would not be expected to be higher than surface release. In addition, given the greater thermocline with depth and greater expected thermal shock expected in the Southern California Bight, the results of this study may provide a suitable conservative proxy for survival of yelloweye rockfish in depths from 30-50 fm. Mortality rates are likely to be lower for yelloweye rockfish in these depths given lower thermal shock in northerly waters where they are found and the very low mortality rates observed between 0 and 50 fm (Hannah et. al. 2012 and unpublished data), making this a conservative proxy. Conversely, use of the results from all species from Hannah et al. (2012) as a proxy for expected cowcod mortality in depths less than 30 fm may be reasonable.

The results of yet unpublished acoustic tagging studies presented to the Council in June 2012 (D.2c_Sup_SWRSC_PPT_Vetter_June202BB.pdf, Wegner, Hyde, and Pribyl, in prep.) provides an alternative estimate of total mortality from direct observations of cowcod as well as proxy estimates based on other co-occurring shelf rockfish species. In this study 50 shelf rockfish predominantly caught between 70 and 100 fm were fitted with acoustic tags, released using descending devices and tracked with an array of six receivers that recorded depth and acceleration providing information on movement and mortality over a four month study period. Of the nine cowcod tagged in this study, five emigrated from the study area and all four that remained within the range of receivers survived. Until the time at which the five cowcod that emigrated from the study area departed, they were actively moving within the range of the receivers, providing no indication that they were in any worse condition than those fish that remained within the receiver range for the duration of the study (Hyde and Wegner, personal communication). Bank rockfish did not fare as well as the other four species in the study and it was found that the extent of the injuries suffered by this species were more severe than the other species indicating that they may be more susceptible to mortality due to barotrauma with only 33 percent (2/6) surviving to ten days (Hyde and Wegner, personal communication).

In this study, the majority of mortality occurred within the first few days and no additional mortality was observed in fish that remained within the range of receivers after six days through the remainder of the four month study. All the fish encountered were included in the study; none of the fish were selectively included in the study due to their relative condition at the time of capture. The study purposely tagged all encountered fish done to avoid biasing the results toward higher survival by selectively tagging fish that were in better condition. Of the tagged individuals remaining within the study area for ten days, 76.7 percent (23/30) survived and provides a proxy estimate of total mortality expected for shelf rockfish for four months since no additional mortality was observed beyond ten days for fish remaining within the range of the receiver array (Table 5).

The vast majority of the mortality occurred within two days as indicated by the low additional mortality of 14.8 percent between three and ten days (Table 5). Two day cage studies provide a proxy estimate of mortality that reflects the mortality rates expected for all released shelf rockfish with higher sample sizes. Since the majority of fish that died did do so within the first two days, use of the cage study data combined with mortality three to ten days from the acoustic tagging study may provide an aggregate estimation of mortality that makes use of larger sample sizes from the two day cage studies and provides an informed estimate of long term mortality.

The mortality rate of 14.8 percent for all fish still alive and within the receiver range between day three and the end of the study can be combined with two day mortality rates from cage studies to provide a proxy estimate of mortality expected for shelf rockfish. The result is an expected total mortality rate of 39.5 percent for depths between 30 and 50 fm, incorporating the 29 percent mortality rate from the two day cage study and Jarvis and Lowe (2008) and the 14.8 percent long term mortality rate from the acoustic tagging study of Wegner et al. (in prep.).

The 39.5 percent mortality rate estimate should be considered precautionary given the mortality rate of the ten day observation of fish that remained within receiver range was 23.3 percent (23/30). The acoustic tagging study can also inform two day mortality rates and ten day mortality rates as well as a stand-alone estimate for total mortality expected over the course of 10 days, which may be assumed to reflect mortality expected through the duration of the four month study (Table 5). In studies where cowcod caught in 50 to 80 fm for exhibition in aquaria and recompressed in a hyperberic chamber resulted in a 69 percent survival rate (11/16, Smiley and

Drawbridge 2007), which is expected to be lower than for fish released using a descending device since fish were subjected to subsequent decompression according to Navy dive tables to allow them to be kept at surface pressure and they were subject to the continued stress of captivity. Combining this estimate with the samples (30) from the ten day observation from Wegner (in prep.) provides an estimated proxy aggregate mortality rate of 26 percent (34/46) and a direct estimate of aggregate mortality for cowcod of 25 percent (5/20) for fish caught in greater than 50 fm. Thus the proxy long term estimate of 39.5 percent mortality for 30-50 fm should be considered precautionary since it exceeds estimates expected from results of these directed studies and is far in excess of the 100 percent survival observed for the nine cowcod observed over the course of two days and the four within receiver range over the course of the ten day study caught in 50-100 fm. The higher mortality estimate for 30-50 fm may be in part due to the inclusion of squarespot rockfish in the two-day mortality estimate and bank rockfish in the long term mortality rates as well as the stress experienced by fish from confinement and repeated contact with the walls of the cages in two-day cage studies.

To provide a buffer for uncertainty surrounding long term mortality of fish consistent with that applied to surface release mortality rates developed by the GMT and previously reviewed and approved by the SSC, an additional 5 percent mortality per 10 fm of depth may be added to the discard mortality rates. The 3 to 10 day mortality rate of 14.8 percent from Wegner et al. (in prep.) provides an alternative estimate of long term mortality to combine with short term estimates from two day cage studies. This alternative method of accounting for long term mortality would address the potential overestimate of mortality rates due to the overlapping time period of the two day cage study mortality and one to five day mortality from Albin and Karpov (1996) if the method analogous to that employed by the GMT in estimating surface mortality rates were applied. Given the overall mortality rate of 23.3 percent for individuals of all species that remained within receiver range for more than ten days, the long term mortality rate assumption of 5 percent per 10 fm of depth of capture applied to fish discarded at the surface may be excessive, especially at depths greater than 20 fm where this proxy mortality rate combined with the 8.3 percent from Albin and Karpov (1996) well exceeds 15 percent. The total mortality rates for 10 days from Wegner et al. in combination with results from Smiley and Drawbridge (2007) are considered as an alternative measure of aggregate mortality for depths greater than 50 fm. The lower total mortality or three to ten day mortality rates provided from these studies may be more appropriate at these depths and can be applied in place of the arbitrarily precautionary 5 percent per 10 fm of depth intended to address uncertainty regarding long term mortality prior to these studies. The overestimation of mortality beyond two days may be exacerbated by of the 5 percent per 10 fm with the potentially excessive 8.3 percent from the Albin and Karpov (1996) estimate of one to five day mortality for fish vented, tagged and retained at the surface in live wells, which is partially redundant if combined with the mortality observed from the two day cage studies or acoustic tagging studies.

The results of Wegner et al. (in prep.) should be applicable to species found farther to the north where the thermocline is less extreme and lower mortality is expected as a result of reduced change in temperature and thermal shock. In addition, the greater depth of capture informs a mortality rate expected for shelf rockfish in deeper depths than sampled in Hannah et al. 2012 that could be applied to yelloweye rockfish in combination with the two-day mortality rate from Jarvis and Lowe (2008) from 30-50 fm providing an estimated mortality of 39.5 percent. Within

30 fm, a proxy combining the 1 percent mortality observed for yelloweye rockfish in the two-day cage study and the 14.8 percent mortality rate expected for fish from the south in much greater depths for day three through ten for long term mortality (assumed the same through four months) would result in a proxy estimate of mortality of 15.7 percent. Sample sizes, number of fish surviving, survival rates and confidence intervals for mortality rate estimates assuming a binomial distribution given the sample size from the studies discussed above are provided in Table 5. The survival rate estimates and confidence intervals are provided in Figure 1, which shows that the majority of the estimates are well above 50 percent is also the case for the lower 95 percent confidence intervals for survival.

Table 5. Total study sample (N), number of fish surviving (S), the binomial expectation of survivorship (Exp.), and the 95% binomial confidence intervals of survivorship (C.I.) by study, depth bins, and days after release for several rockfishes. Confidence intervals were calculated using binom.test in R ver. 2.15.1.

Species	Metric	Depth bin (fm)							Study
		0-30	31-50	51-80	51-100+	71-100+			
		2 and (4) days	4 days	10+ days	10 + days	2 days	3-10 days	10 days	
Yelloweye	N	24 (24)	25						2 day-Hannah et al. 2012; 4 day-Hannah unpub.
	S	24 (24)	24						
	Exp.	1	0.96						
	C.I.	0.86-1.00							
Cowcod	N			16	20	9	4	4	Smiley and Drawbridge 2007; Wegner et al. in prep..
	S			11	15	9	4	4	
	Exp.			0.69	0.75	1	1	1	
	C.I.			0.41-0.89	0.51-0.91	0.66-1.00	0.40-1.00	0.40-1.00	
Black	N	144							Hannah et al. 2012
	S	130							
	Exp.	0.9							
	C.I.	0.84-0.96							
Blue	N	36							Hannah et al. 2012
	S	28							
	Exp.	0.78							
	C.I.	0.61-0.90							
Canary	N	41							Hannah et al. 2012
	S	41							
	Exp.	1							
	C.I.	0.91-1.00							

Species	Metric	Depth bin (fm) 0-30 2 and (4) days	31-50 4 days	51-80 10+ days	51-100+ 10 + days	71-100+ 2 days	71-100+ 3-10 days	71-100+ 10 days	Study
China	N	3							Hannah et al. 2012
	S	3							
	Exp.	1							
	C.I.	0.29-1.00							
Copper	N	10							Hannah et al. 2012
	S	10							
	Exp.	1							
	C.I.	0.69-1.00							
Quillback	N	28							Hannah et al. 2012
	S	28							
	Exp.	1							
	C.I.	0.88-1.00							
Flag	N		32						Jarvis and Lowe 2008
	S		26						
	Exp.		0.81						
	C.I.		0.64-0.93						
Honeycomb	N		20						Jarvis and Lowe 2008
	S		13						
	Exp.		0.65						
	C.I.		0.41-0.85						
Squarespot	N		34						Jarvis and Lowe 2008
	S		13						
	Exp.		0.38						
	C.I.		0.33-0.74						

Species	Metric	Depth bin (fm) 0-30	31-50	51-80	51-100+		71-100+		Study
		2 and (4) days	4 days	10+ days	10 + days	2 days	3-10 days	10 days	
Vermilion	N		75						Jarvis and Lowe 2008
	S		56						
	Exp.		0.75						
	C.I.		0.63-0.84						
Bocaccio	N		66		10	12	9	10	Jarvis and Lowe 2008; Wegner et al. in prep..
	S		53		9	11	9	9	
	Exp.		0.8		0.9	0.92	0.7169	0.9	
	C.I.		0.69-0.89		0.55-1.00	0.62-1.00	0.72-1.00	0.55-1.00	
Bank	N				6	9	5	6	Jarvis and Lowe 2008; Wegner et al. in prep..
	S				2	8	2	2	
	Exp.				0.33	0.89	0.4	0.33	
	C.I.				0.043-0.78	0.52-1.00	0.05-0.85	0.043-0.78	
Starry	N				3	3	3	3	Jarvis and Lowe 2008; Wegner et al. in prep..
	S				3	3	3	3	
	Exp.				1	1	1	1	
	C.I.				0.40-1.00	0.40-1.00	0.40-1.00	0.40-1.00	
Sunset	N				7	9	6	7	Jarvis and Lowe 2008; Wegner et al. in prep..
	S				5	8	5	5	
	Exp.				0.71	0.89		0.71	
	C.I.				0.29-0.96	0.52-1.00	0.36-0.99	0.29-0.96	
Total	N	287	227	16	46	42	27	30	
	S	265	161	11	34	39	23	23	
	Exp.	0.92	0.71	0.69	0.74	0.93	0.85	0.77	
	C.I.	0.89-0.95	0.65-0.77	0.41-0.89	0.59-0.86	0.81-0.99	0.66-0.96	0.58-0.90	

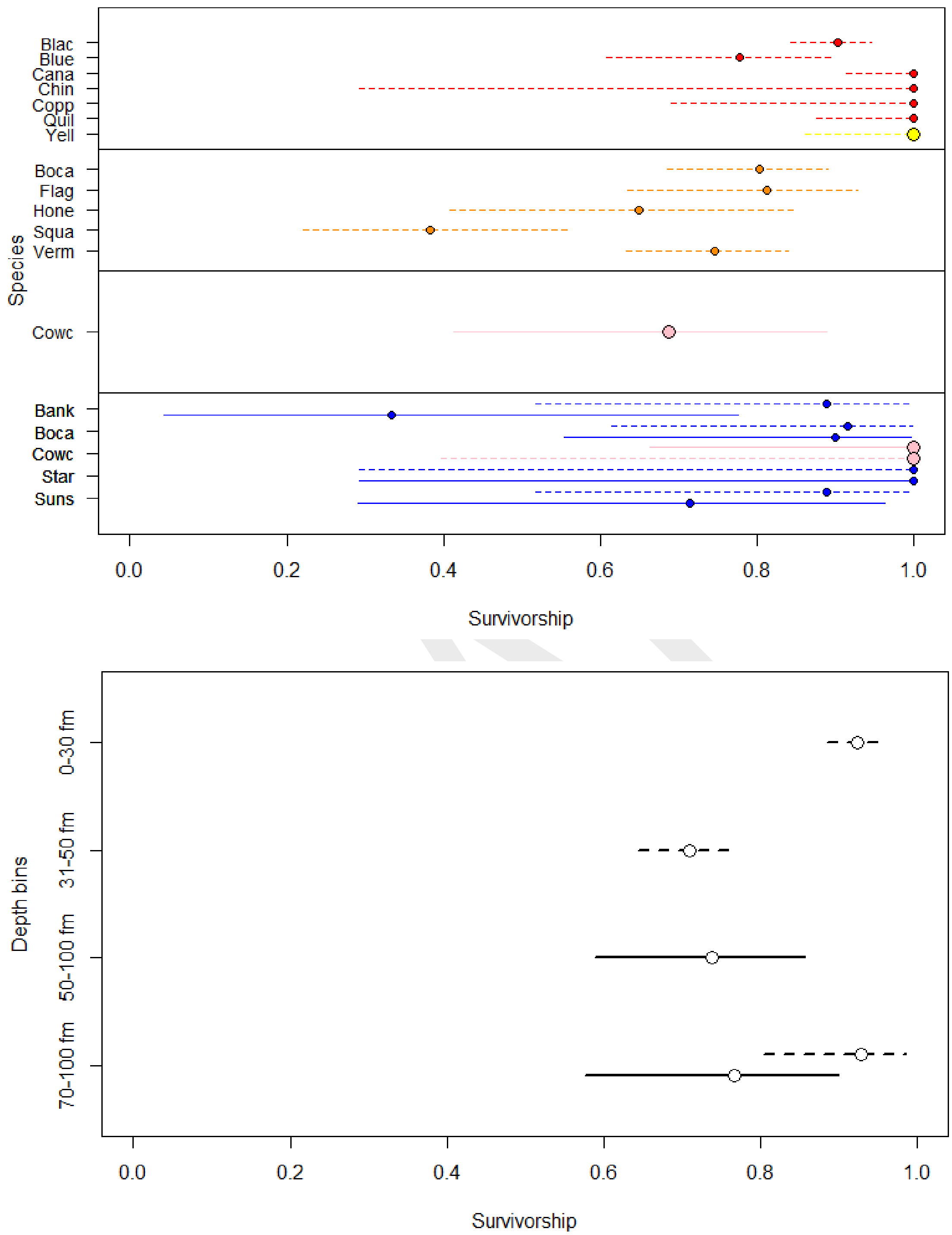

Figure 1. Expected survivorship (points) and 95% confidence intervals (horizontal lines) for several rockfish species (top panel) and depth bins (bottom panel). Depth bins are also given on the secondary y-axis of the top panel. Yelloweye and cowcod are focus species for this analysis, and thus are designated with larger points. Line types also designated survivorship up to 2 days (broken lines) and 10 days (solid lines) after release. Data sources are listed in Table 5.

Framework for Estimating Discard Mortality Rates

A similar framework to that employed in estimating mortality rates reflecting surface release can be applied in estimating mortality rates expected for fish released using a descending device, by the simply replacing the current short term surface mortality rate from the GLM with the two and four day mortality rate from a cage study such as (Hannah et al. 2012 and unpublished data) for yelloweye rockfish or Jarvis and Lowe 2008 for cowcod. When determining surface release mortality rates for cowcod there was not a sufficient number of samples available to provide a direct estimate and as a result, a proxy estimate from other members of the deep demersal guild was used. Direct estimates for cowcod are also lacking from two day cage studies, but estimates from other deep demersal guild species are available from Jarvis and Lowe (2008). The acoustic tagging study of Hyde et al. (unpublished data) provides two day estimates of mortality as well. As with surface release mortality rates, the three factors can be combined as in Equation 2 to estimate mortality rates for fish released using descending devices.

Equation 2. M = 1 – ((1 - two or four day mortality rates) x (1 - short term bottom mortality) x (1 - long term delayed mortality))

An alternative method of estimating mortality rates would involve combining discard mortality rates for two day cage studies by Jarvis and Lowe (2008) or Hannah et al. (2012) with long term three to ten day mortality rates from Wegner et al. (in prep.) using Equation 3. The combination of the two day tagging study data depends on the species to which it is being applied and the depth in which the data was collected.

Equation 3. M = 1 – ((1 - two or four day mortality rates from cage study) x (1 – three to ten day long term acoustic tagging mortality rates))

Mortality rates for each 10 fm depth increment can be determined in a number of ways depending on the direct or proxy estimates of short term and long term mortality rates applied, assumptions made about the applicability of the data to a given species or depth and acceptable levels of uncertainty. Descriptions of mortality estimation methods considered by the GMT in accounting for components of mortality in Equation 2 and the resulting mortality rates applied to yelloweye rockfish are provided in Table 6 and Table 7, respectively, while those reflecting application of Equation 3 are provided in Table 8 and Table 9, respectively. Descriptions of mortality estimation methods considered by the GMT in accounting for components of mortality in Equation 2 and the resulting mortality rates applied to cowcod are provided in Table 10 and Table 11, respectively, while those reflecting application of Equation 3 are provided in Table 12 and Table 13, respectively. In some depth bins for a given method, mortality rates from Hyde et al. (in prep.) reflecting 10 day aggregate mortality (representing 4 months of mortality) or for mortality rates derived by combining data from Wegner et al. (in prep.) and Smiley and Drawbridge (2007) for 10+ days are used as stand-alone estimates of mortality as they are assumed to reflect the full extent of mortality expected. Specific mortality rates and equations applied in each method for each depth bin are provided in footnotes below each table in which estimates are provided. Moving from left to right across the table, methods accrue increasing assumptions, uncertainty, and risk associated with the use of data from species other than cowcod or yelloweye rockfish or application of estimates from data collected from depths shallower than those in which they are being applied, which are explicitly reported in the table containing the descriptions of the methods.

Table 6. Description of methods applied in estimating mortality rates for yelloweye rockfish calculated using Equation 2, including whether the method uses data collected from yelloweye individuals and applies mortality rates in depths from which the data were collected. The assumptions, uncertainties, and risks associated with each method are also provided.

Method	Short Term Mortality Rate Estimation Description	Additional Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
1A	Hannah Yelloweye RF 0-50 fm, 100% Mortality 51-100 fm	Albin and Karpov 8.3% and 5% per 10 fm	Yes	Yes	Moderate sample size in 0-50 fm, arbitrary 5%/10 fm mortality, redundancy in Albin and Karpov 1-5 day and 2 day/4 day mortality short term mortality rates, assumes a 100% mortality rate 50-100 fm overestimating mortality
1B	Hannah All RF 0-30 fm, Jarvis and Lowe 31–50 fm, Wegner 2 Day All RF 51-100 fm	Albin and Karpov 8.3% and 5% per 10 fm	No	Yes	Proxy estimates from other species <50 fm, moderate sample size 51-100 fm, arbitrary 5%/10 fm mortality, redundancy in Albin and Karpov 1-5 day and 2 day mortality
1C	Hannah All RF 0-30 fm, Jarvis and Lowe 31-100 fm	Albin and Karpov 8.3% and 5% per 10 fm	No	No	Proxy estimates from other species in all depths, mortality rates from 31-50 fm to deeper depths, arbitrary 5%/10 fm mortality, redundancy in Albin and Karpov 1-5 day and 2 day mortality
1D	Upper 95% Confidence Interval 1A	Albin and Karpov 8.3% and 5% per 10 fm	Yes	Yes	Moderate sample size in 0-50 fm, arbitrary 5%/10 fm mortality, redundancy in Albin and Karpov 1-5 day and 2 day/4 day mortality, assumes a 100% mortality rate in 50-100 fm overestimating mortality.

Method	Short Term Mortality Rate Estimation Description	Additional Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
1E	Upper 95% Confidence Interval 1B	Albin and Karpov 8.3% and 5% per 10 fm	No	Yes	Proxy estimates from other species <50 fm, moderate sample size 51-100 fm, arbitrary 5%/10 fm mortality rates, redundancy in Albin and Karpov 1-5 day and 2 day mortality
1F	Upper 95% Confidence Interval 1C	Albin and Karpov 8.3% and 5% per 10 fm	No	No	Proxy estimates from other species in all depths, applies mortality rates from 30-50 fm to deeper depths though they may be acceptable since they are higher than estimated in deeper depths by other methods, arbitrary 5%/10 fm mortality rates, redundancy in Albin and Karpov 1-5 day and 2 day mortality

Table 7. Yelloweye rockfish mortality rate estimates in each 10 fm depth bin using the combination of the three components of discard mortality in Equation 2. Color coding reflects the description of the mortality rates applied in producing the composite estimate in each depth bin provided in the corresponding footnote below the table and use mortality estimates for components found in Table 5. Assumptions regarding the applicability of mortality rates to depths or species in question increase to the right.

Depth Bin (fm)	Surface Mortality Yelloweye	1A	1B	1C	1D	1E	1F
		Hannah Yelloweye RF 0-50 fm, 100% Mort. 51-100 fm	Hannah All RF 0-30 fm, Jarvis and Lowe 31–50 fm, Wegner 2 day 51-100 fm	Hannah All RF 0-30 fm, Jarvis and Lowe 31-100 fm	Upper 95% C.I. 1A	Upper 95% C.I. 1B	Upper 95% C.I. 1C
0-10	22%	13.8%[1]	19.9%[2]	19.9%	19.0%[5]	22.5%[6]	22.5%
11-20	39%	18.3%	24.1%	24.1%	23.3%	26.6%	26.6%
21-30	56%	22.9%	28.3%	28.3%	27.5%	30.7%	30.7%
31-40	100%	27.4%	47.9%[3]	47.9%	31.8%	52.3%[7]	52.3%
41-50	100%	31.9%	51.2%	51.2%	36.1%	55.3%	55.3%
51-60	100%	100.0%	40.3%[4]	54.4%	100.0%	48.0%[8]	58.3%
61-70	100%	100.0%	44.6%	57.7%	100.0%	51.7%	61.3%
71-80	100%	100.0%	48.8%	60.9%	100.0%	55.4%	64.2%
81-90	100%	100.0%	53.1%	64.2%	100.0%	59.2%	67.2%
91-100	100%	100.0%	57.4%	67.5%	100.0%	62.9%	70.2%

[1.] **M = 1 – ((1 – 0.01 Hannah Yelloweye RF 2-4 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[2.] **M = 1 – ((1 – 0.08 Hannah All RF 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[3.] **M = 1 – ((1 - 0.29 Jarvis and Lowe 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[4.] **M = 1 – ((1 – 0.07 Wegner 2 Day All RF) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[5.] **M = 1 – ((1 – 0.07 95% CI Yelloweye RF 2-4 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[6.] **M = 1 – ((1– 0.11 95% CI Hannah All RF 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[7.] **M = 1 – ((1 - 0.35 Jarvis and Lowe 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**
[8.] **M = 1 – ((1 – 0.19 Hyde 2 Day All RF) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))**

Table 8. Description of methods applied in estimating mortality rates for yelloweye rockfish calculated using Equation 3, including whether the method uses data collected from yelloweye individuals and applies mortality rates in depths from which the data were collected. The assumptions, uncertainties, and risks associated with each method are also provided.

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
2A	Hannah Yelloweye RF 0-50 fm, 100% Mort. 51-100 fm	15% Wegner 3-10 day Mortality Rates	Yes	Yes	Moderate sample size in 0-50 fm, assumes 3-10 day mortality encompasses all long term mortality in 0-50 fm, assumes a 100% mortality rate in greater depths than samples were available, which is likely overestimating mortality in these depths.
2B	Hannah All RF 0-30 fm, Jarvis and Lowe 31–50 fm, Hyde / Smiley 10 day 50-100 fm	15% Wegner 3-10 day Mortality Rates 0-50 fm	No	Yes	Proxy estimates from other species <50 fm, moderate sample size 51-100 fm, assumes 3-10 day mortality encompasses all long term mortality in 0-50 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
2C	Hannah All RF 0-30 fm, Jarvis and Lowe 31-100 fm	15% Wegner 3-10 day Mortality Rates	No	No	Proxy estimates from other species for all depths, applies mortality rates from 30-50 fm to deeper depths though they may be acceptable since they are higher than estimated in deeper depths by other methods, assumes 3-10 day mortality encompasses all long term mortality.
2D	Upper 95% Confidence Interval 2A	15% Wegner 3-10 day Mortality Rates	Yes	Yes	Low sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
2E	Upper 95% Confidence Interval 2B	15% Wegner 3-10 day Mortality Rates 0-50 fm	No	Yes	Proxy estimates from other species <50 fm, low sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
2F	Upper 95% Confidence Interval 2C	15% Wegner 3-10 day Mortality Rates 0-50 fm	No	No	Proxy estimates from other species <50 fm, low to moderate sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality

Table 9. Yelloweye rockfish mortality rate estimates in each 10 fm depth bin using the combination of the two components of discard mortality in Equation 3 or 10 day mortality rates. Color coding reflects the description of the mortality rates applied in producing the composite estimate in each depth bin provided in the corresponding footnote below the table and use mortality estimates for components found in Table 5. Assumptions regarding the applicability of mortality rates to depths or species in question increase to the right.

Depth Bin (fm)	Surface Mortality Yelloweye	2A	2B	2C	2D	2E	2F
		Hannah Yelloweye RF 0-50 fm, 100% Mort. 51-100 fm	Hannah All RF 0-30 fm, Jarvis and Lowe 31–50 fm, Wegner / Smiley 10 day 50-100 fm	Hannah All RF 0-30 fm, Jarvis and Lowe 31-100 fm	Upper 95% C.I. 2A	Upper 95% C.I. 2B	Upper 95% C.I. 2C
0-10	22%	15.7%[1]	21.6%[2]	21.6%	38.6%[5]	41.3%[6]	41.3%
11-20	39%	15.7%	21.6%	21.6%	38.6%	41.3%	41.3%
21-30	56%	15.7%	21.6%	21.6%	38.6%	41.3%	41.3%
31-40	100%	15.7%	39.5%[3]	39.5%	38.6%	57.1%[7]	57.1%
41-50	100%	15.7%	39.5%	39.5%	38.6%	57.1%	57.1%
51-60	100%	100.0%	26.0%[4]	39.5%	100.0%	41.0%[8]	57.1%
61-70	100%	100.0%	26.0%	39.5%	100.0%	41.0%	57.1%
71-80	100%	100.0%	26.0%	39.5%	100.0%	41.0%	57.1%
81-90	100%	100.0%	26.0%	39.5%	100.0%	41.0%	57.1%
91-100	100%	100.0%	26.0%	39.5%	100.0%	41.0%	57.1%

1. **M = 1 – ((1– 0.01 Hannah Yelloweye RF 2-4 Day) x (1 – 0.15 Wegner 3-10 Day All RF))**
2. **M = 1 – ((1– 0.08 Hannah All RF 2 Day) x (1 – 0.15 Wegner 3-10 Day All RF))**
3. **M = 1 – ((1 - 0.29 Jarvis and Lowe 2 Day) x (1 – 0.15 Hyde 3-10 Day All RF))**
4. **M = 0.26 Wegner All RF 10+ Days**
5. **M = 1 – ((1– 0.07 95% CI Hannah Yelloweye RF 2-4 Day) x (1 – 0.34 95% CI Wegner 3-10 Day All RF))**
6. **M = 1 – ((1– 0.11 95% CI Hannah All RF 2 Day) x (1 – 0.34 95% CI Wegner 3-10 Day All RF))**
7. **M = 1 – ((1 - 0.36 95% CI Jarvis and Lowe 2 Day) x (1 – 0.34 95% CI Wegner 3-10 Day All RF))**
8. **M = 0.41 95% CI Hyde All RF 10+ Days**

Table 10. Description of methods applied in estimating mortality rates for cowcod calculated using Equation 2, including whether the method uses data collected from cowcod individuals and applies mortality rates in depths from which the data were collected. The assumptions, uncertainties, and risks associated with each method are also provided.

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
3A	Wegner Cowcod 2 day All Depths	Albin and Karpov 8.3% and 5% per 10 fm	Yes	Yes	Very low sample size, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality
3B	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Wegner Cowcod 2 day 51-100 fm	Albin and Karpov 8.3% and 5% per 10 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low sample size 51-100 fm, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality
3C	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Wegner All RF 2 day 51-100 fm	Albin and Karpov 8.3% and 5% per 10 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, moderate sample size 51-100 fm, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
3D	Upper 95% Confidence Interval 3A	Albin and Karpov 8.3% and 5% per 10 fm	Yes	Yes	Very low sample size, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality
3E	Upper 95% Confidence Interval 3B	Albin and Karpov 8.3% and 5% per 10 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low sample size 51-100 fm, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality
3F	Upper 95% Confidence Interval 3C	Albin and Karpov 8.3% and 5% per 10 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, moderate sample size 51-100 fm, arbitrary 5%/10 fm mortality, redundancy in mortality between Albin and Karpov 1-5 day mortality and 2 day mortality

Table 11. Cowcod mortality rate estimates in each 10 fm depth bin using the combination of the three components of discard mortality in Equation 2. Color coding reflects the description of the mortality rates applied in producing the composite estimate in each depth bin provided in the corresponding footnote below the table and use mortality estimates for components found in Table 5. Assumptions regarding the applicability of mortality rates to depths or species in question increase to the right.

Depth Bin (fm)	Surface Mortality Deep Demersal Species	3A	3B	3C	3D	3E	3F
		Wegner Cowcod 2 day All Depths	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Wegner Cowcod 2 day 51-100 fm	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Wegner All RF 2 day 51-100 fm	Upper 95% CI. 3A	Upper 95% CI. 3B	Upper 95% C.I. 3C
0-10	21.0%	13.8%[1]	19.9%[2]	19.9%	42.5%[5]	22.5%[6]	22.5%
11-20	35.0%	18.3%	24.1%	24.1%	45.5%	26.6%	26.6%
21-30	52.0%	22.9%	44.7%[3]	44.7%	48.6%	49.4%[7]	49.4%
31-40	100.0%	27.4%	47.9%	47.9%	51.6%	52.3%	52.3%
41-50	100.0%	31.9%	51.2%	51.2%	54.6%	55.3%	55.3%
51-60	100.0%	36.5%	36.5%	40.3%[4]	57.6%	57.6%	48.0%[8]
61-70	100.0%	41.0%	41.0%	44.6%	60.7%	60.7%	51.7%
71-80	100.0%	45.5%	45.5%	48.8%	63.7%	63.7%	55.4%
81-90	100.0%	50.1%	50.1%	53.1%	66.7%	66.7%	59.2%
91-100	100.0%	54.6%	54.6%	57.4%	69.7%	69.7%	62.9%

[1.] M = 1 – ((1 – 0.01 Cowcod 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[2.] M = 1 – ((1 – 0.08 Hannah All RF 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[3.] M = 1 – ((1 - 0.29 Jarvis and Lowe 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[4.] M = 1 – ((1 – 0.07 Wegner 2 Day All RF) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[5.] M = 1 – ((1 – 0.34 95% CI Wegner Cowcod 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm)
[6.] M = 1 – ((1– 0.11 95% CI Hannah All RF 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[7.] M = 1 – ((1 - 0.35 Jarvis and Lowe 2 Day) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))
[8.] M = 1 – ((1 – 0.19 Wegner 2 Day All RF) x (1 – 0.083 Albin and Karpov) x (1 – 0.05 per 10 fm))

Table 12. Description of methods applied in estimating mortality rates for cowcod calculated using Equation 3, including whether the method uses data collected from cowcod individuals and applies mortality rates in depths from which the data were collected. The assumptions, uncertainties, and risks associated with each method are also provided.

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
4A	Smiley / Wegner Cowcod 10+ day	15% Wegner 3-10 day Mortality Rates	Yes	Yes	Low sample size, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
4B	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Smiley / Wegner Cowcod 10+ day 51-100 fm	15% Wegner 3-10 day Mortality Rates 0-50 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
4C	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Smiley / Wegner All RF 51-100 fm	15% Wegner 3-10 day Mortality Rates 0-50 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low to moderate sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality

Method	Short Term Mortality Rate Estimation Description	Additional Long term Mortality Rate Description	Direct Estimate for Species in Question	Depth Applied Same as Data Collection	Assumptions, Uncertainties, and Risks
4D	Upper 95% Confidence Interval 4A	15% Wegner 3-10 day Mortality Rates	Yes	Yes	Low sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
4E	Upper 95% Confidence Interval 4B	15% Wegner 3-10 day Mortality Rates 0-50 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality
4F	Upper 95% Confidence Interval 4C	15% Wegner 3-10 day Mortality Rates 0-50 fm	No 0-50 fm Yes 51-100 fm	Yes	Proxy estimates from other species <50 fm, low to moderate sample size 51-100 fm, Smiley and Drawbridge cowcod from hyperbaric chamber may bias mortality high, assumes 10 day mortality encompasses all long term mortality

Table 13. Cowcod mortality rate estimates in each 10 fm depth bin using the combination of the two components in Equation 3 or 10 day mortality rates. Color coding reflects the description of the mortality rates applied in producing the composite estimate in each depth bin provided in the corresponding footnote below the table and use mortality estimates for components found in Table 5. Assumptions regarding the applicability of mortality rates to depths or species in question increase to the right.

Depth Bin (fm)	Surface Mortality Deep Demersal Species	4A	4B	4C	4D	4E	4F
		Smiley / Wegner Cowcod 10+ day	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Smiley / Wegner Cowcod 10+ day 51-100 fm	Hannah All RF 0-20 fm, Jarvis and Lowe 21-50 fm, Smiley / Hyde All RF 51-100 fm	Upper 95% C.I. 4A	Upper 95% C.I. 4B	Upper 95% C.I. 4C
0-10	21%	25%[1]	22%[2]	22%	49%[5]	41%[6]	41%
11-20	35%	25%	22%	22%	49%	41%	41%
21-30	52%	25%	40%[3]	40%	49%	56%[7]	56%
31-40	100%	25%	40%	40%	49%	56%	56%
41-50	100%	25%	40%	40%	49%	56%	56%
51-60	100%	25%	25%	26%[4]	49%	49%	41%[8]
61-70	100%	25%	25%	26%	49%	49%	41%
71-80	100%	25%	25%	26%	49%	49%	41%
81-90	100%	25%	25%	26%	49%	49%	41%
91-100	100%	25%	25%	26%	49%	49%	41%

1. M = 0.25 Smiley / Wegner Cowcod 10+ Days
2. M = 1 – ((1– 0.08 Hannah All RF 2 Day) x (1 – 0.15 Wegner 3-10 Day All RF))
3. M = 1 – ((1 - 0.29 Jarvis and Lowe 2 Day) x (1 – 0.15 Wegner 3-10 Day All RF))
4. M = 0.26 Wegner All RF 10+ Days
5. M = 0.49 95% CI Smiley / Wegner Cowcod 10+ Days
6. M = 1 – ((1– 0.11 95% CI Hannah All RF 2 Day) x (1 – 0.34 95% CI Wegner 3-10 Day All RF))
7. M = 1 – ((1 - 0.36 95% CI Jarvis and Lowe 2 Day) x (1 – 0.34 95% CI Wegner 3-10 Day All RF))
8. M = 0.41 95% CI Wegner All RF 10+ Days

Are these methods appropriate? Do the methods sufficiently account for uncertainty?

Although current catch accounting practices account for depth-dependent recreational rockfish discard mortality for fish released at the surface, the assumed discard mortality rates are based on simply throwing fish overboard and onto the surface. Applying these estimates to all discarded rockfish may result in an overestimate of total discard mortality used in management because some recreational fishermen release rockfish at the depth of capture with descending devices. Discard mortality rates are lesser for rockfish released at the bottom, as accomplished with descending devices, than at the surface (Hannah, *et al.* 2012; Hochhalter and Reed 2011; Jarvis and Lowe 2008). The surface mortality rates and mortality rates reflecting the use of descending devices with the application of Equation 2 and Equation 3 for yelloweye rockfish are provided in Figure 2 and Figure 3, respectively, while the results for cowcod are provided in Figure 4 and Figure 5, respectively. Comparing the mortality rates and the difference between mortality rates for surface release and release using a descending device, it is clear that substantial overestimates in the mortality could be made if their use was not accounted for.

The proportion of fish released using the devices and the proportion of catch by depth will determine the magnitude of the difference in mortality when the rates reflecting use of descending devices are applied instead of surface release. The proportion of catch of yelloweye rockfish and cowcod caught in each 10 fm depth increment are superimposed on mortality rates for surface release compared to each of options for estimating mortality of fish released using descending devices provided in Figure 2 and Figure 3 for yelloweye rockfish and in Figure 4 and Figure 5 for cowcod. Greater reductions in mortality are expected in deeper depths where the surface release mortality rate approaches 100 percent due to the inability of fish to escape the surface subjecting them to predation by avian and pinniped predators as well as sun exposure and thermal shock. Applying lesser discard mortality rates to rockfish released with descending devices would more accurately reflect mortality rates of fish discarded in a way that eliminates these sources of mortality. Accounting for the reduction in mortality from their use may allow greater opportunities for these fisheries since regulations are crafted in rod-and-reel fisheries to keep species within relatively low harvest guidelines.

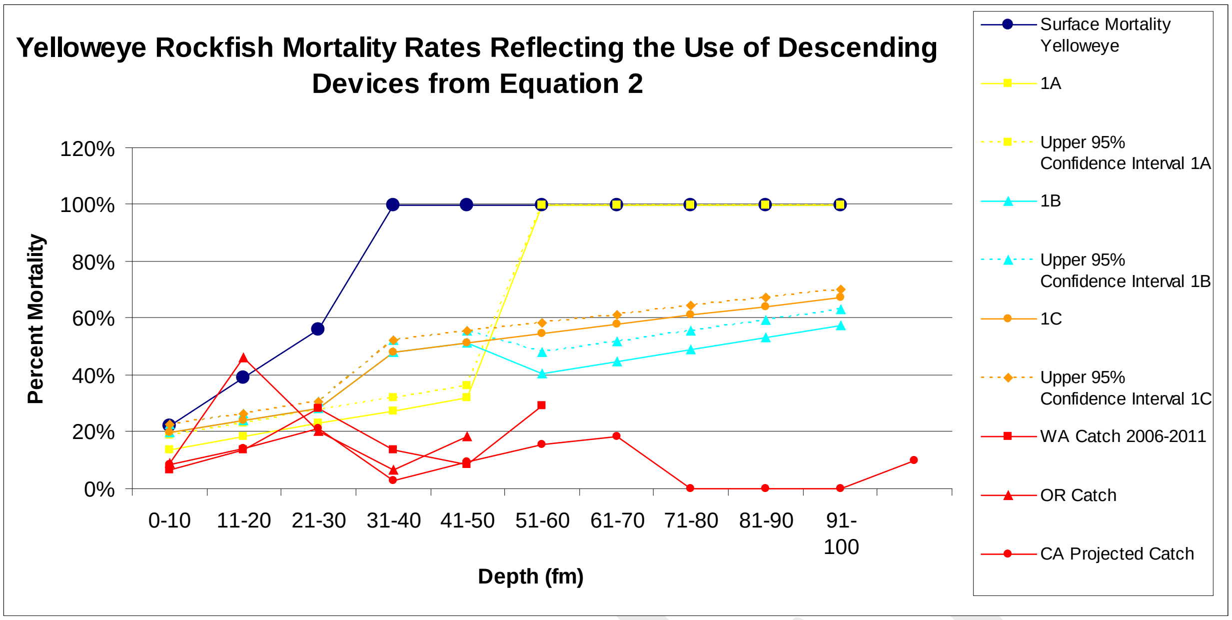

Figure 2. Plotted mortality rates by depth bin estimated for each method of estimating mortality rates for yelloweye rockfish using Equation 2. Surface release mortality is provided to allow comparison to current mortality rates applied to discards. Proportions of catch by depth from recent years for Oregon and Washington recreational fisheries and proportion of projected catch for all depths in California.

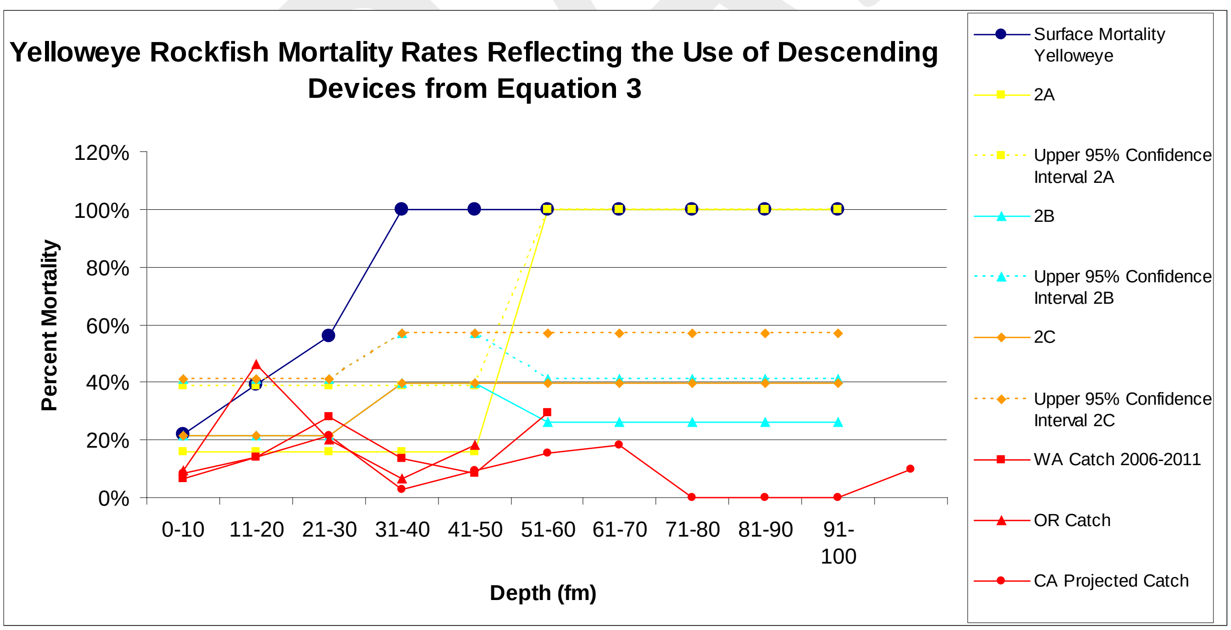

Figure 3. Plotted mortality rates by depth bin estimated for each method of estimating mortality rates for yelloweye rockfish using Equation 3. Surface release mortality is provided to allow comparison to current mortality rates applied to discards. Proportions of catch by depth from recent years for Oregon and Washington recreational fisheries and proportion of projected catch for all depths in California.

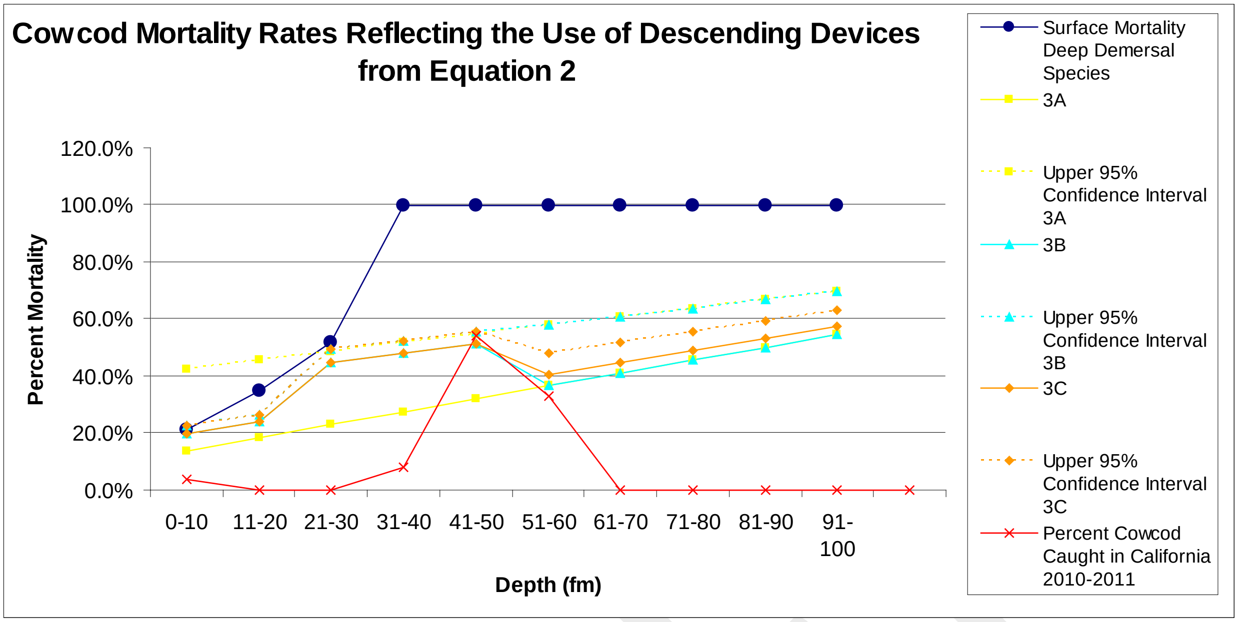

Figure 4. Plotted mortality rates by depth bin estimated for each method of estimating mortality rates for cowcod using Equation 2. Surface release mortality is provided to allow comparison to current mortality rates applied to discards. Proportions of catch by depth from 2010-2011 in the California recreational fishery.

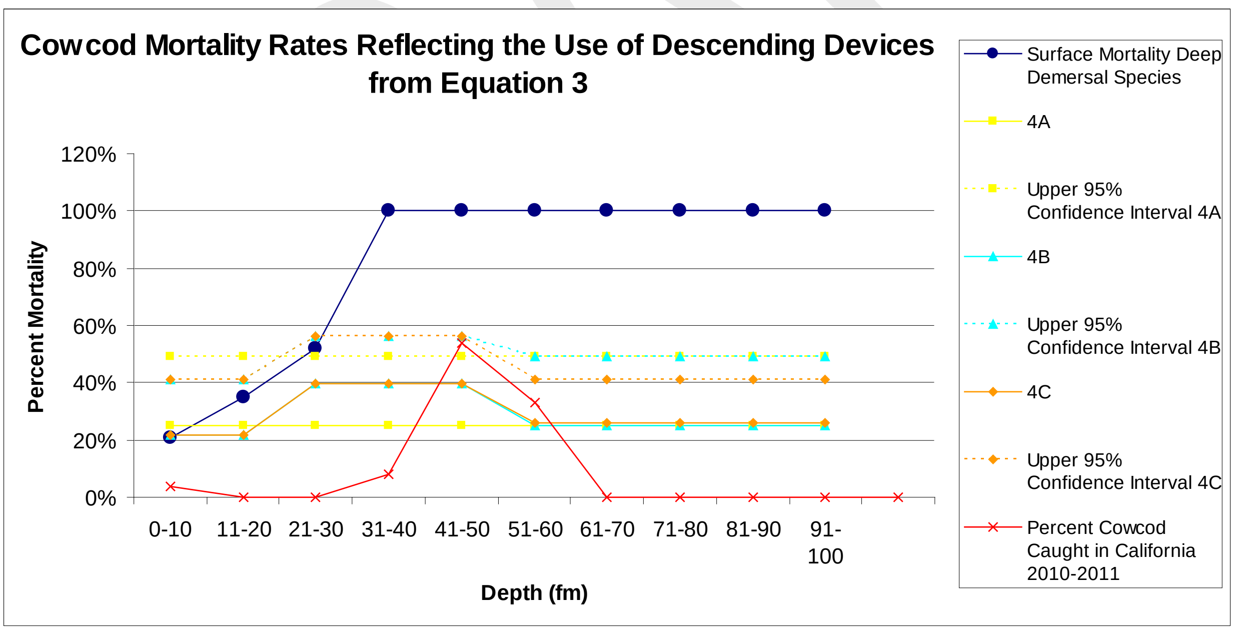

Figure 5. Plotted mortality rates by depth bin estimated for each method of estimating mortality rates for cowcod using Equation 3. Surface release mortality is provided to allow comparison to current mortality rates applied to discards. Proportions of catch by depth from 2010-2011 in the California recreational fishery.

Considerations Related to Mortality Estimates

Assumptions and Biases Implicit in Mortality Estimation Methods and Buffers Addressing Uncertainties

The one to five day mortality rates from Albin and Karpov (1996) may be biased high relative to release with a descending device due to the increased handling of sampled fish as a result of having been vented, tagged, and retained at the surface in a holding tank without the benefit of recompression and subsequent additional handling during their captivity. This may also be the case for cage studies in which fish were subject to stress from greater handling during tagging and measuring, unable to escape predation by sea lice, being confined and repeated contact with cage walls. On the other hand, the cages offered the potentially disoriented rockfish protection from predation by lingcod or pinnipeds. Barometric chamber studies by Parker (2006) subjecting fish to pressure equivalent to 40 fm then reducing pressure to zero followed by resumed pressure found a 3 percent mortality rate for black rockfish held for 21 days. This is far lower than that observed over two days in the Hannah et. al. (2012) study indicating that they may be more sensitive to other aspects of the treatment. Conversely, the black rockfish in the barometric chamber study were not subject to stress from handling and temperature change, making the results less representative of the expected mortality from release using a descending device, though they do provide an indication of the long term survivability of fish beyond two days.

Though each of the proxy estimates of mortality for fish discarded with a descending device have limitations, assumptions and biases associated with their application relative to outcomes from release with various devices, they do provide an indication of the expected response. With suitable buffers provided by the assumed long term mortality rates and redundancies between components of mortality, such estimates can be considered more or less conservative. Application of the rates from these studies to species or depths other than those sampled in the studies should be done with caution, considering the likely degree of violation of assumptions and magnitude of deviations from the estimated values in the context to which they are being applied. Consideration of whether existing buffers for uncertainty are sufficient or whether additional appropriate buffers can be applied to mitigate associated risk of an underestimate are essential in the event that proxy information is applied.

Additional Considerations

The field sampling methods used in deriving the mortality rates have inherent biases compared to fish that are released using a descending device that should be considered relative to their potential to underestimate or overestimate mortality. The trauma from increased handing, lack of access to food, abrasion and impact from containment and injury from tagging may bias high two-day mortality rates derived for rockfish returned to the bottom in cages (Jarvis and Lowe, 2008, Hannah et al. 2012). On the other hand, cages may prevent predation by lingcod or pinnipeds, though such rates may be limited by the presence of such predators at the time and location of release, while other biases are expected to result in overestimates of effect on all released fish.

Mortality from Multiple Capture Events

This section still needs discussion, and will be completed after the November Council meeting.

Time on Deck

It takes longer to release a cowcod or yelloweye rockfish with a descending device than at the surface. Since time on deck (surface holding duration) prior to recompression has been shown to increase the probability of mortality occurring in rockfish (Jarvis and Lowe 2008), a time on deck mortality rate may need to be applied to cowcod and yelloweye rockfish released with recompression devices. Additionally, anglers should be encouraged to have the devices ready to use prior to fishing.

Predation Due to Swimming Impairment

Yelloweye rockfish released with descending devices are not protected from predators like the fish from the barrel studies. Since impaired swimming ability has been modeled for yelloweye rockfish immediately post recompression in depths shallower than 30 fm (15 percent of individuals at 0 fm with a slight increase by depth to 25 percent of individuals at 30 fm, Hannah and Matteson 2007)), a portion of fish released with descending devices may be at greater risk of predation due to impaired swimming ability.

If and how long it takes for yelloweye rockfish to regain normal swimming behavior following recompression is unknown. Impaired swimming (maintaining neutral buoyancy) can be caused by ruptured swim bladders, which have been shown to heal for most (77 percent) black rockfish within 21 days (Parker, *et al.* 2006). The time it takes for yelloweye swim bladders to heal is unknown, but may take longer than for black rockfish due to thicker swim bladders (cite).

Low yelloweye rockfish mortality (1.2 percent) during the 17 day mark/recapture study (Hochhalter and Reed 2011) indicates that predation may not have occurred, since this covers the time period when the fish would be most vulnerable to predation (e.g., healing swim bladders and initial release). Although the Hochhalter and Reed (2011) study occurred in Alaska, many of the same predators occur within west coast waters (e.g., lingcod and pinnipeds). Further, lingcod, regardless of size, rarely eat rockfish over 6.5 inches (Beaudreau 2012) and anglers rarely, if ever, catch rockfish smaller than 6.5 inches.

Predation by pinnipeds is of greater concern since Pacific rockfish remains are commonly found in California sea lion scats (10-60 percent, highly variable by season and year, Lowry, *et al.* 1991). Presence of pinnipeds following tagging in the Hochhalter and Reed (2011) study site was not documented.

Physiological Impairment from Barotrauma

Although not sources of mortality (unless starvation due to severe vision loss occurs), effects on health and fitness affecting foraging ability (i.e., vision and hearing and fecundity are discussed.

Since yelloweye rockfish are visual predators and barotrauma can result in damages to the eye (i.e., stretching of the optic nerve and retinal tearing), starvation could be a source of morality. Although post-recompression visual performance has not been studied for yelloweye rockfish, studies have been done on other rockfish species. Rogers et al. (2011) examined post-recompression visual performance of rosy rockfish that had exhibited exophthalmia ("popped eyes") and found that vision quickly restored (four days) and improved after a month to the point where the fish could track small and fast moving objects. Similarly, Brill et al. (2008) examined post-recompression retinal function of black rockfish that had exhibited exophthalmia and found no measurable negative effects.

There is no evidence that barotrauma and recompression decreases reproductive viability of female yelloweye rockfish. Sixteen female rockfish were captured one to two years after recompression at the same reef (< 40 fm) from the Hochhalter and Reed (2011)) mark/recapture study, and all had successfully gone through gonadal development, mating, larval gestation, and half had gone through parturition (spawning; personal communication between Brittany Blain, University Alaska-Fairbanks and Alena Pribyl, NOAA SW Fisheries Science Center; PFMC 2012).

Venting

Venting rockfishes prior to release is not recommended. Venting may result in pierced vital organs, as well as increased risk of infection {Parrish and Moffitt 1993; Keniry, 1996 #386; Theberge, 2005 #395}. Further, even with proper venting techniques by trained biologists, studies have found that venting does not significantly decrease mortality {Gotshall, 1964 #396; Bruesewitz and Coble 1993; Render and Wilson 1993}.

Implementation

Implementation of differential mortality rates when descending devices are used will be somewhat dependent on the SSC review of the above methodology. Therefore, the sections below may be incomplete, and will be updated with more details after the SSC review in November.

To account for the use of descending devices in mortality estimates, not only must the mortality rate reflecting their use be determined, but the proportion of fish released with devices and proportion of encountered fish released using a descending device in each 10 fm depth increment must also be estimated to apply the mortality rates. Since calculations used to determine the proportion of fish released with devices and the proportion encountered at each depth may vary among the state recreational fisheries due to different catch accounting methods, it is important to consider whether agencies should independently calculate proportions of fish released with devices for their respective fisheries, or whether a uniform method should be applied to all states and fisheries. Calculations for determining both mortality rates and proportions of rockfish released with descending devices for the recreational fisheries should be reviewed by the SSC Groundfish Subcommittee. In addition, the methods of applying the mortality rates should be reviewed by the RecFIN Technical Committee. The following are descriptions of the existing data available for these calculations, the additional data elements that would be required and limitations to collecting this data in each state.

Dockside Angler Interview Background Information

The sampling programs in all three states have been recently reviewed by the national Marine Recreational Information Program. Links to the reviews are below.

Washington:
https://www.st.nmfs.noaa.gov/mrip/projects/downloads/MRIP_OSP_Review_Report_Final.pdf

Oregon:
http://www.countmyfish.noaa.gov/projects/downloads/MRIP_ORBS_Review_Report_Final.pdf

California:
http://www.countmyfish.noaa.gov/projects/downloads/MRIP_CRFS_Review_Report_Final.pdf

Appendix 3 contains the "Interview Section" of the Oregon Ocean Recreational Boat Survey (ORBS), as an example of the interview questions and procedures that samplers are asked to follow when they sample a vessel. Washington and California have similar procedures and questions, though there may be some variation. This information is provided as an example of what samplers are currently asking each vessel. An "interview" consists of a sampler's complete interaction with a vessel, including asking the questions about effort, catch, location, etc. and collecting biological samples (lengths, scanning for coded wire tags, etc.). ORBS samplers currently ask 16 questions, some with multiple parts, such as the species encounter question.

The amount of time for each interview varies depending on the number and species of the catch. The required biological sampling varies with species, some take more time than others. The time per interview can range from 2 to 10+ minutes. For each additional question or task asked of the dockside samplers there is a trade-off in the total number of interviews or sampling rate.

There is concern that adding questions regarding descending device will reduce sample rates. Sample rates would only be affected by additional questions during high effort periods (sample rates more commonly affected by slow returns of anglers to port). Secondly, the descending device questions would only apply to a small percentage of interviews since it is conditional on the release of a yelloweye rockfish or cowcod (2 percent of interviews in Oregon in 2011; 497 of

22,678). Lastly, the descending device questions should only add minimal time to interviews that range from two to 10+ minutes, with most of that time being attributed to obtaining biological data (e.g., lengths and weights) or scanning for tags (e.g., coded-wire and PIT).

Washington

A detailed description of the Washington Department of Fish and Wildlife's Ocean Sampling Program (OSP) is available on the Pacific States Marine Fisheries Commission Recreational Fisheries Information Network (PSMFC RecFIN) website.

http://www.recfin.org/documents/wa-osp-methods102008-0

The OSP estimates total ocean recreational effort and catch by boat type (charter and private), port, catch area, and trip type (primary target species). Boat trip sampling is conducted randomly to generate estimates of catch for most ocean-caught species: salmon, rockfish and other groundfish, halibut, albacore, sharks, and cods. Estimates of released fish are also generated using angler interviews.

The catch per boat is sampled through intercept surveys. Returning boats are systematically sampled at a minimum target rate of 20% within each boat type (charter and private). Boats are randomly selected for sampling to maintain a consistent sampling rate throughout the day; boats are included in the sample regardless of size, mooring location, trip type, etc. The sampling rate for the day depends on the projected effort and the number of available samplers. Overall, the sampling rate in each port in a year averages over 50% for charter boats and over 40% for private boats.

Since 2002, as part of the field intercept survey, OSP samplers have been asking anglers whether they discarded any fish during their fishing trip, and if so, to identify discarded catch by species and number. Discarded catch is expanded in the same manner as retained catch to produce estimates of total discarded catch.

The OSP has been collecting information on the depth of capture since 2003. Samplers ask the depth at which the majority of the catch was caught and record only one depth. It is assumed that fish are discarded at the same depth as the depth of capture. Depth data is not used in any catch expansion algorithm. Each month, along with estimates of total catch, OSP provides RecFIN with the raw intercept data that includes the depth of capture by species. RecFIN uses the OSP intercept data to estimate the proportion of fish caught in each of the GMT depth categories and then applies the GMT mortality rates to produce estimates of discard mortality.

In addition, the OSP collects biological information such as lengths for bottomfish and halibut and salmon and asks about interactions with birds during each interview.

The OSP does not currently collect data on the use of descending devices in our recreational fishery. To apply mortality rates for fish released with a descending device our sampling approach would need to be modified to ask anglers additional questions to determine the proportion of anglers that are using the device. It will be important to consider the implications of adding a series of additional questions to the angler interview. Samplers are already at the point where their ability to gather all of the needed data during each interview while maintaining required sampling rates is at risk. Discussions on how to collect additional information such as whether or not an angler released any fish with a descending device will include trade-offs such as losing other important data such as the number fish lengths samplers are able to collect or reduced sampling rates.

As a first step, to collect information where it would be most beneficial to the recreational fishery while minimizing impacts on sampler interview data, WDFW could consider only asking about the use of descending devices when an angler reports discarding prohibited species such as yelloweye or canary rockfish. Questions on the use of descending devices could be asked only on trips targeting bottomfish and halibut and avoid questions on salmon trips to maintain salmon sampling rates that are necessary to achieve sampling rates for coded wire tags.

Alternatively, a supplemental sampling project could be developed to collect information on the use of descending devices. This would likely come at a significant cost but could be considered as a temporary measure to collect baseline information on a temporary basis while more permanent solutions are explored.

Proportion of Yelloweye Rockfish Encountered by Depth

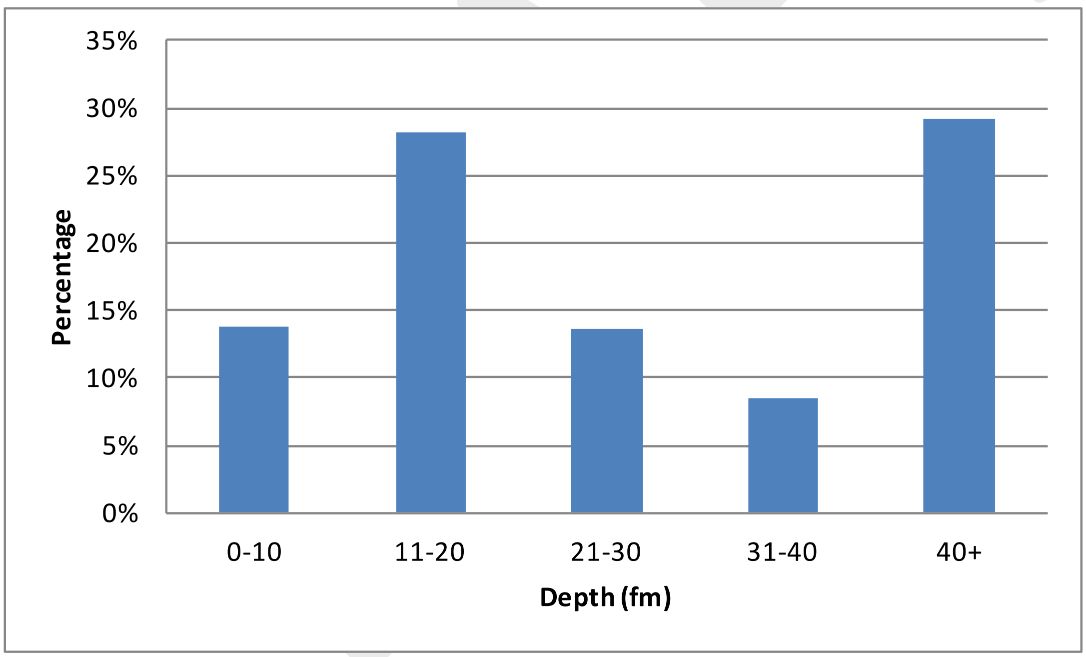

Figure 6. Yelloweye rockfish (retained and released) by depth bin from all Washington recreational trip types combined from 2006-2012.

Oregon

Sampling Rates

A detailed description of the Oregon Recreational Boat Survey (ORBS) sampling design can be found at: http://www.dfw.state.or.us/MRP/salmon/docs/ORBS_Design.pdf.

The primary goals of the ORBS dockside interviews are to generate accurate and unbiased estimates of anglers per boat and catch by species per boat for the ocean recreational boat fishery, and to sample for and recover from the ocean recreational salmon fishery coded wire tags (CWTs). Further, the estimates are expected to be accurate when stratified to the level of statistical week, port, boat type, trip type, season type, and area of effort/catch. To sample salmon adequately for CWTs, a minimum sampling rate standard of 20 percent of landed salmon by port and week has been established to better insure that CWT recoveries will represent the actual fishery interceptions occurring for any given strata. The ORBS has generally adopted this as the minimum standard for all fisheries, ports, and time periods sampled.

A variety of other data are also collected including information on the number of fish released, lengths and weights of fish, departure time, interview time, and information on estuary trips as well. Beginning in April of 2012, ORBS began obtaining data on the proportion of yelloweye and canary rockfish released with descending devices. The descending device question applies to all interviews, both charter and private, in which a yelloweye or canary rockfish discard is reported. The data are stratified by port and summed over ports to generate estimates for catch areas and the entire state.

Due to substantial differences between charters and private boats (i.e., charters often use moorage areas that are separated from the private boat use areas, have a wider range in number of anglers, and the fact that charter trip type and return time is available in advance), charter boat effort is stratified to trip type prior to the interview, and interviews are selected by samplers to be representative of the fleet activity for the various target species. Private boats cannot be stratified to trip type prior to the interview, and therefore, interviews are selected in a random fashion within the boat basin and launch ramp area to reduce potential sampling bias towards trip type.

ORBS samplers are instructed to interview private boats without prejudice to size, number of anglers, presence or absence of fish or fishing tackle, etc. Samplers are instructed to always interview the “next boat” that they see returning to their area of operation, and once that interview is completed look for the next returning boat. Private boat interviews are recorded for any boat that has completed their trip; regardless of whether they entered the ocean or even fished (correct proportion of non-fishing trips is needed to determine actual fishing effort).

Sampling schedules are set in advance by ORBS permanent staff to provide representative sampling coverage for all day types, season types, and to cover the hours of the day when charter and private fishing vessels can be expected to return from the ocean. Interviews are always initiated at the boat at the time that it arrives back at the dock or ramp to insure that all anglers and catch are present from the trip.

Proportion of Yelloweye Rockfish Encountered by Depth

ORBS samplers ask anglers if they released any rockfish, and if so from what depth. Figure 7 shows the percentage of yelloweye rockfish encountered in the Oregon recreational bottomfish and halibut fisheries by depth bin. Over 45 percent of yelloweye rockfish encountered were from 10 to 20 fm (Figure 7). Encounters in depths greater than 30 fm accounted for 24.5 percent of encounters.

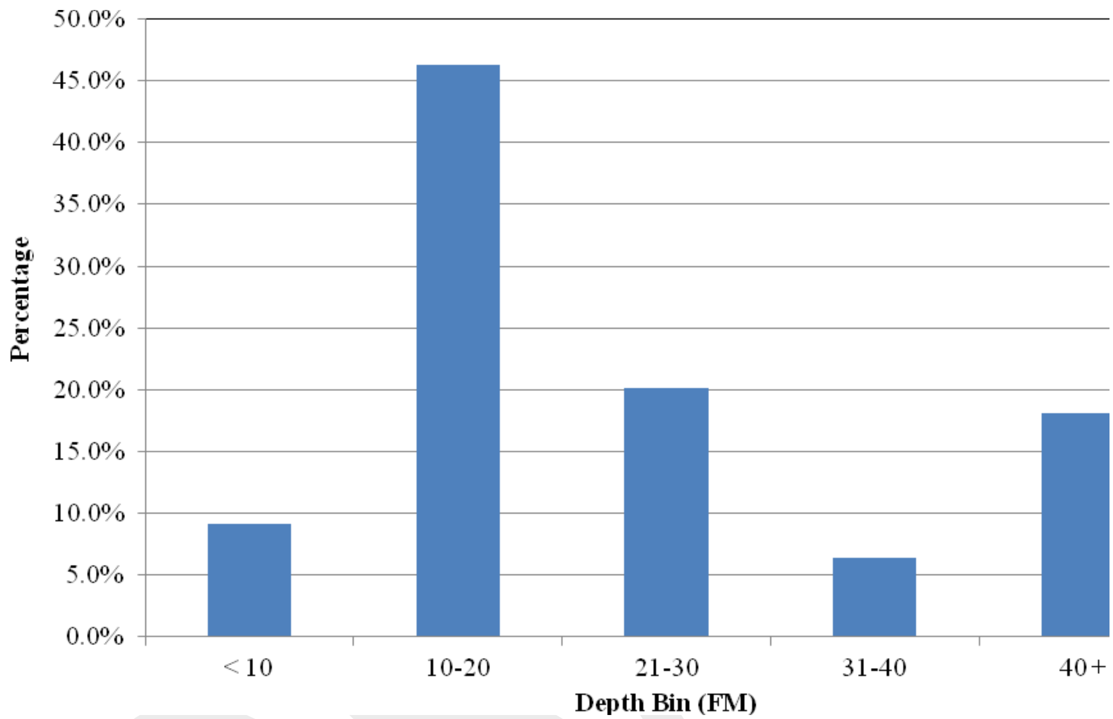

Figure 7. Percentage of yelloweye rockfish released by depth bin from the Oregon recreational bottomfish and halibut fisheries combined, 1 January 2010-10 September 2012.

Application of Mortality Rates

This section will be updated after the SSC review of mortality rates.

Current discard mortality calculation (100% assumed released at surface):

Discard mortality rate formula: $\sum_{depths}$ (P RS_{depth} x DMR RS_{depth})

Discard mortality (mt) formula: DMR x total fish (expanded) x avg. fish weight

Depth	Fish RS	P RS		DMR RS		Product	
0-10	6	0.133	x	0.22	=	0.03	
11-20	24	0.533	x	0.39	=	0.21	
21-30	12	0.267	x	0.56	=	0.15	
> 30	4	0.067	x	1.00	=	0.07	
					∑ =	0.45	= Overall mortality rate

RS = Released at surface; P = Proportion (of fish); DMR = Discard mortality rate; Depth is in fm.

Potential discard mortality calculation with proportion released at surface and at depth:

Discard mortality rate formula: $\sum_{depths}$ (P RS_{depth} x DMR RS_{depth} + P RD_{depth} x DMR RD_{depth})

Discard mortality (mt) formula: DMR x total fish (expanded) x average weight of fish

1. For each depth bin, multiply proportion of fish released by at surface by at-surface discard mortality rate, multiply proportion of fish released at depth by at-depth discard mortality rate, and add products

2. Sum added products from step 1 for each depth bin (overall discard mortality rate) and multiply by estimated total fish and by average weight of discarded fish

Example:

Depth	Fish	Fish RD	Fish RS	P RD		DMR RD		P RS		DMR RS		Product	
0-10	6	3	3	0.065	x	0.05	+	0.065	x	0.22	=	0.02	
11-20	24	12	12	0.261	x	0.10	+	0.261	x	0.39	=	0.13	
21-30	12	6	6	0.13	x	0.15	+	0.13	x	0.56	=	0.09	
> 30	4	2	2	0.043	x	0.20	+	0.043	x	1.00	=	0.05	
											∑ =	0.29	= Overall mortality rate

RS = Released at surface; RD= Released at depth; P = Proportion (of fish); DMR = Discard mortality rate; Depth is in fm; used theoretical values for DMR RD

California

What data is Currently Collected?

Sampling rates and data elements collected differ among boat modes in the California recreational fishery sampled by the California Recreational Fisheries Survey (CRFS). The boat modes sampled by the CRFS include the party charter mode (PC), the primary private and rental boat mode (PR1), and the secondary private and rental boat mode (PR2). The division between the two private and rental boat modes allows greater sampling effort to be focused on those locations where the majority of the catch occurs. The PR1 mode accounts for about 90 percent of the private and rental boat effort and catch for species that are a management priority including rockfish, while the PR2 mode accounts for the remaining 10 percent (CDFG 2011).

The private and rental boat fleet is sampled at dockside at locations accessible by samplers including launch ramps and public docks. The PR1 mode is sampled at a rate of 20 percent of the days of the month, while the PR2 mode is sampled at a rate of 10 percent of the days per month. In both surveys, data is collected on whether a given fish was discarded live or dead. In most cases, the depth and location of capture of the majority of the fish in the catch or that were discarded if no fish were retained is recorded by the sampler and applied to all fish in the catch. If fish were caught at more than one location, a second location and bottom depth can be listed for PR2 interviews and for each sampler-observed or angler-reported fish, it is indicated whether the fish was caught at the location where most of the fish was caught, though often times the angler cannot provide this information. In the PR1 mode, multiple locations and depths of encounter can be entered, but anglers often report the location where the majority of the fish were landed if there was landed catch or discarded in the event that no catch was landed but fish were discarded. Anglers sampled at PR1 locations who reported discarding rockfish are asked whether a descending device was used during the course of the trip, though the question is not asked specifically with regard to the disposition of any one fish. The PR2 survey is not currently collecting information about the use of descending devices.

Less than 5 percent of the PC mode trips are sampled in each CRFS district. These trips are either sampled onboard or dockside with the preference to sampling onboard for trips targeting rockfish to collect data on discard length, depth of capture data and spatial data on the location of capture. At each stop, the sampler records the beginning location and bottom depth (not fishing depth) and the end location and bottom depth. The sampler also records whether the boat was anchored, stationary, drifting or trolling. In the past, samplers conducting PC interviews at dockside inquired with the deckhand or captain as to the depth and location where the majority of the fish were caught, though this information was not collected in 2012, but may be collected in the future. Most rockfish trip data is collected onboard party boats for which location and depth data is recorded at each stop, providing depth data for the majority of sampled trips.

Data on the disposition of each fish released while sampling onboard party boats are currently collected at the level of discarded live or dead at each stop, with the exception of observed released cowcod, for which additional information is provided on whether the fish was released with or without a descending device. At each stop, the sampler observes some of the anglers on the boat and records whether a descending device was used by those anglers at that stop, though data is not collected on the disposition of individual fish with the exception of cowcod. When sampling the PC mode at dockside, the sampler asks whether any fish were discarded and records their disposition, but no disposition code of released using a descending device is currently provided for individual fish. In both PC onboard and dockside modes, the captain or crew of each boat that targeted groundfish is asked, “Did you use a descending device on this trip?” and the response is recorded at the boat level.

While data on depth of capture is already being collected to inform the proportion of catch by depth, additional discard disposition data would have to be collected to determine the proportion of rockfish released using a descending device. To be certain that a descending device was used to release a particular individual fish, an additional inquiry would have to be made regarding which of the fish that were released were released using a descending device. Gathering this additional data for all discarded rockfish may be time prohibitive and may require that other data such as lengths of retained fish or interviews over the course of the day be forgone to have time to collect this data in some modes. Collection of such data in the course of onboard sampling through discard tally disposition data that requires only that the disposition be tallied in another entry may not result in conflicts, while the time intensive dockside sampling in the PR1, PR2 and PC require trade-offs that could adversely affect other estimates based on survey data.

To provide needed data on the proportion of fish released using a descending device in the PR1 mode would need to be added for a secondary question regarding disposition to inquire as to which, if any, of the released fish were released using a descending device. In the PR2 mode, addition of a disposition code indicating release with a descending device would also be required. In the PC mode, a third disposition of discarded using a descending device would need to be added to the discard tally data sheet to allow the proportion of fish released using a descending device to be recorded. This information is already being collected for cowcod in the PC mode, but entries would facilitate recording of this data for any species for which the data would collected. If reported disposition of encountered fish are to be used to estimate the proportion of fish released using a descending device in the onboard PC mode, then an additional entry would be needed to record this information on the interview form. A entry for released using a descending device would need to be added to the PC dockside survey to provide data to inform the proportion of fish of each species released using a descending device. Depth data for the PC dockside mode would be provide additional information regarding the depth of capture, though onboard sampling data could be used to represent the proportion of catch by depth in the appropriate stratum.

Limitations

One way to minimize trade-offs and forgoing other data elements to obtain additional disposition information would be to have a separate survey to collect data on discards, but this would require additional staffing and is likely to be cost prohibitive. Alternatively, while collection of this data for all species may not be possible, it may be possible to collect the additional disposition data for all of the overfished or season limiting species. Collection of this data for species like cowcod and yelloweye rockfish that are rarely encountered would not pose an issue since the infrequent encounters would not demand as much time to be taken from other duties. More common species like canary rockfish, black rockfish and bocaccio would pose more of an issue since they are more frequently encountered and more time would be required to collect the additional disposition data. Though black rockfish has the potential to be a season-limiting species and bocaccio is an overfished species, neither limit current fishing season length or depth restrictions. Thus, if collection of data for yelloweye rockfish, cowcod and canary rockfish could be achieved, this would allow benefits to be derived from the use of descending devices to accrue to anglers, as a result of their efforts to release them with descending devices. The only concern is that the lack of accounting for other species may not provide an incentive to release them using a descending device that is present for the others, though this information is not common knowledge.

One concern relative to uncommon species such as cowcod and yelloweye rockfish is that very few individuals are encountered in any one month in each district, water area and trip type stratum and thus random sampling error may result in imprecision in the estimates of the proportion of fish released using descending devices and proportion of catch by depth. This can be addressed through the use of pooling rules which could be applied to increase the sample size. This may only be an issue in some districts and pooling rules can be established to achieve a minimum sample size by increasing the number of months and years included or by borrowing data from an adjacent district. While the proportion of fish released using a descending device may not be likely to differ between districts since outreach is carried out statewide, the proportion of catch by depth may differ due to differences in the depth distribution of reefs and thus effort or depth restrictions between areas affecting the depth to which anglers fish and encounter the species in question. Thus, pooling by time would be preferred in attaining a sufficient sample size within a district as long as the depth restriction between periods was the same. The results for each stratum in each district would be applied to the expanded estimates of encountered fish, thus attaining a suitable representative sample size through pooling would be essential to accurately reflect the use of the devices and reduction in mortality relative to surface release.

Ascribing all fish in the catch in the PR modes or in future PC dockside mode to the depth at the location where majority of the fish were caught presents a source of uncertainty regarding the actual proportion of catch by depth. The specific depth of capture for each individual is assumed to be the average depth of catch for the day, though some fish were caught shallower or deeper. Even the depth of encounter informing the proportion of catch by depth in the PC mode is provided by the average of depth at the beginning of the drift and the end of the drift, resulting in some uncertainty as to the actual depth of catch for an individual along the course a drift. Refining the resolution by asking more specific questions about the depth of capture of each fish in the PR mode is limited by the ability of the angler to differentiate between fish of the same species in their catch and where each of them were caught. Such a request pushes the bounds of the ability of anglers to recall such information accurately as well as their patience in continuing the interview. In addition, the additional time it would take to collect such data would be time prohibitive and would be likely to cause other data elements or interviews to be forgone. Collection of additional data for rarely encountered species may be more feasible, but would still carry an added time burden and require samplers to recall the need to ask the question for this subset of species.

Application of the mortality rates determined for these species would assume that the gear being used effectively to return fish to depth and the rates are representative of the mortality rates expected for discarded fish sampled in the field. Some of the uncertainties in the estimates of mortality rates are in part addressed by including species that may be more sensitive to barotrauma (i.e., bank rockfish in Wegner, Pribyl and Hyde, in prep.) or that were kept on deck longer than others (i.e., squarespot rockfish in Jarvis and Lowe, 2008). Explicit buffers can also be added to the proportions of fish released using descending devices to address concerns regarding reporting bias by anglers who may report using a descending device when the fish was actually released at the surface. One has to ask why the angler would even report the fish if they were going to be less than honest about its disposition, so this may not be a valid reason for a buffer. Concerns also arise relative to the potential for the observer to affect the frequency of use on observed PC trips and how representative the estimates will be of behavior of unobserved trips to which the proportions of fish released are expanded.

If a fish has been on deck for greater than the ten minutes for which the estimate from Jarvis and Lowe (2008) was derived, its condition may not be likely to motivate them to use a device in returning the individual to depth and thus it may not be returned using a device. To address uncertainty in the efficacy of use of the devices to return a fish to sufficient depth for it to return to and stay at the bottom, a nominal buffer may be warranted. Some data is available on the efficacy of the devices though newer lip grip devices have come on to the market since the study that allow pressure/depth specific release and may cause estimates of failed descent to be overestimated. Outreach and education by CDFG have focused on the use of these devices and industry/angler advocacy groups have provided pressure release lip grip devices to their member PC boats to increase the frequency of use and effectiveness of their application. When anglers take time to put the fish back down, they are likely to use the most effective means possible or become technically proficient with the gear at hand as not to waste time that could be spent doing other tasks or fishing, in part reducing concerns regarding efficacy of use. As new devices that are more effective come on to the market, less effective means are likely to decline in use, improving efficacy. Better understanding variation in efficacy of use may be an area of future research or additional data mining by the GMT. In addition, uncertainties and assumptions involved in the application of mortality rates in total mortality estimates is a subject for review by the RecFIN Technical Committee as well as the SSC.

Considerations Related to Implementation

This section will be updated after the SSC review of mortality rates. It is included in this report to help facilitate discussions with the SSC, other advisory bodies, and the Council. After the discussions in November, the GMT will update, organize, and refine this section.

- Coastwide consistency
- Data availability from each state
- Are 10 fm bins too fine scale for the data we have available?
- Don't think enough research to support 10 fm bins, maybe more nearshore (<30 fm) and offshore (>30 fm)
- Is management data robust enough to support 10 fm depth bins
- Sampling program trade-offs
- What is the cost to other sampling duties of adding questions?
- Overall duties (salmon, bio samples)
- Groundfish information
- Sampling program priorities
- MRIP review said some parts being oversampled
- May be necessary to meet CWT collection goals
- For groundfish might be best to handle through RecFIN technical committee
- Overall need to include the salmon folks
- If only collect data from one mode, don't apply to all
- Conversely, if can't collect data from all modes, doesn't mean can't use it for those that do collect data
- Match sampling precision to estimation precision and management objectives

- All states are assuming that fish are discarded (descending) at the same depth as average catch

Conclusions/GMT Recommendations

At the June 2012 meeting, the Council tasked the GMT with developing a report on how to integrate recreational angler use of descending devices into the management system for cowcod and yelloweye rockfish caught with rod-and-reel gear, with the goal of applying a discard mortality rate that reflects use of a descending devices in the release of fish rather than surface release beginning in 2013. Accounting for the use of descending devices in mortality estimates for additional rockfish species and for the commercial nearshore groundfish fishery may occur in the future, but only cowcod and yelloweye rockfish released by recreational fisheries were requested for immediate review due to GMT workload constraints and because regulations used to limit discard mortality of these species are most restrictive relative to other overfished species. Mortality rates determined here for yelloweye and cowcod should be applicable to other demersal rockfish other than the subgenus *Sebastosomus* as there was little variation across estimates provided for such species.

Mandatory use of descending devices in the recreational fisheries may be ill-advised, because discard data are obtained from angler reports and accuracy of reports may be reduced if reporting an illegal activity is required. However, a mandatory requirement to carry descending devices during all recreational trips would be beneficial as it would likely maximize use of the devices. In the interim, outreach and education should be continued to motivate anglers to have and use descending devices. Should the Council decide to account for the use of descending devices in catch accounting, this fact should be included in outreach to inspire anglers that require additional motivation beyond knowledge that they are reducing their impacts to use them.

Additional research should be undertaken to obtain additional data for a broader suite of species over a greater range of depths for both long term and shorter term mortality. The cost of acoustic tagging and the intensity of sampling activity required to maintain the array makes it expensive to obtain mortality rates on all released fish regardless of condition. Use of two day cage studies to collect information on short term mortality for all encountered fish regardless of condition may allow collection of data for a greater number of species over a wider range of depths. Acoustic tagging of fish in better condition to or of all encountered fish for high priority species to reflect mortality over the longer-term, can provide a better indication of long term mortality rates and should be pursued in addition to cage studies. Though it may be time prohibitive to collect data on the proportion of fish that are released using a descending device for all species without forgoing other data elements, obtaining estimates of mortality rates for as many species as possible over a wide range of depths will make mortality rates available should these species become a priority in catch accounting if deemed overfished and thus represent limitation of season length or depth restrictions.

Review of the methods and data elements required to apply mortality rates reflecting the use of descending devices should be developed by the states and reviewed by the RecFIN Technical Committee. Ideally, once mortality rates for fish released with descending devices are established, RecFIN should use the individual state estimates of the proportion of fish released with descending devices to produce estimates of mortality for these fish as is currently done to apply estimates of mortality for fish released at the surface. Should issues arise as to the validity of the methodology for applying the mortality rates in catch accounting, perhaps funding for additional research or assistance of consultants can be obtained through the Marine Recreational Information Program (MRIP). Discussion of the necessary data elements with state data collection staff to coordinate collection of the data and development of forms and database configurations allowing its integration into estimates will be essential and require additional staff work load. Each state may be in a different phase of implementation and leeway should be given to allow states to bring forth methods for review and a timeline for integration of the alternate mortality rates into catch accounting as soon as 2013 and the intent should be for all states to account for their use by the 2015 season.

Methodology Reviewed but Rejected

Proxy Species—Black or Blue Rockfish

In the Hannah et al. (2012) cage study, 25 yelloweye rockfish were caught in depths shallower than 30 fm, held in cages (barrels) at the bottom for two days, and all survived. In the Hochhalter and Reed (2011) mark-recapture study, yelloweye rockfish were caught in depths shallower than 40 fm, released at the bottom, and estimated average survival was 98.8 percent (95% CI=52.2 - 99.9 percent). The authors concluded that depth did not affect survival among the ranges of depths sampled in the study (< 40 fm); however, only 5 percent of their yelloweye rockfish were caught deeper than 30 fm, and no tags were recovered from those fish. Therefore, the average mortality rate from these studies (~1 percent) could be used as the discard mortality rate for yelloweye rockfish released with descending devices only for depths shallower than 30 fm (Options 1, 2A, 2B; Table 14).

Table 14. Proposed discard mortality rates by depth bin of capture for yelloweye rockfish released at the surface and with descending devices. Option 1 is a conservative approach that assumes 100 percent mortality in depths where survival has not been determined in recompression studies (> 30 fm). Options 2A and 2B, less conservative but potentially more accurate approaches, are based on theoretical yelloweye rockfish survival curves that were developed by shifting the blue rockfish (Option 2A) and black rockfish (Option 2B) curves seaward and having the decline in survival begin at 30 fm (Figure 8). Survival at midpoints of the 10 fm depth bins (e.g., 35 fm for 31-40 fm depth bin) were used for mortality rates.

		Descending devices		
Depth bin (fm)	Surface	Option 1	Option 2A	Option 2B
0-10	22%	1%	1%	1%
11-20	39%	1%	1%	1%
21-30	56%	1%	1%	1%
31-40	100%	100%	2%	2%
41-50	100%	100%	16%	5%
51-60	100%	100%	79%	23%
61-70	100%	100%	97%	56%
71-80	100%	100%	100%	83%
81-90	100%	100%	100%	91%
> 90	100%	100%	100%	100%

Until survival of yelloweye rockfish caught in depths greater than 30 fm and released at depth is studied, speculative mortality rates for fish caught beyond this depth and released with descending devices will may to be used.

A more conservative approach (Option 1; Table 14) would be to apply a 100 percent discard mortality rate to yelloweye rockfish caught deeper than 30 fm, whether they were released with a descending device or not.

However, it is unlikely that 30 fm is a "knife-edged" threshold depth beyond which all yelloweye rockfish die. The actual relationship between depth of capture and probability of survival likely resembles a logistic curve (with a tapering of survival by depth), similar to what was modeled for blue rockfish and black rockfish post-recompression survival in the Hannah et al. (2012) cage study (Figure 8). Since 100 percent survival of yelloweye rockfish occurred in the study depths (< 30 fm), the authors could not model the relationship between depth and yelloweye rockfish survival beyond 30 fm, which is necessary data for developing discard mortality rates with descending devices.

To predict this relationship in depths beyond 30 fm, the survival curves of blue rockfish and black rockfish could be shifted from their original depths of decline to 30 fm (depth beyond which yelloweye rockfish survival is unknown; Figure 8). These theoretical yelloweye survival curves could then be used to develop discard mortality rates for yelloweye rockfish caught deeper than 30 fm and released with descending devices (Table 14). Options 2A and 2B may still be considered conservative because the depth of declining survival begins at 30 fm, but may actually occur beyond 30 fm.

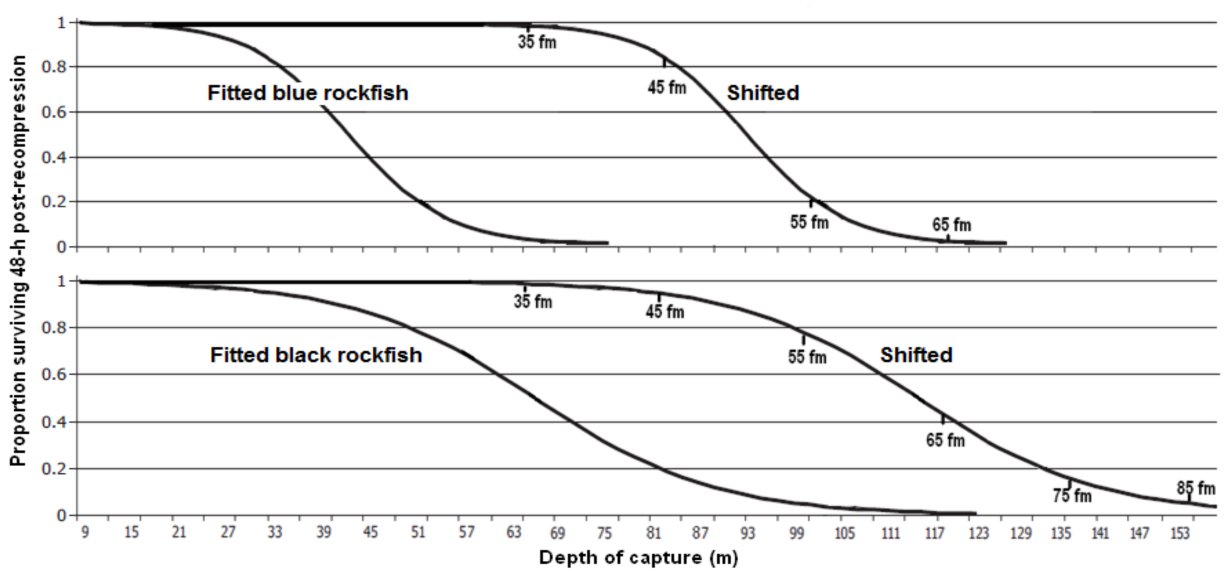

Figure 8. Fitted 48 hour post-recompression survival curves by depth for blue rockfish and black rockfish from Hannah et al. (2012) and shifted curves (point of initial decline of survival in each fitted curve shifted to 30 fm). Shifted curves are theoretical relationships between depth and survival of yelloweye rockfish released with descending devices.

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Appendix 1. Overview of Current Research

Several recent studies have looked at the physical effects of barotrauma on rockfish and at the effectiveness of deepwater release to improve the survivability of rockfish suffering from barotrauma.

In general, these studies showed that rockfish released back to the depth of capture have improved survivability (reduced discard mortality) compared to fish released at the surface. Mortality rates for fish released back to the depth of capture are highly variable between species. Other variables such as temperature, time at the surface and depth of capture also affect survival. Most studies have looked at short term survival (two-four days) after recompression. There is little information on the effects of barotrauma on longer term survival.

The summary below focuses on research used in this report to produce estimates of mortality for yelloweye and cowcod rockfish released with a descending device. The annotated bibliography provided by Alana Pribyl for the June Council meeting offers a comprehensive summary of additional research related to barotrauma http://www.pcouncil.org/wp-content/uploads/D2a_ATT2_ANNOTATED_BIB_JUN2012BB.pdf .

Jarvis and Lowe, 2008 looked at the effects of barotrauma on both the initial capture survival and the short term (2-day) survival of line caught rockfish off southern California following recompression.

Initial capture survival was studied by characterizing captured fish according to external signs of barotrauma including stomach eversion, exophthalmia (bulging eyes), corneal gas bubbles, subcutaneous gas bubbles, and prolapsed cloaca. Demersal rockfish species were targeted in depths ranging from 10-52 fm. Handling time to measure and examine fish was kept to less than 2 minutes. Fish were placed in a live well with fresh seawater for 10 minutes and observed for gill ventilation as a sign of initial capture survival. The fish were then euthanized and dissected within 24-48 hours to determine the internal signs of barotrauma.

One hundred sixty-eight rockfish representing 21 species were captured and examined for external signs of barotrauma and initial capture survival. Vermilion, greenspotted, olive, halfbanded and honeycomb rockfish comprised the majority of the catch. Initial capture survival was 68 percent overall but varied by species. Eight of 12 species had greater than 75 percent initial capture survival, whereas olive and rosy rockfish had low survival. Fish caught at deeper depths generally showed higher numbers of trauma but species caught at shallow depths showed relatively similar survival proportions as species caught in deeper depths.

Two-day post recompression survival was studied by capturing nearshore and shelf rockfish at depths ranging from 27-49 fm. External signs of barotrauma, bottom depth, time of capture and standard length were recorded for each fish. Fish were externally tagged before being lowered back to the original capture depth in coasted wire mesh cages. Cages were left on soft bottom near the fished reefs for two days. After the two days, the cages were pulled up to 11 fm where divers met the cage and assessed each fish for mortality and external signs of barotraumas. The observation depth was chosen to reduce the probability of barotrauma injury resulting from the second decompression event. Dead fish were retained and examined for signs of internal barotrauma and live fish were released.

Three hundred twenty eight rockfish representing 17 species were captured and examined for external signs of barotrauma, 257 fish were recompressed to the original capture depth to assess the two-day post recompression survival. The average capture depth was 39 fm and ranged from 30 – 44 fm. Five species; vermilion, bocaccio, flag, squarespot and honeycomb rockfish comprised the majority (82 percent) of the catch. Overall short term survival of rockfish was 68%, similar to the initial capture survival (68 percent). Less than 1 percent of the caged fish showed external signs of barotrauma 2 days after recompression. Two-day post recompression survival was species-specific and ranged from 36 percent for squarespot to 82 percent for starry rockfish. There was a significant difference in species survival among the five most abundant species; squarespot rockfish showed the lowest survival and bocaccio rockfish showed the highest survival (89 percent).

The study found that although there were species-specific differences in the types and degree of barotrauma, most rockfish showed greater than 75 percent initial capture survival, suggesting that the degree of barotrauma is not a good predictor of initial mortality (within the first 10 minutes of capture).

The authors suggest that intraspecific variability in barotrauma responses of fish captured at similar depths could be due to differences in the relative volume of the swim bladders when the fish are caught. They explain that the extent of barotrauma will vary depending on whether the fish is neutrally buoyant at the depth of capture. In addition, interspecific variability in swim bladder morphology may influence the occurrence of swim bladder tears. The swim bladders of olive rockfish observed in this study were relatively thin compared to more robust swim bladders observed in vermilion, copper and brown rockfish. Olive rockfish showed high mortality and high occurrence of swim bladder tears.

The study suggests that species-specific differences in external signs of barotrauma could be related to species differences in body morphology and the degree of movement in the water column. Rockfish like bocaccio with more elongated, laterally compressed bodies that occurred in schools off the seafloor like showed few signs of barotrauma. Rockfish like vermilion with relatively deeper bodies that are more demersal showed a high degree of barotrauma. The researchers point out that although it might be expected that fish that showed a high degree of barotrauma would have low post recompression survival they did not observe that trend.

Depth was not a significant predictor of 2-day post recompression survival of rockfish in this study but other studies have shown depth to significantly affect post release survival (Wilson and Burns 1996; Morrissey et al. 2005; St John and Syers 2005). Differences in foraging behavior (benthic predators vs. water column planktivores) and differing swim bladder morphology suggest that depth effects on rockfish are likely to differ by species.

This study found surface holding time was found to have a significant effect on recompression survival. Fish held at the surface for 10 minutes or less had a 78 percent probability of survival following recompression and increased to 83 percent if fish were released within two minutes of landing. Surface holding time may explain species specific differences in survival in this study.

Of the five most abundant species caught, squarespot rockfish showed the lowest survival. These fish were held at the surface an average of 5 minutes longer than the other four species. The difference in holding time was not significantly different but may have been biologically different.

This research provides evidence of both short and long term post release survival of line-caught southern California nearshore and shelf rockfish recompressed to capture depths from 30- 44 fm and also found that recompression is most effective if fish are released back to depth within minutes of capture.

The authors point out that for long lived species like rockfish it may be important to consider cumulative mortality risk, which increases exponentially with every recapture (Bartholomew and Bohnsack 2005).

Hannah et al. 2012 used a cage system designed to minimize the adverse effects of caging fish in the field to evaluate the discard mortality of seven species of rockfish with barotrauma.

The primary objective this study was to measure short term (48 hour) post recompression survival for a variety of Pacific rockfish species commonly captured in the recreational hook and line fishery in the northern California, Oregon and Washington (NCOW) area as a function of capture depth.

The lack of information on post recompression survival for most NCOW can in part be attributed to the difficulties with controlling for the adverse effects of caging fish. Adverse effects can include strong currents and large waves that create movement in a cage moored to the seafloor and causes stress and injuries; parasitic amphipods or sand fleas may adversely affect the survival of cages fish. Cages constructed from netting or aluminum bars cause lesions from repeated contact with the sides of the cages and allowed caged fish to be susceptible to parasitic amphipods. A special cage system was designed for this study to minimize these adverse effects.

The key features of the cage used in this study included nonabrasive surfaces for any part that would come into contact with the fish and sufficient weight to resist movement in currents and movement caused by the mooring line and exclusion of amphipods while maintaining adequate water exchange. An opaque, non-abrasive plastic drum was used in place of a cage constructed of wire or netting. The drum was positioned so it was isolated from the mooring line and was attached directly to a heavy bracket to reduce the potential for movement. Ventilation holes were covered with fine mesh stainless steel screens to protect the fish from parasitic amphipods.

Rockfish were captured at reefs off Seal Rock, Cape Perpetua, and Lincoln City, Oregon using standard recreational hook and line gear. A variety of fish were targeted at depths ranging from 5-35 fm.

Following capture fish were scored for seven signs of barotrauma, measured for fork length and photographed. The fish were then place in cages and evaluated with respect to orientation (upright, on its side or belly up), activity level (strong, week or none) and the presence or absence of movement in the operculum, body and tail. The surface interval time was calculated from the time the fish was brought on board to the time the cage was deployed and was minimized as much as possible. It was assumed that minimizing the surface interval would best mimic the experience of a typical discarded rockfish. The target duration for cage confinement was 48 hours but at times it was necessary to shorten or extend the caging period. Upon retrieval, fish were evaluated while still in water in the cage for condition. Once removed from the cage signs of barotrauma were recorded. Each fish was released into the ocean and its ability to descend was noted.

While the primary interest was the effect of depth of capture on post recompression survival, three other variables that can be related to survival; fish length, the surface to bottom temperature differential and time at the surface were also evaluated.

Two hundred eighty-eight individuals of seven species were captured from six depth intervals and evaluated for 48 hour post recompression survival. Species collected included 144 black rockfish, 36 blue rockfish, 42 canary rockfish, 3 china rockfish, 10 copper rockfish, 28 quillback rockfish and 25 yelloweye rockfish. The rockfish ranged from 22-52 cm in total length and time on deck averaged less than 3 minutes per fish with a range of 1-9 minutes. Only 12 fish had a time on deck of 5 minutes or more and all of those survived.

Up to a capture depth of 30 fm post recompression survival was 100 percent for yelloweye rockfish and copper rockfish and 78 percent for blue rockfish. Up to a capture depth of 35 fm, survival was 100 percent for canary rockfish and quillback rockfish and 90 percent for black rockfish. Across species, the frequency of visible signs of barotrauma was not a good indicator of survival potential. The high survival of canary and yelloweye rockfish occurred despite the frequency of high visible barotraumas scores. The lower 48 hour post recompression survival of blue rockfish occurred despite relatively low visible barotraumas scores.

Logistic regression analysis showed that 48 hour post recompression survival in black rockfish was negatively associated with depth of capture ($P < 0.01$) and the surface-bottom temperature differential ($P < 0.01$) but not with fish length or surface interval ($P > 0.05$).

Fitted logistic curves showed that across the range of depths and temperatures observed in this study, depth of capture had a stronger negative effect on survival in black rockfish than did the surface-bottom temperature differential. Increasing depth of capture reduced post recompression survival more rapidly and at shallower capture depths for blue rockfish than for black rockfish.

The cage design was very effective at minimizing the adverse effects of caging rockfish. The majority of individuals were in excellent condition after cage confinement. Although adverse cage effects were greatly limited, the estimates of 48 hour post recompression survival from this study only apply to discards under a carefully considered set of conditions. Survival estimates from this study are only representative for quickly released rockfish that either descend to depth successfully on their own power or that are assisted to depth with recompression devices and not to situations when re-submergence is delayed or unsuccessful. The authors suggest that survival estimates from this study be viewed as the upper limit for post recompression survival because other possible effects such as deeper capture depths, predation on released fish, poor handling and any other adverse effects from recompression devices on survival were not considered.

The authors also caution that this study produced only small sample sizes for some species and depths indicating greater uncertainty in the mortality estimates generated for those species and depths. Longer term survival for the species in this study has not been studied.

Hochhalter and Reed, 2011 developed a study to quantitatively evaluate the effectiveness of deepwater release at improving the survival of discarded yelloweye rockfish in the wild.

The authors cite the Jarvis and Lowe, 2008 field study and Parker et al. 2006 laboratory study as examples of high sort term survival for rockfish released quickly back to the depth of capture but suggest that the mortality estimates from these reports may represent the upper bound of survival because they don’t account for delayed mortality.

To address this, Hochhalter and Reed developed a study that would allow rockfish to be at liberty in the wild long enough to incorporate delayed mortality beyond two days and that would include the effects of behavior impairment and predation.

A mark recapture study was used to collect individual encounter histories of yelloweye rockfish released at depth. Anglers used hook and line to capture yelloweye rockfish on an isolated reef in Prince William Sound, Alaska in mid- May 2009. Fishing was conducted across the entire summer fishing season and included a wide range of tackle to represent the range of recreational fishing conditions. Fishing was conducted over a 7-day time period followed by a 10-day hiatus. Survival was estimated for the 17-day time interval separating the midpoints of the consecutive sample sessions. Time of hook-up, reaching the surface, beginning of descent, and release were recorded for each captured fish. Once at the surface, fish were measured for total length (mm), assessed for external signs of barotrauma, and examined for hook location. Fish were given a passive integrated transponder (PIT) tag as a primary mark and an individually numbered T-bar tag as a secondary mark. The presence or absence of external barotrauma signs was assigned using the criterion outlined by Hannah et al. (2008). Only 8 percent of the captured yelloweye rockfish were at the surface more than 10 minutes. Fish were released back to the bottom using a 680 g lead-head jig with the barb filed off.

A total of 182 individual yelloweye rockfish were captured and tagged. Forty five yelloweye were recaptured once and 8 were recaptured twice. Depths of capture ranged from 12-40 fm. The average survival probability for yelloweye rockfish released at depth was 98 percent

The study also looked at the ability of rockfish to successfully submerge after being released at the surface; this is considered the most critical step to surviving discard mortality and has been cited as an appropriate proxy for survival after release at the surface (Hannah et al. 2008).

Hook and line gear was used near the mark-recapture reef to target yelloweye rockfish and estimate submergence success. Captured yelloweye were measured and assessed for external signs of barotraumas. Fisher were then released at the surface and observed for 30 minutes.

A total of 95 yelloweye rockfish were captured and released at the surface to estimate the probability of re-submergence. Of the 95 individuals observed, 21 successfully re-submerged for a submergence probability of 22 percent. The estimate of submergence probability was used as a maximum survival estimate for yelloweye rockfish released at the surface and compared with the estimate of survival for fish released at depth. The results indicate that the average survival of discarded yelloweye rockfish can be increased by 4.5 times if the fish are released at depth quickly after capture (< 2 minutes) rather than at the water’s surface.

Wegner, Pribyl and Hyde (in prep.aration) http://www.pcouncil.org/wp-content/uploads/D2c_SUP_SWFSC_PPT_VETTER_JUN202BB.pdf, studied the post release survival and behavior of deep-dwelling rockfish suffering from barotrauma.

In this study fifty shelf rockfish caught off southern California in 44-98 fm were fitted with acoustic tags and released using descending devices to reduce bycatch mortality. Tagged fish were tracked with an array of six receivers that recorded depth and acceleration providing information on movement and mortality over a four month study period. In addition to bank (n=12), bocaccio (n=13), starry (n=3) and sunset rockfish (n=13), 9 cowcod were also tagged.

Thirty nine (78 percent) of the tagged fish survived after two days and twenty three (46 percent) of the tagged fish survived ten days after being released. Three tagged fish died after two-days and seven died after ten-days. Eight fish were unaccounted for after two days and twenty fish were unaccounted for after ten-days.

Of the nine cowcod tagged in this study, all (100 percent) survived after two days, five were assumed to have emigrated from the study area and the four (44.4 percent) that remained within the range of the receivers survived. Bank rockfish did not do as well as the other four species in the study and the extent of barotrauma injuries suffered by this species were more severe than the other species suggesting they may be more susceptible to barotrauma with only 33 percent surviving to ten days. Excluding bank rockfish 87.5 percent (21/24) of the tagged rockfish that remained in the study area survived to ten days. If you include bank rockfish in the estimate of survival 76.7 percent (23/30) of the tagged rockfish survived to ten days.

The majority of mortality occurred within the first two days and no additional mortality was observed in fish that remained within the range of receivers between ten days and the remainder of the four month study. Some of the captured fish were selectively included in the study due to their relatively good condition at the time of capture which may bias the results toward higher survival.

Smiley and Drawbridge, 2007 used a portable hyperbaric chamber to evaluate the feasibility of restoring depleted rockfish stocks by breeding them in captivity and releasing offspring into the wild.

This paper describes the development of a portable hyperbaric chamber that allowed for fish to be caught manually by hook and line, quickly recompressed, transported and then decompressed over time while allowing for observation, stable water temperature and good water quality.

The study focused on bocaccio, cowcod and vermilion rockfish because of their commercial and ecological importance, depleted status and recognition that population rebuilding times would be long. Bocaccio and vermilion had been successfully kept alive following capture but because cowcod had not it was the focus of the study. Fish were caught between 50 and 80 fm.

The study was broken down into three phases for the development of the hyperbaric chamber

Phase I: Assessed gear types and ascent rates to determine species specific catch per unit effort and relative sensitivity to barotrauma.

Phase II: Designed to test the use of a two chamber hyperbaric system for onboard recompression and define all of the protocols associated with fish handling.

Phase III: Implemented the refined protocols and the four chamber hyperbaric system.

Once caught, fish were examined for external signs of barotrauma such as protruding eyes, extruded stomach, orientation, respiration and buoyancy.

In Phase III, 16 cowcod were recompressed and decompressed and 11 survived to feed, yielding a survival rate of 69 percent.

Appendix 2. Research and Data Needs

The following section is the result of a GMT brainstorming session, trying to determine possible future research and data priorities; it still needs to be organized and refined. It is included in this report to help facilitate discussions with the SSC, other advisory bodies, and the Council. After the discussions in November, the GMT will update, organize, and refine this section.

In Section 3, we outlined discussed methods of using the information currently available in the literature to inform discard mortality rates by depth when descending devices are used. However, it is possible that the literature does not yet contain a sufficient amount of information to inform the use of these methods for management.

Surface mortality

At the time the surface mortality rates were estimated (PFMC and NOAA, 2009), the GMT also identified uncertainties and data needs:

- Limited data for several species
- Very limited information about post-release mortality rates
- Insufficient data to evaluate differences in depth effects among species
- Lack of depth-specific information in delayed mortality adjustments
- No additional uncertainty associated with delayed mortality adjustment
- The data do not cover the entire coast (i.e. ends at the OR/WA border) and ignore possible regional differences, such as temperature effects.

Using proxy species for yelloweye rockfish and cowcod:

The GMT investigated the possible use of blue and black rockfish barotrauma studies to inform depth-based mortality rates for yelloweye (cite those studies). The GMT is not recommending the use of these species as proxies for yelloweye because:

- these studies indicated that barotrauma effects (visible and non-visible) varied by species, and by depth of capture and release; and
- it is therefore uncertain whether these species are appropriate proxies for yelloweye.

This dialogue on using proxy species prompted further discussions about what information would be needed to inform future management decisions regarding differential mortality rates when descending devices are used. Several GMT members and Council staff indicated that there is interest from the public (including academia) to conduct more barotrauma-related research that is more management relevant. The following questions were considered priorities for future research.

What is a sufficient sample size by species and depth? To help inform future research priorities, input from the SSC regarding minimum and maximum sample sizes would be helpful.

When considering the current body of research as a whole, are there species that would be appropriate proxies for yelloweye and cowcod?

Specifically, would more robust species with thick-walled swim bladders be appropriate for yelloweye and canary proxies? Particularly those species that are from the same guild or stock complex.

What specific research would help inform this? Increased depth sampling, commercial nearshore observer or electronic monitoring (EM), and tagging data could be integrated with existing studies and expanded.

Is rockfish physiology or depth of capture more indicative of an appropriate proxy species?

Collected more information on yelloweye and cowcod physiology relative to other species studied.

Is bottom shape more or less sensitive to barotrauma? For example, how do bocaccio more streamlined build),yelloweye (more deep-bodied), and squarespot (built more like uncommon, Southern CA species) compare in terms of their barotrauma effects?

Our understanding is that yelloweye and cowcod typically rest on the near the bottom. Therefore, to what degree do they use their swim bladders? Does this influence how much they are affected by barotrauma?

The GMT recommends inviting current experts in barotrauma research in order to continue this dialogue with the GMT, SSC, and the Council to help answer the questions above.

How often and how correctly descending devices are used:

In addition to the current state-of-our-knowledge relative to barotrauma effects on rockfish, a key component to implementing discard mortality rates is to understand how often and correctly are descending devices being used. To obtain this information, the GMT discussed the possibility of adding questions to the state-level dockside surveys that are currently conducted.

The following questions were proposed:

Of the yelloweye and cowcod released on this trip, what was the depth of capture and release?

Were descending devices used for releasing these species?

If so, how many yelloweye and cowcod were released with descending devices?

Please estimate the amount of time these yelloweye and cowcod spent on-deck, prior to being released with a descending device.

Answering these questions is important for both surface release and descending device assumptions. However, it is widely understood by the GMT that survey interviewers are often pressed for time, and have to consider how amenable fishermen are to being asked questions after their fishing trip.

Trade-offs relative to collecting information to answer this question:

Key questions to the state sampling programs: would the states be willing to change their survey question structure to accommodate the above questions (or similar questions)? If we add questions for yelloweye and cowcod, would adding these same questions for other rockfish species be an additional marginal or significant cost? If the cost is marginal, perhaps these questions could be asked for other rockfish species.

Members of the GMT noted at this meeting that adding even one or two questions to current survey efforts will likely result in losing some biological information (i.e., less time to ask all of these biological questions). Or, some proportion of interviews may be lost. ODFW mentioned that their samplers have indicated that approximately 1-2 interviews per hour would be lost, if more questions were added to their current survey. For this report, the WDFW and CDFG did not have enough time to characterize the cost to their current survey efforts.

Current state sampling rates:

We received input from Russell Porter (RecFIN) at this meeting. He mentioned that samplers have indicated that they are sampling at higher rates than is necessary. We would like to follow-up with him, and possibly others, for clarity. That is, is the sampling rate higher than is necessary for salmon sampling goals, relative to groundfish sampling goals? Based on Mr. Porter's comment, the following questions were proposed:

Would it be beneficial to scale back the number of interviews and focus on getting more detail in these interviews? I.e., adding barotrauma-related questions.
Has an analysis been conducted recently to determine appropriate sampling levels for groundfish management purposes?

The following section highlights some ideas on how this information could be collected, including some novel approaches that may help reduce the burden on state sampling personnel.

Technology and tools:

It may be beneficial to investigate methods of encouraging voluntary adoption of commonly used modern technologies to help augment current creel survey efforts. Increased popularity of iPads™, digital cameras, GoPro™ cameras, and social media could be merged with creel efforts in the future. Many fishermen carry digital cameras these days (e.g., on their smartphones) so this effort could allow for incorporation of digital verification of species to improve species identification accuracy. Additionally, if efforts on improved voluntary data acquisition prove to have merit, future tests merging creel survey efforts with voluntary methods could be realized. This information stream may significantly improve the ability of recreational fishery managers to manage fisheries in near real-time, especially in salmon fisheries, allowing greater Near Real Time (NRT) nimbleness in management response. Additionally, further research in species-object recognition could complement these efforts, and help prevent from the accumulation of unsampled digital photo data.

Provide voluntary sport logbooks, such as those with laminated data sheets, clipboards, and wax pencils. Also, dockside samplers could be furnished with digital cameras to take photos of these laminated data forms for incorporation into creel data during sampling downtimes and daily reconciliation. The log could include all species caught released, depth of catch and/or release, and GPS location.

Recommend the development, or use of, descending devices with a gauge that records depths of release. This would be a more accurate than relying upon angler memory of depth of release. Samplers could review the descending device records.

Create a website where anglers can submit voluntary information, with potential smartphone and/or tablet compatibility. Individual passwords for each fisherman would be provided to follow their efforts throughout the year. Fishermen could add photos when submitting information. Fisherman may have a greater sense of ownership of their data, and the assumptions that result from potential use of this data. Fisherman could then see their annual catch histories and any credits attributed to their use of descending devices. Other information that could be provided to anglers may include:

estimated catch summaries (by state, regional areas within states, etc.);

short term and long term trends in estimated harvest to show anglers the positive effects of using descending devices; and

any other information that could be incorporated into “canned” status reports such as fact sheets with illustrations of the more difficult species of rockfish to identify and tips on identifying rockfish.

Collect information about the use of descending devices by anglers in a manner similar to how economic data are currently collected by NMFS/MRIP for recreational fisheries nationwide (“economic add-on”). That is, at the end of their interview, ask anglers whether they would be willing to participate in a short follow-up interview, via phone, e-mail, or mail.

Create incentives for fishermen to participate in these programs

Recreational anglers with a track record for providing voluntary, high quality data, could be given "credits" that might translate to more fishing opportunities, similar to lottery hunting programs.

Recommend a version of the "master hunter" program where anglers are trained in species identification, the use of descending devices, etc. Anglers participating in such programs in one year could then be entered into a lottery for an additional fishing weekend the following year.

Outreach and education:

It may be worthwhile to add some sort of social media component such as linking to public education sites and giving "credits" to recreational anglers who participate in voluntary programs.

Appendix 3. Oregon Ocean Recreational Boat Survey Interview Guide

To provide an example of the information samplers are currently required to obtain during each interview, an excerpt from the ORBS Sampling Manual (2012) is below. The sampling programs in Washington and California have similar protocols, though the exact questions may vary.

INTERVIEW GUIDE FOR ORBS SAMPLING

Interviewing private anglers and charter boat captains can be challenging. The ORBS interview template provides an example on how to successfully conduct an interview by insuring that all questions are asked correctly and in a logical sequence. In addition, the template walks through the data elements that are required for the Nomad. Experienced samplers may develop their own method of conducting interviews provided that all data elements are collected. Remember when dealing with the public to be courteous and professional.

ORBS samplers should interview and sample catch from as many private boats as possible during working hours. In addition, samplers should interview as many charter boats as possible using a stratified sampling design to insure all trip types are interviewed for each statistical week. The procedure will vary slightly depending on the port configuration, but the general process is outlined here and will aid in guiding you through the interview and sampling methodology. The interview guide has been divided into two sections:

interviewing returning private boats, and

interviewing returning charter boats

Private Boat Interview

In a given area, the sampler will interview the first private boat seen coming in after the conclusion of the prior interview. Do not deviate from this selection process, even if you think the boat wasn't fishing.

Once the sampler spots a recreational boat returning, the sampler will attempt to follow that boat to its landing location. Always approach the boat with a good attitude, and be polite and professional.

Trip Interview

BOAT: Try to record in the Nomad the boat number when you are following the boat to its landing location, or when you first approach the boat. If not, record it when you first arrive. If the boat is mooring in a slip, wait for them to get the boat tied down before beginning your interview.

INTRODUCTION: "Hello, my name is ________ and I represent Oregon Department of Fish and Wildlife". At this point it is always good to converse briefly with the anglers about their trip, regardless if they were fishing or not. For example: "How was it out there?" or "Did you have a good time?", etc. Proceed to question 3.

INTENTION: "I have a few interview questions about your trip..." and if you know already that the boat was fishing then add "and would like to sample your catch". Proceed to question 4.

OceanEstuary FIELD: "Did you spend time in both the ocean and estuary, or only one?" If they went in both the estuary and ocean you will enter (Y) in this Nomad field and you will need to conduct two interviews starting with the ocean. If they only fished in one you will enter (N). If the trip was non-fishing, you will still need to enter where they went, in both the ocean and estuary (Y) or only one (N). Proceed to question 5.

TripType FIELD: If they went fishing ask "What was the main species that you fished for?" The pull-down menu will provide all possible options. Proceed to question 6.

Num of Anglers FIELD: "How many people were fishing on this trip?" Enter the number of anglers in this field. Note: some individuals aboard the boat may not have fished, therefore it is very important you ask, do not just assume all were fishing. Proceed to question 7. If it was a non-fishing trip (boat ride) you would enter in the angler field the total number of people in the boat.

Area FIELD: "What area did you fish?" or "where did you fish?" record the correct salmon management area in to this field. If the anglers were bottom, halibut, or spear fishing proceed to question 8, otherwise proceed to question 9.

Reef FIELD: If they were bottom, halibut, or spear fishing show them the reef charts and ask "What reef area did you catch the majority of your fish?" If they didn't catch any fish then ask "What reef area did you spend the majority of your time fishing?" Proceed to question 9.

Depth FIELD: "What was the bottom depth where you caught most of your bottomfish including any you released?" If they were bottom, halibut, or spear fishing and didn't catch any fish then ask "At what bottom depth did you spend the majority of your time fishing? Proceed to question 10, if the boat has landed and retained fish.

Departure time FIELD: For an estuary trip - "What time did you leave the dock this morning?", and for an ocean trip – "What time did you cross the bar this morning"? The next field, "TripHrs FIELD" automatically calculates the trip duration. If you don't enter the departure time right away during the interview, then the calculated trip duration is incorrect. If this happens you will need to correct the trip duration time. Proceed to question 11.

Crabbed FIELD: "Did you crab during the trip"? Enter (Y) for yes and (N) for no. If they crabbed enter the number of Dungeness crab retained in the "encounter screen". Do not enter any other crab species. Proceed to question 12.

The Nomad "trip screen" is completed once all the questions above have been answered. At this time, proceed to the "encounter screen" if the boat has landed and retained fish. If the trip was non-fishing, proceed to the next boat.

The following information is required to complete the "encounter screen":

Species name

Number landed and retained (which is the "catch" field in the encounter screen)

Number released by species

Number of salmon that were tagged with CWT

Number of salmon that have an adipose fin

The sampler is required to count and identify all fish species landed and retained. In addition, the sampler is required to bio-sample a portion of the catch and scan salmon, halibut, and black rockfish in accordance to the sampling goals. There are three ways in which the fish can be examined:

Onboard the boat

On the dock (ask the angler(s) to pass the fish to you on the dock), and

At the fish cleaning station. (follow the angler(s) to the cleaning station)

If the fish species are unknown, ask the angler(s): "What fish species do you have onboard?" Proceed to question 13.

Once the sampler knows what species are onboard, then a decision can be made on what information is required. If bio-samples and/or scanning is required then proceed to question 14, if not proceed to question 15.

Ask the angler(s): "I will need to examine the fish and sample the _____ species" and "The preferred method would be if you pass me the fish so that I can sample them on the dock." If the angler is reluctant to pass the fish to you then state "Alternatively, I could sample them aboard the boat." Proceed to question 16.

Ask the angler(s): "I will need to examine the fish" and "Would you prefer to pass them to me so that I can examine them on the dock or would you prefer me to examine them onboard your boat?" Proceed to question 16.

After you have examined all of the fish and collected all needed samples, then ask the angler(s): `“Did you release any fish during your trip?”` If they answer No then say `“thank you for your time.”` Record their answer and move to the next boat. If they answer Yes then ask: `“What species and how many?”` If they are uncertain of which species they released you can show them some printed information to assist them in identification. If they are still uncertain enter the unknown species code for that species group, i.e., unknown rockfish is code 410. Do not guess about what species were released. Record their answer and move to the next boat.

Interview protocol for incomplete private boat trips

In some ports, recreational fishing anglers may return to port for a variety of reasons (picking up or dropping off an angler, restroom breaks, etc.) even though they have not completed their fishing trip and plan to head back out. If you encounter this and **the entire party intends to head back out**, an interview with those anglers should be conducted as **Private, Non-fishing** and a note should be created in the notefield (see page ____) indicating the interview is **incomplete**.

If, however, **any member(s) of the party do not intend to head back out**, the angler(s) should be interviewed using the same methodology for a returning boat. Under this scenario, there would be no need for an incomplete interview note for any of the anglers since they completed their fishing trip. Additionally, as the boat heads back out with the remaining anglers, a new departure time should be assigned and the trip should be treated as a new fishing trip if it is interviewed later when the trip is complete for the remaining anglers.

If a boat returns multiple times on a given day, follow the procedure described above, interviewing any anglers that have completed their trips for the day and assigning new departure times to the boat each time it heads back out. Continue this methodology until the boat returns for the final time and the last interview is conducted.

Charter Boat Interview

The charter boat selection methodology is a modification of the private boat process. The two factors that need to be considered when selecting a charter boat are:

Sampling the first charter boat seen returning after the completion of the prior interview, and

Ensuring all trip types are covered during the statistical week.

Work with the other samplers in your port to ensure adequate coverage of all trip types.

Interview procedure

Each charter boat has unique sampling challenges, these challenges should be discussed during your in port orientation. In addition, you should make an effort to introduce yourself to the employees at the charter boat offices during the port orientation, and to the captain and crew of the charter boats as you encounter them. It is your responsibility to fully understand how best to sample the charter boats within your port. Contact Jason Edwards at (541) 867-0300 ext. 271 or your assigned sampling coordinator if you have questions.

Always approach the charter boat with a good attitude, and be polite and professional. This will aid in developing a good working relationship with the charter companies and boat captains, which will make your job easier and more enjoyable.

Trip Interview

In some cases the sampler will need to examine the fish first and then interview the charter captain. If you sample the catch first then proceed to step M, if however, you interview the captain first then proceed to question A.

BOAT: Try to record in the Nomad the charter boat name when you are following the boat to its landing location, or when you first approach the boat.

INTRODUCTION: You should already know the captain so there is no need to introduce yourself as an ODFW employee, just say `“Hello Captain ________”.` However, if it is your first time interviewing the captain then state. `“Hello, my name is _________ and I represent Oregon Department of Fish and Wildlife”.` At this point it is always good to converse briefly with the captain if he seems interested and if you have time, if not proceed to question C.

INTENTION: `“I have a few interview questions about your trip...”` Proceed to question D.

OceanEstuary FIELD: `“Did you fish in both the ocean and estuary, or only one?”` If they fished in both the estuary and ocean you will enter (Y) in this Nomad field and you will need to conduct two interviews starting with the ocean. If they only fished in one you will enter (N). If the trip was non-fishing, you will still need to enter where the boat went, in both the ocean and estuary (Y) or only one (N). Proceed to question E.

Fishery FIELD: `“Did you fish in the ocean, or in the estuary?”` Enter (O) for ocean or (E) for estuary in this field. Proceed to question F.

TripType FIELD: `“What was the main species that you fished for?”` The pull-down menu will provide all possible options. If the target species is different from the information you received from the charter office, then you will need to change the trip type on your Charter Effort Form (page ______) and possibly the Recreational Ocean fishery Effort Form (page ______) to match the interview, and write a note that there was a change in the Nomad **“note”** field **AND** on the Recreational Ocean Fishery Effort Form. Proceed to question G.

Num of Anglers FIELD: “How many people were fishing on this trip?” Enter the number of anglers in this field. Also, ask “Did any crew fish on this trip?” If the answer is yes then ask “Is that in addition to or does that include _______ anglers?” Proceed to question H.

Area FIELD: Ask them what salmon management area they fished in “What area did you fish in?” record the correct area in to this field. If they were bottom, halibut, or spear fishing proceed to question I, otherwise proceed to question J.

Reef FIELD: If they were bottom, halibut, or spear fishing show the captain the reef charts and ask “What reef area did you catch the majority of the fish?” If the boat didn’t catch any fish (very unlikely) then ask “What reef area did you spend the majority of your time fishing?” Proceed to question J.

Depth FIELD: “What was the bottom depth where you caught most of your fish including any you released?” Proceed to question K.

Depart. Time FIELD: “What time did you cross the ocean bar this morning?”, or in the case of an estuary trip “What time did you leave the dock this morning?” The Nomad automatically calculates the trip duration, which is the next field, “TripHrs FIELD.” If you don’t enter the departure time right away, during the interview or directly after, then the Nomad’s calculated trip duration is incorrect. If this happens you will need to correct the trip duration time. Review the Nomad edit instructions. Proceed to question L.

Crabbed FIELD: “Did you crab during the trip?” Enter (Y) for yes and (N) for no. If they crabbed enter the number of Dungeness crab retained in the “encounter screen”. Do not enter any other crab species. Proceed to question M.

The Nomad “trip screen” is complete once all the questions above have been answered. At this time, proceed to the “encounter screen”. If the charter did not land and retain any fish proceed to the next boat. **Make sure you ask question “L” before proceeding to the next boat**. The vessel may have not landed any fish, but may have released some.

Encounter Screen or Worksheet Screen

Don’t forget to ask the captain: “Were there any fish released during the trip?” Record the numbers by species in the Nomad. You can enter the released data before you enter the catch data if needed. Proceed to question N if you have not examined the catch. If you have already examined the catch, move to the next boat.

The following information is required to complete the “encounter screen”.

Species name

Number landed and retained (which is the “catch” field in the encounter screen)

Number released by species

Number of black rockfish and halibut scanned for PIT tags (if applicable)

Number of salmon that were tagged with CWT

Number of salmon that had their adipose fins clipped.

Once all the fish species are available, the sampler should be able to collect all the required information to complete the interview process. Typically, during charter trips the returning anglers are provided with baskets to carry their fish. Once the angler disembarks the boat the fish are either filleted or transferred to a bag for home-packing. The sampler is required to count and identify all fish species landed and retained. In addition, the sampler is required to bio-sample a portion of the catch and scan salmon, halibut, and black rockfish in accordance to the sampling goals. There are three ways in which the fish can be examined:

Onboard the charter boat before the anglers disembark,

At the charter office fish fillet station, and

On the dock (some anglers may wish to dress the fish themselves)

An efficient way to count and identify the catch is to systematically examine each basket of fish on the dock or at the fillet station. Ask the filleter(s) before the boat arrives if you can use one of their baskets (make sure you clean the basket once you are finished). You can then move systematically down the line, moving fish from the angler's basket to the empty basket. This method provides three advantages:

No fish are missed,

Each fish is handled for identification, bio-sampling or scanning if needed, and

Each angler's catch is kept separate

For bio-sampling fish species remember to follow the **sampling methodology**. Discuss your intentions with the filleter(s) before the boat returns. The filleter(s) will want to start dressing the fish as soon as possible, so work out an arrangement with them before the charter boat arrives. Proceed to question O.

Ask the angler(s): "I will need to examine your fish and sample the ______ species". Use the systematic sampling method as described above, moving fish from the angler's basket to the empty basket. During this process you should take your bio-samples and scan all required fish. Proceed to question P.

Proceed to next angler and question N until all fish have been sampled. Move to the next boat once all the fish have been examined and you have interviewed the captain. However, if you have not interviewed the captain proceed to question A.

GROUNDFISH ADVISORY SUBPANEL REPORT ON PROGRESS REPORT ON USING DESCENDING DEVICES TO MITIGATE BAROTRAUMA IN RECREATIONAL FISHERIES

The Groundfish Advisory Subpanel (GAP) received reports presented by representatives of Washington Department Fish and Wildlife, Oregon Department of Fish and Wildlife, and California Department of Fish and Game. The GAP also reviewed the Groundfish Management Team (GMT) Report contained within agenda item I.3.b. The GAP supports the concept that discard survivability determinations should be a regular part of fishery management.

Most fishing sectors could benefit from using at-depth release strategies especially Recreational and commercial fixed gear. It is apparent that some level of survivability is realized for most barotrauma prone species that are released at depth. This result could benefit both the fishery and the rebuilding fish stocks.

The bulk of the GAP discussion involved three issues; the magnitude of mortality credit, projected application in the field, and assignment of mortality credits to various fishery accounting areas.

<u>The Magnitude of Mortality Credit</u>

The opinion of the GAP is that it is too early in the process to fix a value for a buffer to cover uncertainty such as the suggested 5 percent per 10 FM of depth. It would be preferred that this determination be done near the end of the process when most or all of the information has been acquired and considered.

<u>Projected application in the field</u>

Another important consideration will be how to predict the actual profile of use of descending devices within a fishery. Perhaps the magnitude of use of these devices will only be sufficient with a mandate in place. Again the GAP would like to suggest that this issue receive additional consideration before finalizing a determination that a mandate is necessary.

<u>Assignment of mortality credits</u>

If mortality credits go forward, how will they be assigned? Credits could go to reducing rebuilding times for species in their rebuilding plans. Credits could go to increasing fishing opportunity by relief of area restrictions and/or allowed increase of encounter rates. Credits could also be placed into a buffer account to “fund” any overages incurred during an annual management cycle. Some combinations of the above could be implemented, but once again the GAP believes that the determination should occur late in the process.

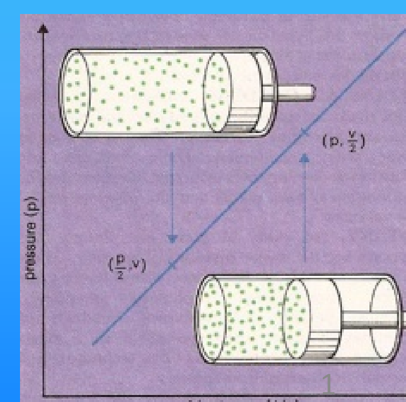
Finally the GAP would like to encourage expansion of the barotrauma studies to include additional species in general and canary rockfish in particular.

PFMC
11/05/12

Agenda Item I.3.b
Supplemental GMT Presentation
November 2012

GMT Progress Report on Developing Mortality Rates for Rockfish Released Using Descending Devices

November 2012
Costa Mesa, CA



June 2012 Council Motion

- Declared that barotrauma associated with our hook and line catch and release recreational groundfish fishery was a priority consideration
- Need to account for the use of descending/ recompression devices in our catch forecasting and catch accounting models
- Such accounting should include a differential release mortality rate associated with depth of capture and depth of release

June 2012 Council Motion

- GMT—develop draft proposed methodologies for decompression release survival rates for yelloweye and cowcod
  - progress report in time for Nov 2012 briefing book
- SSC—review the GMT depth based mortality estimates with regard to best available science and suitability for use in active fishery management decision making and produce a statement for consideration at Nov 2012 meeting
  - Identify additional research and data needs
- Council—consider the GMT proposal, SSC review, and GMT response to the SSC review at the March 2013 Council meeting
  - Objective of implementation in 2013 for cowcod and yelloweye
  - Broader range of species for 2015-2016 cycle

GMT Work to Date

- Sub-group worked between June and September council meetings
  - Summary of how current surface mortality came about
  - Summary of available research
  - Beginning ideas on proposed methodologies
- Entire GMT discussion at September Council meeting
  - Review available research
  - Refined ideas on proposed methodologies
- Entire GMT met in October
  - Review available research
  - Further refined proposed methodologies
  - Thoughts on implementation
  - Research and data needs
- Since October meeting—writing and reviewing progress report

Surface Release Discard Mortality Rate

In 2009, the Council approved estimates of discard mortality by depth developed by the GMT for important rockfish species. The discard mortality rates were based on three components of mortality:

1. surface release mortality;
2. short term bottom mortality; and
3. long term delayed mortality.

This is referred to as Equation 1 in the report.

Species	0-10	11-20	21-30	>30
Black	11%	20%	29%	63%
Black and Yellow	13%	24%	37%	100%
Blue	18%	30%	43%	100%
Bocaccio	19%	32%	46%	100%
Brown	12%	22%	33%	100%
Calico	24%	43%	60%	100%
Canary	21%	37%	53%	100%
China	13%	24%	37%	100%
Copper	19%	33%	48%	100%
Cowcod	21%	35%	52%	100%
Gopher	19%	34%	49%	100%
Grass	23%	45%	63%	100%
Kelp	11%	19%	29%	100%
Olive	34%	45%	57%	100%
Quillback	21%	35%	52%	100%
Tiger	20%	35%	51%	100%
Treefish	14%	25%	39%	100%
Vermilion	20%	34%	50%	100%
Widow	21%	36%	52%	100%
Yelloweye	22%	39%	56%	100%
Yellowtail	10%	17%	25%	50%

Data Informing Mortality Rates with Descending Devices

- Jarvis and Lowe, 2008 looked at the effects of barotrauma on both the initial capture survival and the short term (2-day) survival of line caught rockfish off southern California following recompression in cages
- Hannah et al. 2012 used a cage system designed to minimize the adverse effects of caging fish in the field to evaluate the discard mortality of seven species of rockfish with barotrauma
- Hochhalter and Reed, 2011 developed a study to quantitatively evaluate the effectiveness of deepwater release at improving the survival of discarded yelloweye rockfish in the wild
- Wegner, Pribyl and Hyde (in preparation) http://www.pcouncil.org/wp-content/uploads/D2c_SUP_SWFSC_PPT_VETTER_JUN202BB.pdf , studied the post release survival and behavior of deep-dwelling rockfish suffering from barotrauma
- Smiley and Drawbridge, 2007 used a portable hyperbaric chamber to evaluate the feasibility of decompressing fish to be held in captivity, at the surface

Expected Survivorship and 95% Confidence Intervals for Several Rockfish Species

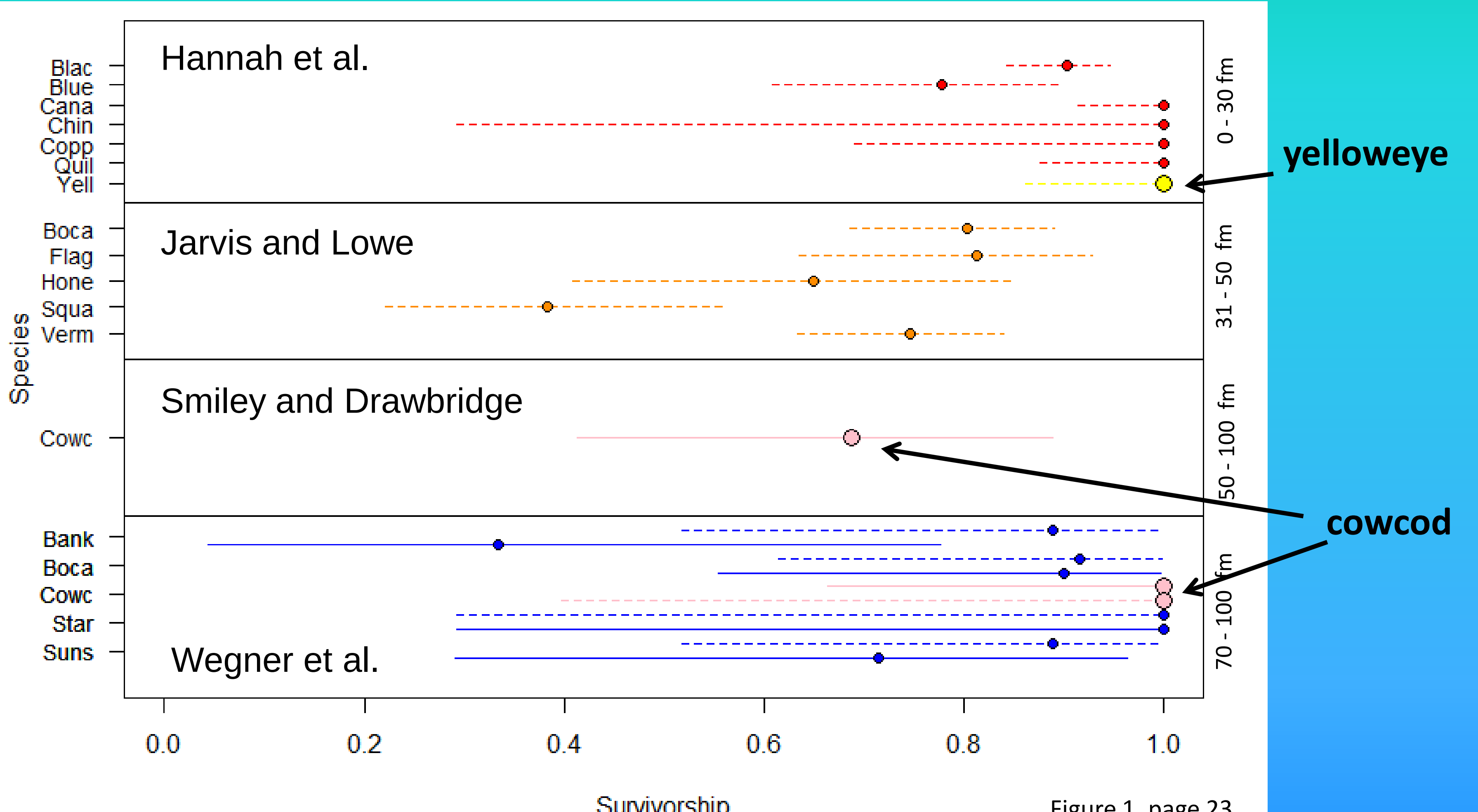


Figure 1, page 23

Depth bins are also given on the secondary y-axis. Yelloweye and cowcod are focus species for this analysis, and thus are designated with larger points. Line types also designated survivorship up to 2 days (broken lines) and 10 days (solid lines) after release.

Expected Survivorship and 95% Confidence Intervals with Species Combined

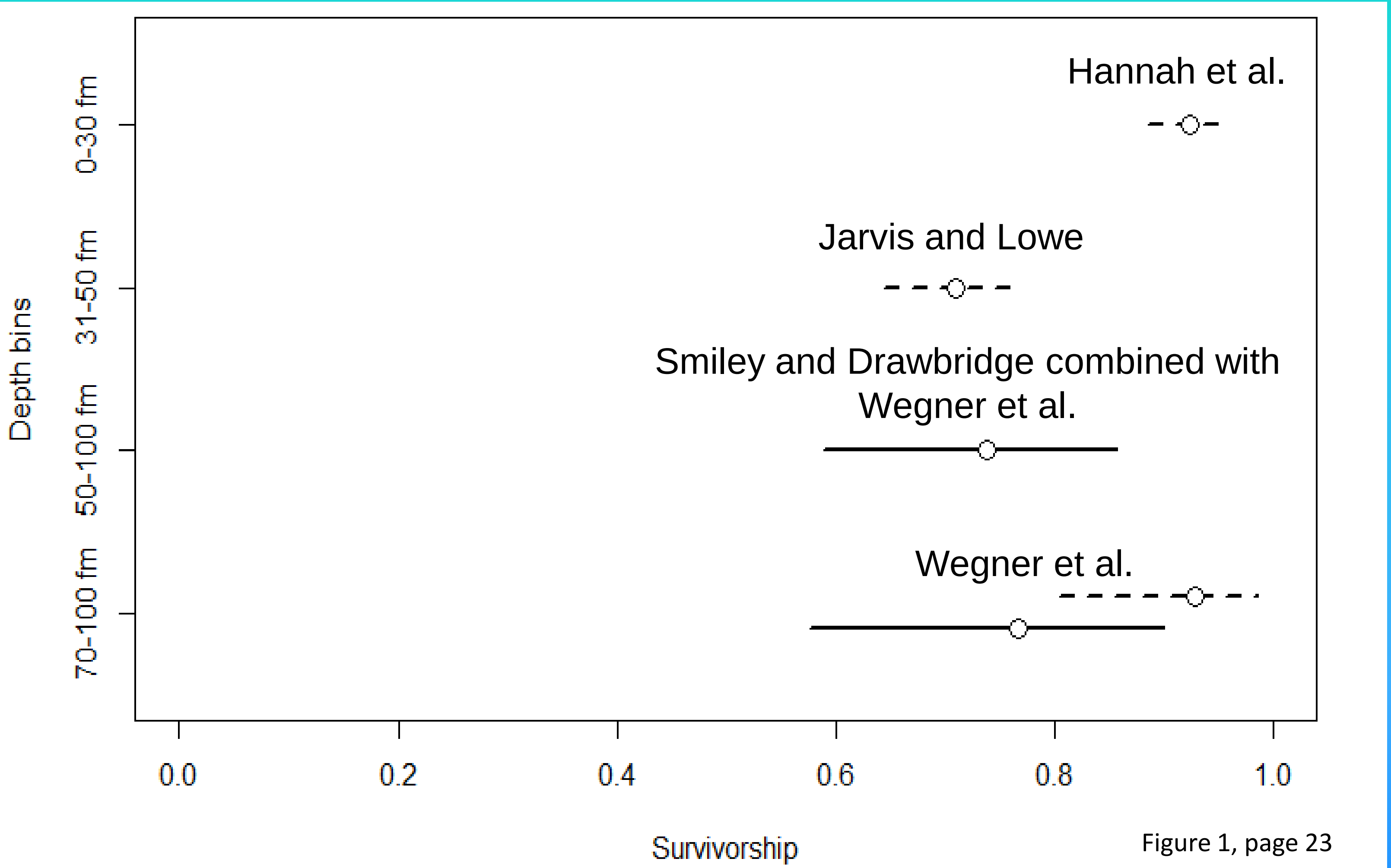


Figure 1, page 23

Line types also designated survivorship up to 2 days (broken lines) and 10 days (solid lines) after release.

Descending Devices Discard Mortality Rates

Builds on approach used for current estimates of surface discard mortality using estimates of mortality for fish released to depth from current research:

Equation 2.

Replaces surface mortality with discard mortality from two to four day cage studies such as Jarvis and Lowe, 2008 or Hannah et. al 2012 or acoustic tagging. The estimates for short term bottom mortality and long term delayed mortality are not changed.

Equation 3.

Replaces surface mortality with discard mortality from cage studies such as Jarvis and Lowe, 2008 or Hannah et. al 2012 or acoustic tagging. Replaces the current short term bottom and long term delayed mortality with estimates of mortality from three to ten day cage studies such as Wegner et al. (in prep.)

In some instances ten day mortality estimates from acoustic tagging provide stand alone mortality rates (no additional mortality past ten days in four month study)

Mortality Rates by Depth Bin Estimated for Each Method of Estimating Mortality Rates for Yelloweye Rockfish using Equation 2

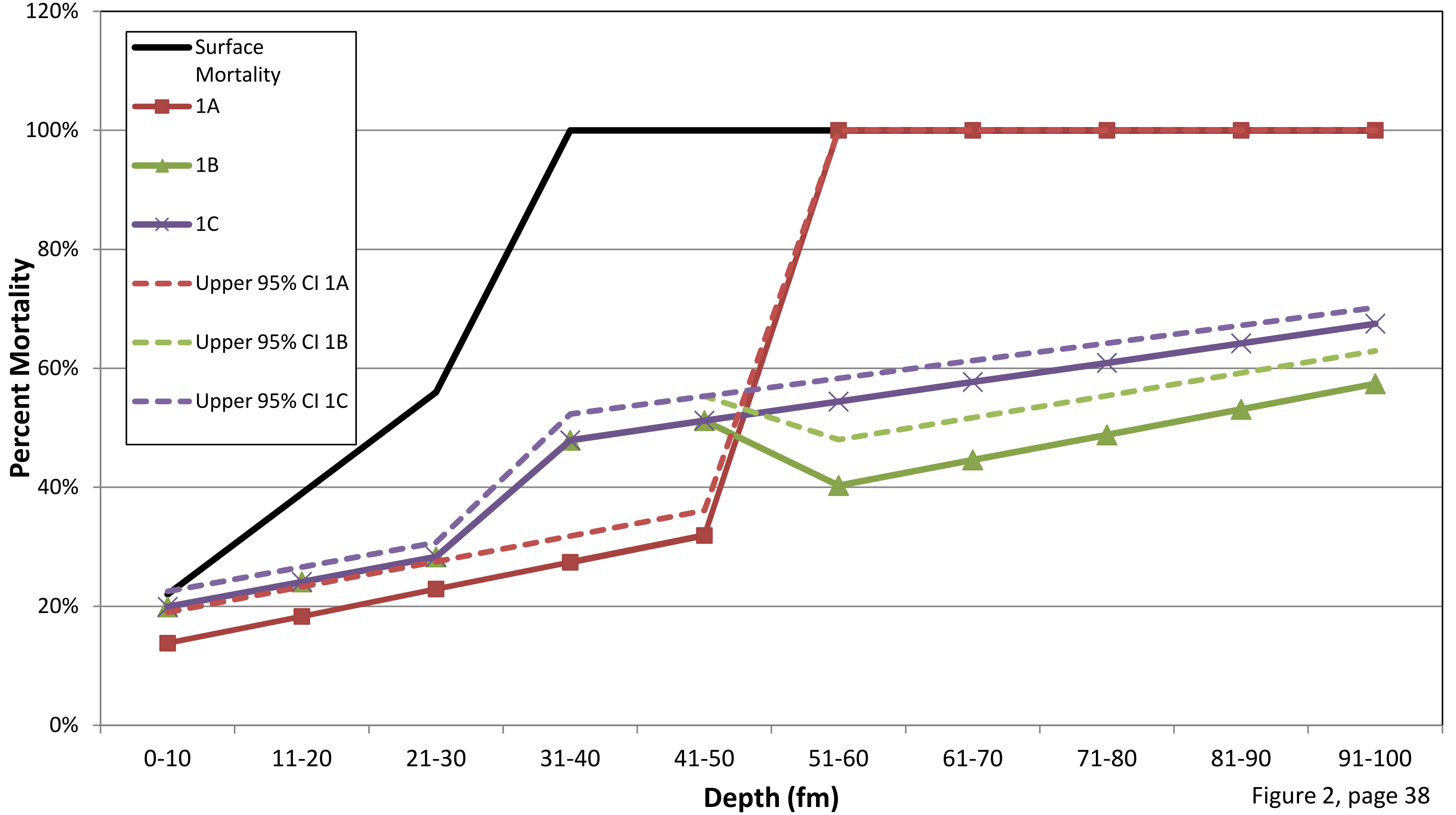


Figure 2, page 38

Mortality Rates by Depth Bin Estimated for Each Method of Estimating Mortality Rates for Yelloweye Rockfish using Equation 3

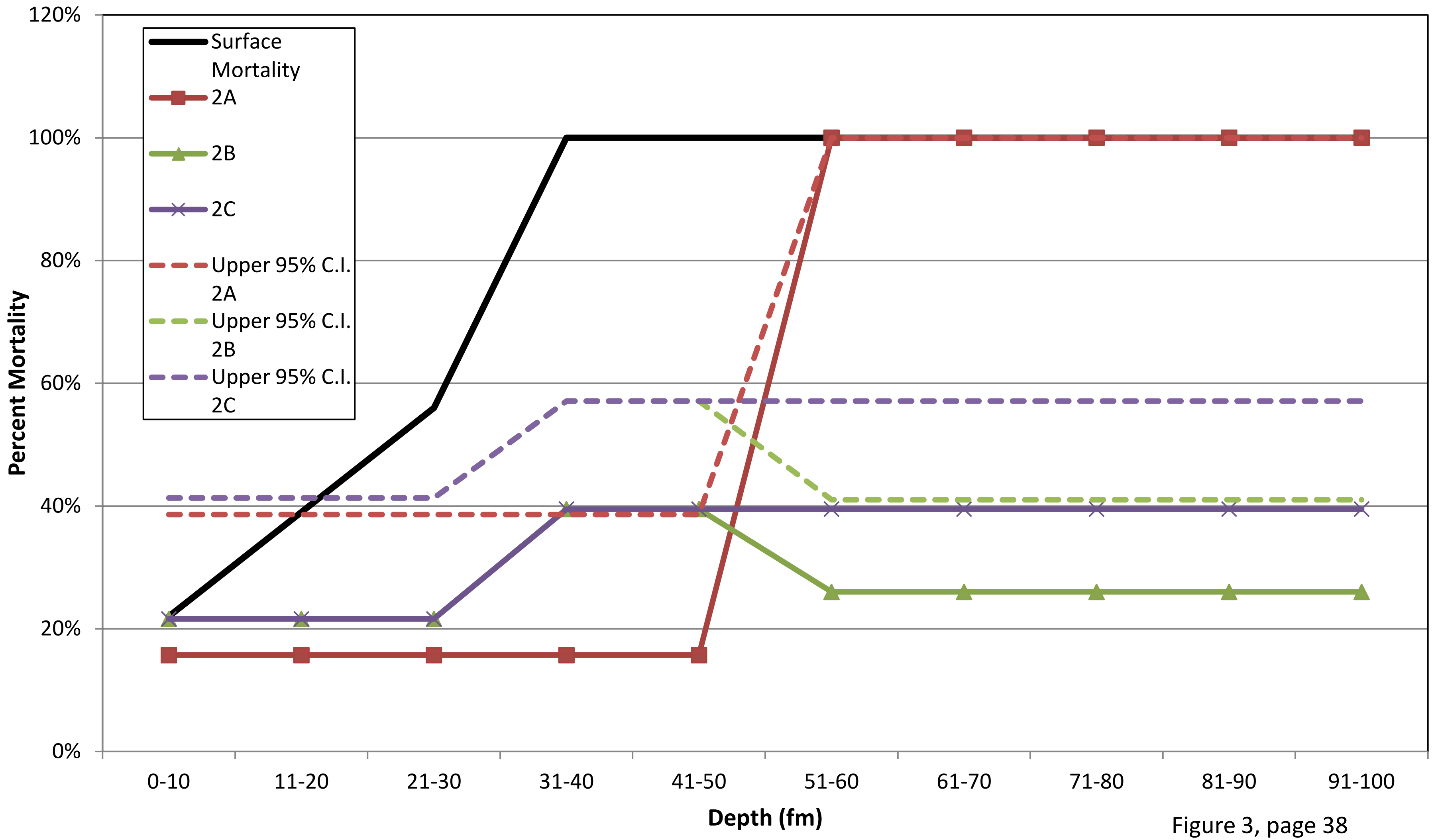


Figure 3, page 38

Mortality Rates by Depth Bin Estimated for Each Method of Estimating Mortality Rates for Cowcod using Equation 2

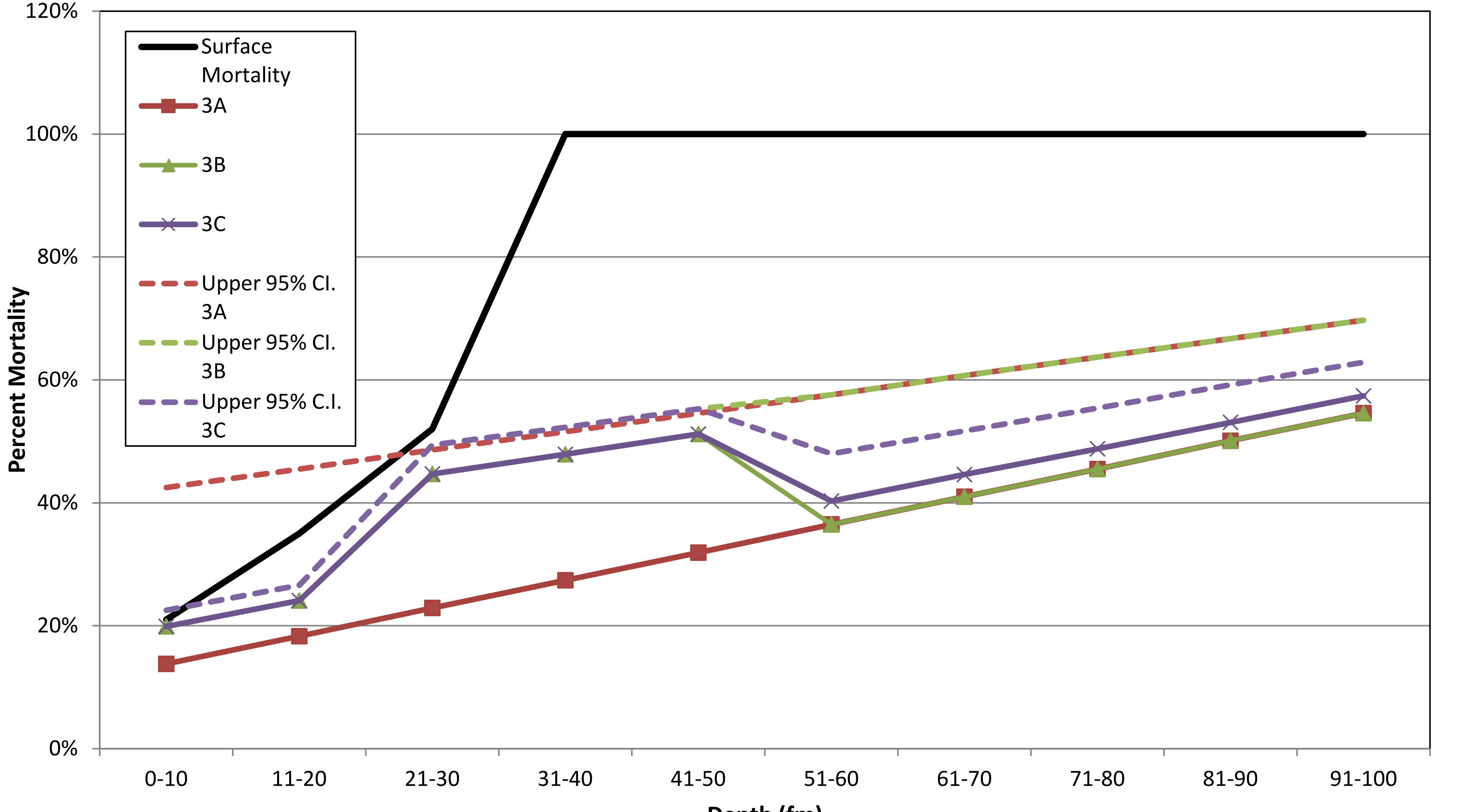


Figure 4, page 39

Mortality Rates by Depth Bin Estimated for Each Method of Estimating Mortality Rates for Cowcod using <u>Equation 3</u>

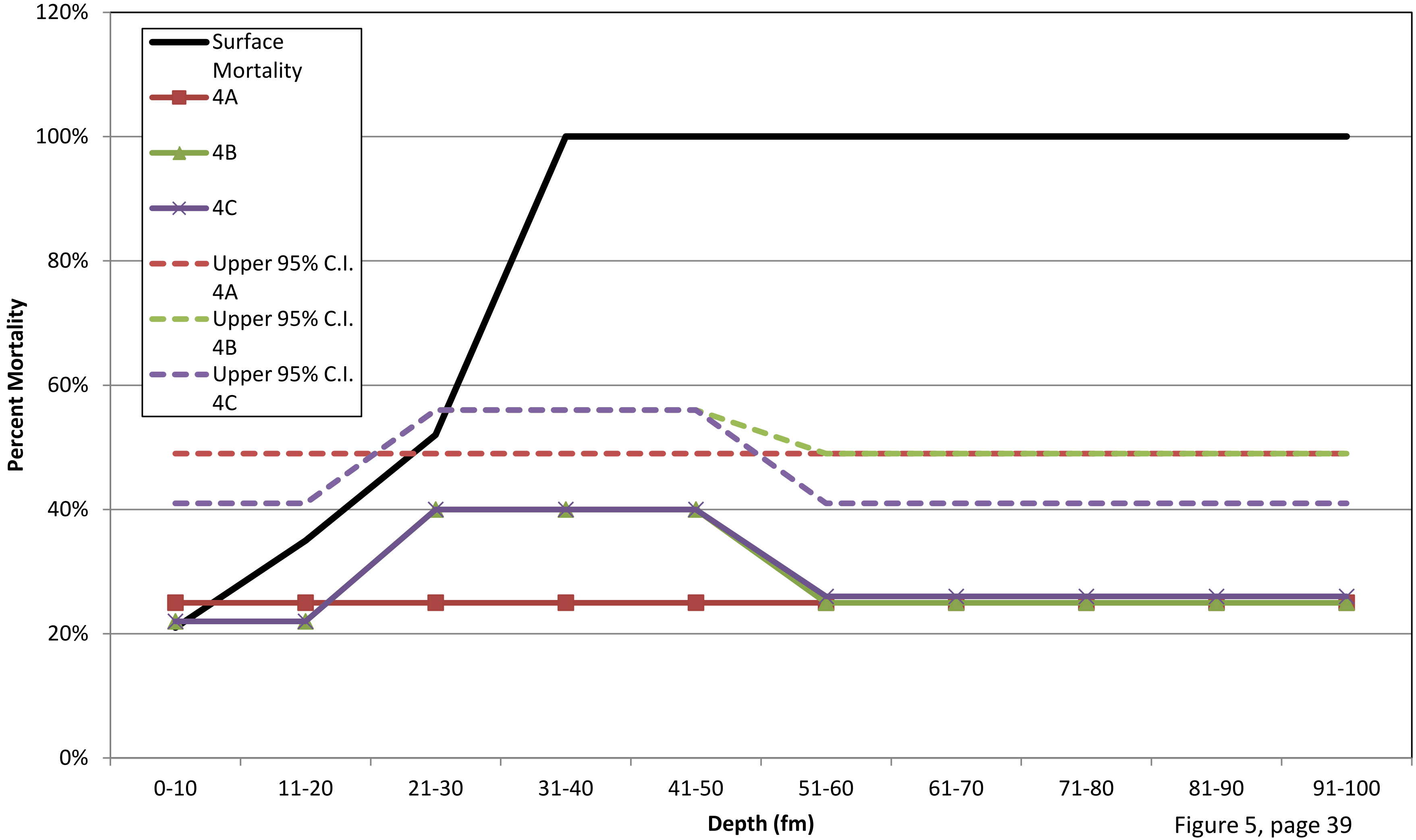


Figure 5, page 39

Yelloweye Rockfish (Retained and Released) by Depth Bin from All Washington Recreational Trip Types Combined from 2006-2012

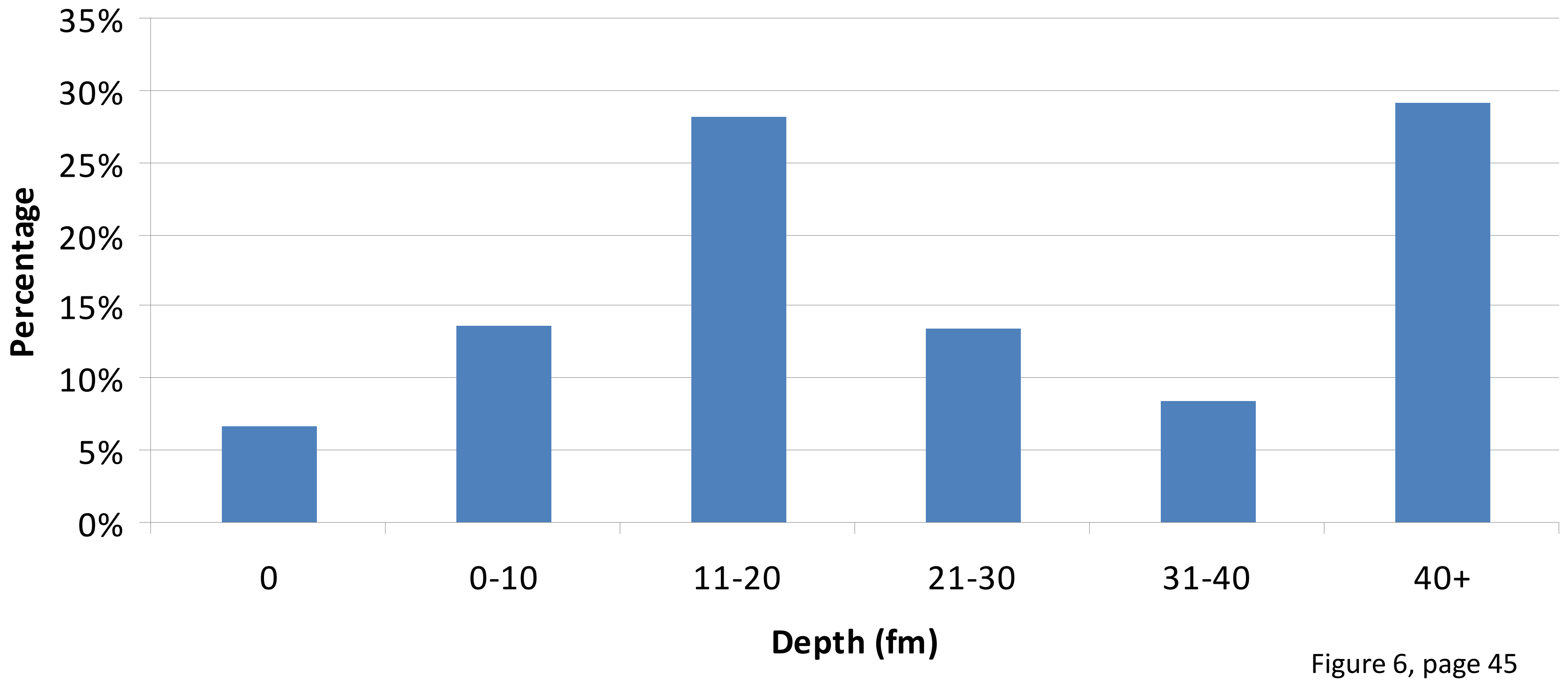


Figure 6, page 45

Percentage of Yelloweye Rockfish Released by Depth Bin from the Oregon Recreational Bottomfish and Halibut Fisheries Combined, 2010-Sept 2012.

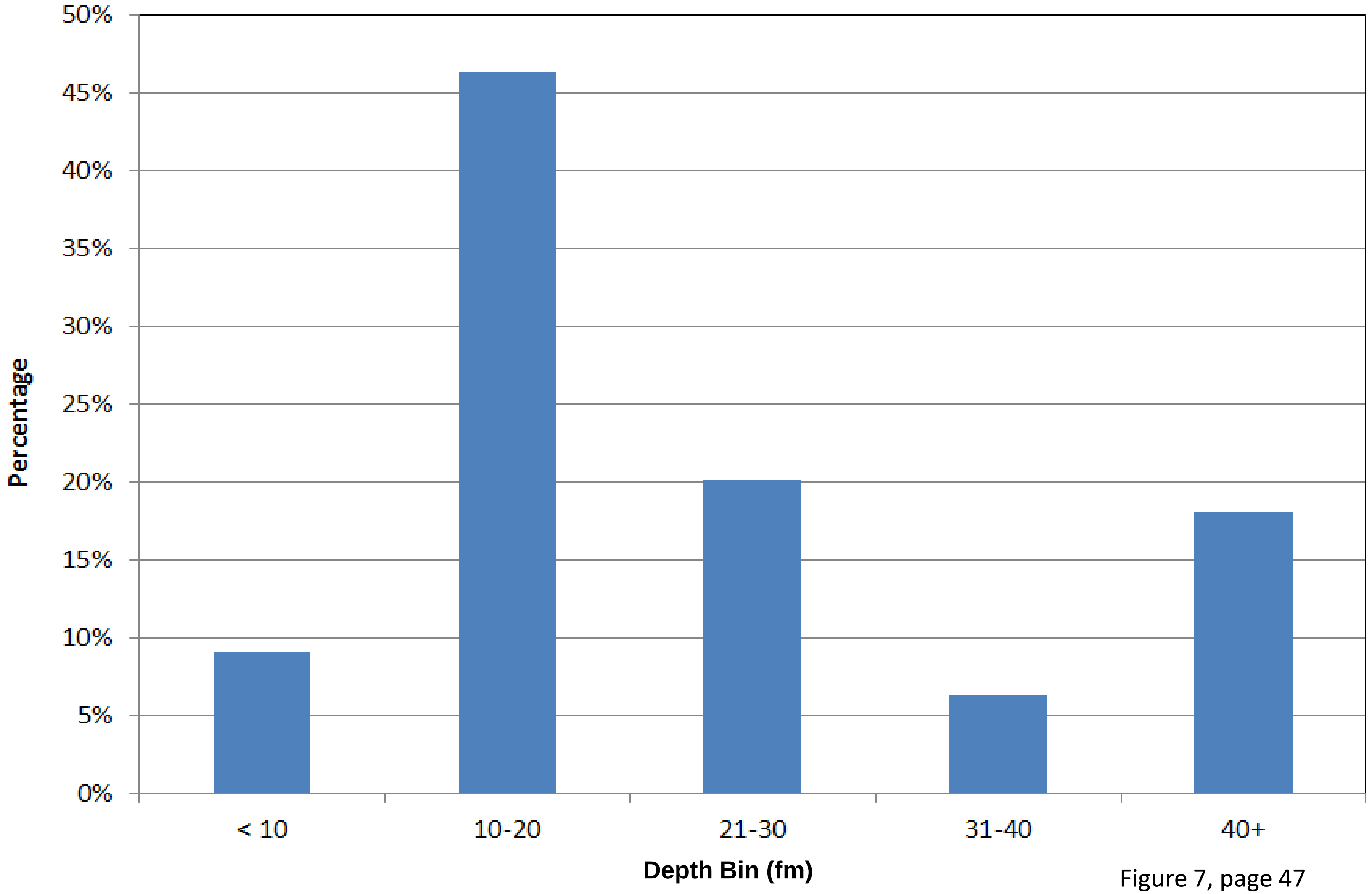
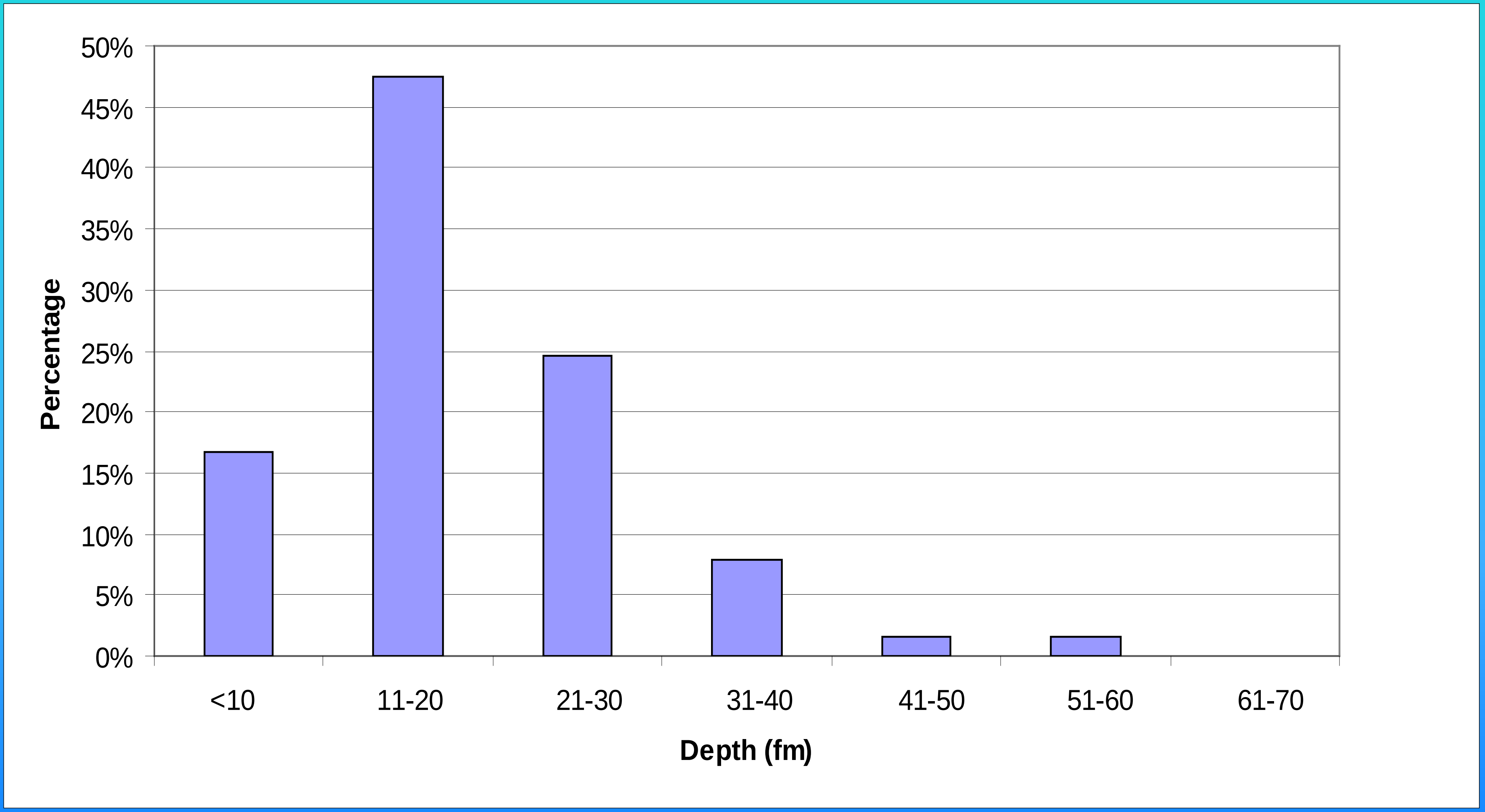
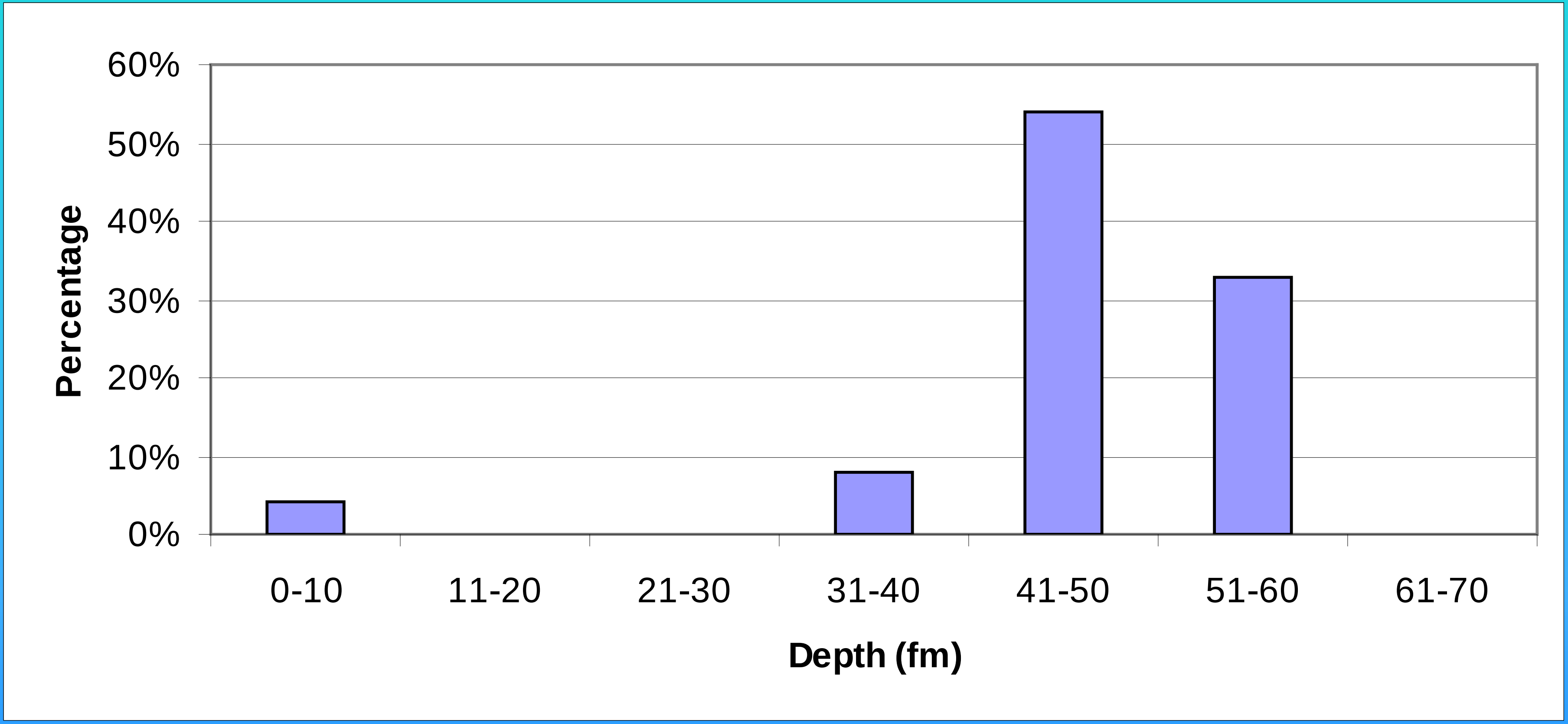


Figure 7, page 47

Percentage of Yelloweye Rockfish Released by Depth Bin from the California Recreational Fishery 2009-2012



Percentage of Cowcod Released by Depth Bin from the California Recreational Fishery 2009-2012



Mortality Rate Considerations

- Do these studies contain sufficient information to provide a basis for developing alternative mortality rates?
- Are the studies applicable to recreational fisheries (cages vs. descending devices)?
- Are proxy estimates based on other species acceptable?
- Of the assumptions and biases presented, which are acceptable?
- Do they account for all or the vast majority of expected mortality and effective mortality from fitness reduction?

Physiological Impairment from Barotrauma Reducing Fitness

- Types of injury affecting fitness
  - Exopthalmia Stretching Optic Nerve:
    - Vision impairment affecting feeding?
    - Rogers 2011 et al. shows recovery in 4 days in Rosy rockfish
  - Ruptured Swim Bladder
    - Buoyancy regulation issues?
    - Pribyl et al. 2012 indicates potential for healing in black rockfish
  - Reproductive Capacity
    - Unable to find mates, produce gametes, produce larvae?
    - Hochhalter and Reed 2011 unaffected recaptured yelloweye rockfish

Precautionary Buffers for Uncertainty in Mortality Rate Estimates

- Addressing Biases
  - Using less robust proxy species for yelloweye and cowcod +
  - Some redundant mortality estimates in equations +
  - Greater handling, tagging and stress from confinement +
  - Predation at the bottom
- Addressing Uncertainty
  - Sample size, random sampling error and precision
- Appropriate magnitude
  - Does lower 95% CI address sample size concerns relative to random sampling error and precision of estimates?
  - Additional buffer ?
- Do we need it? Not done applied in salmon mortality rates or halibut mortality rate estimates just mortality computed with data from research

Implementation/Application of Mortality Rates

- Proportion of yelloweye and cowcod encountered by depth
- Proportion of those fish released using a descending device
- State by state basis
- Depends on information available from sampling program
- Sampling rate by mode
- Pooling by depth, month, area
- Sampling program trade-offs
  - Each additional question asked means X less interviews per hour/day
- Sampling program priorities
  - Most programs were developed for salmon, groundfish has just been added on

Considerations Related to Implementation

- Data available from each state may vary – ability to collect/sample size
- Coastwide consistency vs. optimal estimation with each states data
- Are 10 fm bins for proportion discarded with a device too fine scale? (maybe < 30 fm and > 30 fm) – assume same – catch by depth only
- Match sampling precision to estimation precision and management objectives
- Can use information on one mode, be applied to others?
  - Conversely, if only have it for one mode, does that preclude from using for just that one mode?
- Is proxy data sufficient i.e. proportion of boats in possession
- All states assume that fish are discarded at the same depth as the majority/average of catch – also applies to surface release mortality

Precautionary Buffers for Uncertainty in the Application of Mortality Rates

- Addressing Biases
  - Reported disposition biases vs. omission
  - Failed use when assumed successful
- Addressing Uncertainty
  - Random sampling error – where is the bar, can pooling address this sufficiently without a buffer
- Appropriate magnitude
  - Cost of being wrong – risk to rebuilding/overharvest
  - Basis – estimate of use variance, bias magnitude
- Next steps in quantifying bias and uncertainty

Research and Data Needs

- Appropriate species to use as a proxy for yelloweye and cowcod?
- Increase sample size and depth range for cage studies and acoustic tagging
- Data for more species – priorities: discard rate/mgmt concern
- Percent failure in use of descending devices
- Technology and tools improving effectiveness of use
- Evaluation of current sampling rates/use estimation methods
- Trade-offs in collecting information on descending devices
- Outreach and education – awareness, use and effectiveness

Next Steps

- Refined Process
  - GMT revision of mortality rates , including a preferred alternative(s)
  - States develop methods to apply mortality rates
  - RecFIN review of data methods to apply mortality rates
  - SSC review of preferred mortality rate(s) and methods to apply them
- Additional Species
  - Canary rockfish: Data available, discarded prohibited species, management concern, frequent encounters
  - All species: Constraints on sampling programs, rates ok, application if prohibited in the future
- Buffers for Uncertainty in Estimates and Application
  - GMT develop
  - SSC review

QUESTIONS?

GROUNDFISH MANAGEMENT TEAM REPORT ON USING DESCENDING DEVICES TO MITIGATE BAROTRAUMA IN RECREATIONAL FISHERIES

The Groundfish Management Team (GMT) had the opportunity to meet with the Scientific and Statistical Committee (SSC) at this meeting to discuss the GMT's Progress Report on Using Descending Devices to Mitigate Barotrauma in Recreational Fisheries (Agenda Item I.3.b, GMT Report). In addition, the GMT provided the Council and the Groundfish Advisory Subpanel (GAP) an overview of the Progress Report.

The progress report and discussion with the SSC were the first steps in the process of considering how mortality rates for fish discarded with descending devices could be incorporated into recreational groundfish management. The Council prioritized this task for the GMT and the SSC in June with the objective of potentially developing discard mortality rates for yelloweye and cowcod rockfish as soon as 2013, and possibly including other species during the 2015-2016 harvest specification and management measure cycle. The GMT's intent for this progress report was to provide a broad overview of the current research, some preliminary ideas on how the research might be used to produce depth-specific estimates of mortality for yelloweye and cowcod rockfish when descending devices are used, discuss limitations relative to the amount of data currently available, and offer preliminary ideas for implementation. We acknowledge the difficulty with reviewing and processing the large amount of information included in the Barotrauma Report and we appreciate the time set aside for a discussion with the SSC.

The GMT would like to continue working on this project over the winter with the goal of producing a more refined report consisting of alternatives for consideration at the March 2013 Council meeting. We offer some ideas on the path forward and what we envision should be included in the updated Barotrauma Report:

- The GMT is scheduled to meet in January 2013 with a portion of the meeting reserved to further refine the Barotrauma Report in time for the March Council meeting. The focus would be to develop a smaller range of alternatives and identify a GMT-recommended alternative. **The GMT recommends that a subgroup of the SSC participate in that discussion.** To maximize the efficiency of the discussion with SSC members at the January meeting and help focus that discussion, the GMT proposes some dialogue with these members prior to the January meeting.

- While canary rockfish impacts may not constrain season lengths or depth restrictions for the recreational fishery at present, they are overfished and retention is prohibited. Accounting for the use of descending devices in their release would provide a greater incentive to use descending devices and may result in higher survival for released canary rockfish. Data analogous to that available for developing mortality rates for yelloweye rockfish are available for canary rockfish. **The GMT recommends that mortality rates for canary rockfish and methods for applying the mortality rates be developed for review by the SSC at the March Council meeting.**

- Additional guidance is requested in the development of methods to apply them. Each state has its own data limitations and considerations regarding data required to inform the proportion of anglers using these devices. **The GMT recommends a process in which the methods to estimate the proportion of anglers using descending devices are developed by each state and submitted for review by the GMT and SSC in time for comments to be included in the March Briefing Book.**

- The current timeline for development and review of mortality rates reflecting the use of descending devices and methods to apply them is scheduled to culminate in Council action in March 2013. Most fishing activity takes place over the summer months, and estimates can be augmented to reflect their use retrospectively as long as the appropriate data is being collected in the field. If additional work is required for refinement, final action could be delayed to April to provide additional time, while still allowing implementation in 2013. The GMT envisions a small initial step forward with the opportunity to build as you go, as more research data becomes available.

- The GMT will provide more specific information on implementation in the case that the Council adopts mortality rates for rockfish released with descending devices. The timing of implementation may be different for each state. Some states may be prepared to implement mortality rate estimates sooner than others. Accounting for the use of descending devices should be implemented using mortality rates and methods for application presented by each state that have been reviewed and approved by the Council. **After rates and methods are approved, the GMT recommends implementing them when each state is prepared to do so rather than waiting for all three states to be prepared before moving forward**.

Recommendations:

1. Have the GMT and an SSC sub-group meet to discuss refinement of the mortality rate estimates at the January GMT meeting.

2. Task the GMT with development of mortality rates for canary rockfish for review at the March Council meeting.

3. Have the states provide a description of their proposed methods for accounting for the proportion of anglers using descending devices for review by the GMT and SSC in time for comments to be included in the March Briefing Book.

4. If mortality rates and methods for applying them are approved, state by state implementation would begin when each state is prepared to do so rather than waiting for all three to be prepared before moving forward.

PFMC
11/05/12

RECREATIONAL FISHERIES
INFORMATION NETWORK
PACIFIC STATES MARINE FISHERIES COMMISSION
205 S.E SPOKANE ST., SUITE 100, PORTLAND, OREGON 97202
PHONE (503) 595-3100 FAX (503) 595-3232

October 18, 2012

TO: Chairman Dan Wolford, Pacific Fishery Management Council
FROM: Russell Porter, Chairman, RecFIN Technical Committee
SUBJ: GMT Progress Report on Descending Devices for Rockfish Discards

The RecFIN Techncial Committee and its Statistical Subcommittee met on October 16-18, 2012. They reviewed the GMT's Progress Report on Developing Mortality Rates for Rockfish Released Using Descending Devices, November, 2012. The RecFIN Statistical Subcommittee reviewed the document and provided comments to the Technical Committee for their review of the document. RecFIN supports the adjustments to the discard mortality rates by depth that would allow for reduced levels or mortality when descending devices are used for discards. The progress report asked for SSC comments on four questions. The RecFIN comments on these questions are as follows:

1. *Are the research results cited sufficient to develop mortality rates for cowcod and yelloweye released using descending devices at the depths provided in this progress report?*

The research results cited in this paper are sufficient to suggest that the use of descending devices will reduce mortality rates. Implementation of specific mortality rates should consider uncertainty surrounding point estimates. Mortality rate estimates for these two species are highly uncertain, reflecting small sample sizes. This, combined with uncertainty in the proportion of fish released with a descending device, will reduce the precision of total mortality estimates for both species. Given the paucity of data available on long-term mortality of cowcod or yelloweye released using descending devices, the GMT has proposed the use of data available for other closely related species. Although this "borrowing" of data on other species could support more precise estimates of mortality, it will also likely introduce bias, the direction and magnitude of which should be considered. It will be important to determine which other species are likely to be most representative of cowcod and/or yelloweye.

2. *What are the research and data needs to better inform the development of mortality rates of cowcod and yelloweye using descending devices?*

The precisions of catch rates, effort, discard mortality rates, and the proportion of anglers using descending devices all contribute to the precision of total discard mortality. RecFIN discussed the relative merits of allocating research funds to each component. Research should focus on reducing uncertainty in discard mortality rates associated with the use of descending devices (short- and long-term) for species of concern(e.g. cowcod and yelloweye). Dockside sampling could collect information regarding use of descending devices(preferably standardized among states), and onboard CPFV observer programs could record data on use of descending devices. For 2013, RecFIN recommends that the states focus on estimating the fraction of rockfish discards released using descending devices, preferably by species.

3. *Given the uncertainty in mortality rates from barotrauma studies conducted to date, what level of precaution should be considered for applying a survival rate credit for anglers using descending devices?*

The level of precaution should take into account the high uncertainty in mortality rate estimates.

4. *If survival credit is given, there will be necessary changes to recreational surveys to document the proportion of rockfish by species released using descending devices. Are the current sampling rates sufficient to gain a representative sample of the use of descending devices by fleet?*

Current sampling coverage should be sufficient to estimate the percentage of trips with discarded rockfish that used a descending device. Sampling may not be adequate to describe use of descending devices for the release of individual species or at fine levels of stratification. For example, it will be difficult to get reasonably precise estimates of descending device usage for releases of rarely encountered species(e.g. cowcod). In such cases, reasonable estimates of descending device usage may only be possible at levels of aggregation that include more than one species or use of auxiliary data. Maximum information will be determined by collecting descending device usage for all discarded rockfish by species and mode of fishing.

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PROGRESS REPORT ON USING DESCENDING DEVICES TO MITIGATE BAROTRAUMA IN RECREATIONAL FISHERIES

Mr. John Budrick (California Department of Fish and Game), Ms. Heather Reed (Washington Department of Fish and Wildlife), and Ms. Lynn Mattes (Oregon Department of Fish and Wildlife) presented the current status of the GMT analysis of alternative rockfish mortality rates associated with the use of descending devices (Agenda Item I.3.b, GMT Report).

The GMT provided a review of the research informing alternative mortality rates associated with the use of descending devices to mitigate barotrauma effects on cowcod and yelloweye rockfish. Key uncertainties identified in the GMT's progress report include the effect of depth of capture, limited species-specific research on cowcod and yelloweye, the effect of time on deck, the effect of thermal shock (e.g., temperate gradient across the thermocline) and, significantly, long-term mortality and potential negative effects to reproduction and productivity. These uncertainties led the GMT to use proxy species to develop cowcod and yelloweye mortality rates and extrapolate empirical evidence spatially (e.g., to deeper depths) and temporally (i.e., presuming longer-term mortality rates from apparent survival for individuals at up to 10 days).

The SSC discussed the specific questions to the SSC in the GMT's progress report and offers the following recommendations.

1. Are the research results cited sufficient to develop mortality rates for cowcod and yelloweye released using descending devices at the depths provided in this progress report?

The SSC believes the available scientific evidence is sufficient to assume increased survival of cowcod and yelloweye released with descending devices in recreational fisheries. Given the large uncertainty in estimating long-term effects of barotrauma, the SSC recommends conservative buffers be considered in developing cowcod and yelloweye mortality rates associated with the use of descending devices. The SSC was unable at this time to recommend a particular methodology for determining appropriate mortality rates or how large a precautionary buffer should be given our limited understanding of barotrauma effects. The SSC recommends the GMT provide a more coherent analysis with better rationale for alternatives in the next iteration of their progress report. The GMT should identify a preferred methodology/alternative for SSC and Council consideration.

2. What are the research and data needs to better inform the development of mortality rates of cowcod and yelloweye using descending devices?

Ideally, species-specific research with longer-term studies of cowcod and yelloweye survival could reduce much of the current scientific uncertainty associated with the use of descending devices when releasing these species in recreational fisheries. While expensive, research using pop-up archival tags could improve our understanding of longer-term survival of rockfish when recompression occurs from the use of descending devices.

3. Given the uncertainty in mortality rates from barotrauma studies conducted to date, what level of precaution should be considered for applying a survival rate credit for anglers using descending devices?

A better characterization of the uncertainty in mortality rates from barotrauma studies conducted to date should include uncertainty in longer-term survival than the few fish observed for up to 10 days in the Wegner et al. study, depth of capture, the differential in temperature between the bottom and the surface, the time on deck, and the degree of rough handling by recreational anglers, which may be presumed to be greater for inexperienced anglers relative to that for researchers conducting barotrauma studies. Given that the uncertainty in barotrauma survival associated with the use of descending devices is relatively large, conservative buffers in applied mortality rates should be considered. This is especially important as greater fishing opportunities are considered based on applied "survival credit." Adequate precaution should be considered until population level effects and longer-term survival are better understood.

4. If survival credit is given, there will be necessary changes to recreational surveys to document the proportion of rockfish by species released using descending devices. Are the current sampling rates sufficient to gain a representative sample of the use of descending devices by fleet?

It will be important to gain a representative sample of the proportion of anglers using descending devices by mode and species to adjust catch and release mortality estimates. Proportional use by mode is important since it may be unrealistic to expect private boat anglers to have the same level of expertise as charter skippers and crew. Proportional use by species is important since research conducted to date indicates some species (e.g., blue and bank rockfish) may be more sensitive to barotrauma effects than others. Also, some species, such as shallow nearshore rockfish and yellowtail rockfish, may not require recompression upon release given their resilience to barotrauma, which could bias survey results if the surveys simply asked if descending devices were used in discarding all rockfish. Therefore, quantification of the overall effects of descending device use will require additional questions in surveys, which come at the cost of fewer individuals answering the surveys. Optimizing the length of the survey and obtaining information that can be used to effectively account the discard mortalities of released rockfish will be an important consideration in implementing this initiative. Careful account also needs to be taken of potential biases in survey responses.

The SSC encourages more research on the use of descending devices to mitigate barotrauma in rockfish released in west coast recreational fisheries. Until there is better information on long-term survival of cowcod, yelloweye, and other rockfish species released using these devices, conservative mortality rates should be assumed. Nevertheless, the SSC supports this initiative and agrees that rockfish survival benefits will accrue through the effective use of descending devices.

PFMC
11/05/12

CONSIDERATION OF INSEASON ADJUSTMENTS

Management measures for groundfish are set by the Council with the general understanding these measures will likely need to be adjusted within the biennium to attain, but not exceed, the annual catch limits. This agenda item will consider inseason adjustments to 2012 and 2013 fisheries. The proposed regulations for 2013 fisheries are expected to be published by the National Marine Fisheries Service (NMFS) by the November Council meeting. Potential actions include adjustments to rockfish conservation area boundaries and changes to commercial and recreational fishery catch limits. Adjustments are, in part, based on catch estimate updates and the latest information from the West Coast Groundfish Observer Program.

The Council is also expected to receive an update from NMFS regarding the issuance of 2011 surplus carry-over quota pounds into the 2012 shorebased individual fishing quota (IFQ) fishery. In September, the Council considered inseason projections for sablefish north and south of 36° N. latitude (Agenda Item H.5.b, Supplemental GMT Report, September 2012). The annual catch limits were not projected to be attained or exceeded under any of the scenarios analyzed. The Council recommended that NMFS issue sablefish carryover later this year as the projections are validated.

Agency reports received by the briefing book deadline include an Oregon Department of Fish and Wildlife (ODFW) report describing yelloweye rockfish mortality in the 2012 fisheries (Agenda Item I.4.b, ODFW Report). Additionally, the Washington Department of Fish and Wildlife (WDFW) submitted a report proposing adjustments to 2013 management measures to reduce yelloweye rockfish bycatch (Agenda Item I.4.b, WDFW Report).

Council Action:

1. **Consider information on the status of 2012 and 2013 fisheries and adopt final inseason adjustments, as necessary.**

Reference Materials:

1. Agenda Item I.4.b, ODFW Report: Oregon Department of Fish and Wildlife Report on Inseason Recreational Fishery Yelloweye Rockfish Impacts.
2. Agenda Item I.4.b, WDFW Report: Washington Department of Fish and Wildlife Report on Inseason Adjustments for 2013.

Agenda Order:

a. Agenda Item Overview — Kelly Ames
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Adopt Final Recommendations for Adjustments to 2012 and 2013 Groundfish Fisheries

PFMC
10/11/12

Agenda Item I.4.b
ODFW Report
November 2012

OREGON DEPARTMENT OF FISH AND WILDLIFE REPORT ON INSEASON RECREATIONAL FISHERY YELLOWEYE ROCKFISH IMPACTS

The Oregon Department of Fish and Wildlife (ODFW) took precautionary action pre-season, implementing a more restrictive depth restriction for the recreational bottomfish fishery during the peak of the season (30 fathoms instead of 40 fathoms from April 1 to Sept 30) to account for variability in effort and yelloweye rockfish catch rates. Finalized August catch estimates received in early October show that Oregon recreational fisheries attained the yelloweye rockfish harvest guideline of 2.4 metric tons (mt). Through the end of August, 2.7 mt of yelloweye rockfish are estimated to have been impacted.

Preliminary September data indicates that yelloweye rockfish impacts are 0.15 mt for the month. An additional 0.07 mt (October – December) are projected if the bottomfish fishery remains open for the remainder of the year. The total impacts are projected to be 2.9 mt for the year if the fishery remains open, which is 0.5 mt above the harvest guideline. If the fishery were to close immediately, the estimated impacts are 2.9 mt (no different than if the fishery were left open) due to the little effort that occurs in the final quarter of the year. At the September council meeting, there was a residual of 1.8 mt of yelloweye rockfish in the scorecard (Agenda Item H.5.b., Supplemental GMT Report, September 2012).

Greater than projected encounter rates of yelloweye rockfish were observed in the bottomfish fishery from April through August. Bottomfish effort and impacts from the halibut fishery were similar to previous years. Since ODFW first began collecting depth data for bottomfish trips (2009-2010), catch rates of yelloweye rockfish in depth bins shallower than 30 fathoms have increased dramatically each year, except for a decrease in 0-10 fathoms during 2012 (Figure 1). Compared to the 2009-2010 period, encounter rates in the 10-20 fathoms depth bin increased by ~45 percent for 2011 and ~85 percent for 2012. For 20-25 fathoms, encounter rates increased by ~75 percent and ~110 percent, respectively, and for 25-30 fathoms, encounter rates increased by ~110 percent and ~490 percent, respectively.

Information received from charter captains and private anglers indicate that it may not be possible to avoid yelloweye rockfish, regardless of where they fish. In the past, encounters were infrequent if they avoided yelloweye rockfish "hotspots", but now they frequently encounter them on reefs that historically did not have yelloweye rockfish encounters. Charter captains that ODFW spoke to, also noted that the majority (up to 70 percent) of the yelloweye rockfish they are currently encountering are juvenile, or "the white striped" yelloweye rockfish.

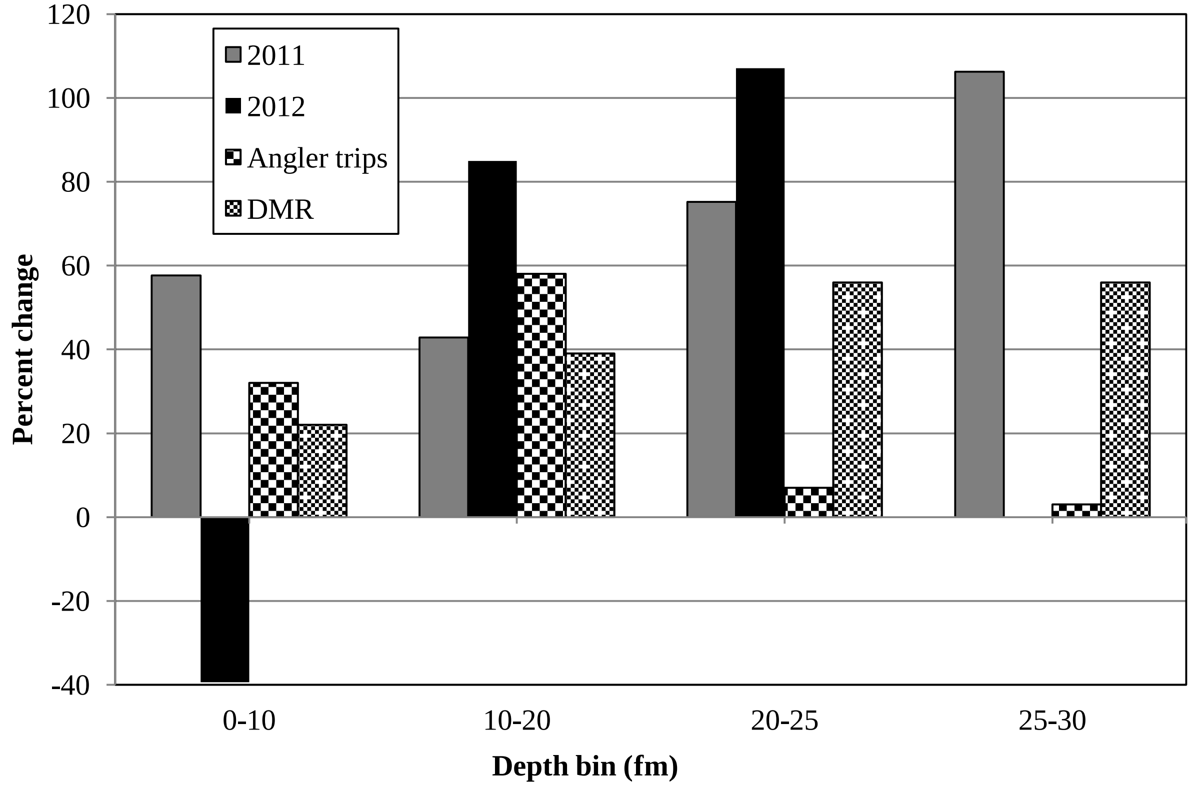


Figure 1. Percent change in yelloweye rockfish catch rates since 2009-2010 for depth bins shallower than 30 fm for the Oregon recreational bottomfish fishery. The change in the 2012 catch rate for 25-30 fm (490%) is not shown because it would disrupt the scale. To illustrate where yelloweye rockfish impacts occur, percent of bottomfish effort and yelloweye rockfish discard mortality rates (DMR) by depth bin are also shown.

GROUNDFISH ADVISORY SUBPANEL REPORT ON CONSIDERATION OF INSEASON ADJUSTMENTS

The Groundfish Advisory Subpanel (GAP) met with the Groundfish Management Team (GMT) to discuss progress of the 2012/2013 fisheries and possible inseason adjustments. The GAP offers the following recommendations and comments on proposed inseason adjustments to ongoing groundfish fisheries.

2012 Inseason

The projected harvests for the 2012 fisheries are tracking within their landing targets, so no inseason action is required at this meeting.

2013 Open Access Fixed Gear North of 36º N. Latitude

Referencing Table 6 found in the GMT statement, the GAP recommends the following:

Alternative 1
Periods 1 through 5: 300 lb. per day, or 1 landing per week of up to 700 lb., not to exceed 1,400 lb. per 2 months;

Period 6: 300 lb. per day, or 1 landing per week of up to 300 lb., not to exceed 600 lb. per 2 months.

Industry representatives indicated a preference to start the season with larger trip limits than was suggested in the No Action alternative to increase economic viability for participants. Industry is well-aware that these earlier season increases may result in a reduced opportunity for period 6.

2013 Limited Entry Fixed Gear North of 36º N. Latitude

The GAP appreciates the work Dr. Sean Matson did in modeling varying sablefish trip limits with corresponding low, medium, and high ex-vessel prices ranges. The GAP believes ex-vessel prices for sablefish will remain low in the short term through at least the middle of next year. With that in mind and looking at Table 2 of the GMT statement, the GAP recommends the following:

Alternative 1, Low Price
1 landing per week of up to 950 lb., not to exceed 2,850 lb. per 2 months

2013 Open Access Fixed Gear South of 36º N. Latitude

Referencing Table 4 of the GMT statement, the GAP supports the following:

Alternative 1
300 lb. per day, or 1 landing per week of up to 1,500 lb., not to exceed 3,000 lb. per 2 months.

Projected effort for the Conception area open access fishery is expected to increase slightly under this alternative, but this sector has been under-attaining its harvest guideline recently, and potential effort increases should pose no problems. Effort increases may be constrained by the poor market prices and lack of buyers in the Conception area.

2013 Limited Entry Fixed Gear South of 36 N. Latitude

The GAP again references Table 4 of the GMT statement and recommends the following:

Alternative 1
1,800 lb. per week.

This trip limit is the same as the current 2012 limit. Members of industry had requested maintaining the same trip limit for the 2013 season. Projected attainment under this alternative is 83 percent as opposed to the 93 percent No-Action limits that were analyzed in the 2013 harvest specifications package.

2013 Recreational Fisheries

The GAP discussed both the Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife (WDFW) reports dealing with inseason recreational issues. The GAP supports the following WDFW recommendation for the 2013 fishing season as follows:

Marine Areas 3 and 4
Restrict the recreational bottomfish fishery to the area shoreward of 20 fathoms from May 1 to September 30 except on days open to the halibut fishery. On days that the halibut fishery is open, no bottomfish except lingcod, Pacific cod, and sablefish can be retained seaward of 20 fathoms.

PFMC
11/05/12

GROUNDFISH MANAGEMENT TEAM REPORT ON CONSIDERATION OF INSEASON ADJUSTMENTS

2013 Action Item Summary

Limited Entry Fixed Gear Daily Trip Limit North for Sablefish

For 2013, only the LE North fishery requires action to bring projected harvests within the annual landing target. The revised projections result from the addition of new harvest data, and revision of the projection model during the 2012 season. For 2013, three trip limit options differ based on price assumptions; compared to No Action, they are:

No Action: 1,100 lbs per week, 4,200 lbs per 2 months
Alt 1: 950 lbs per week, 2,850 lbs per 2 months (90% attainment)
Alt 2: 850 lbs per week, 2,550 lbs per 2 months (90% attainment)
Alt 3: 800 lbs per week, 2,350 lbs per 2 months (92% attainment)

Open Access Fixed Gear Trip Limits North for Sablefish

Alternatives are presented for the open access (OA) North, with the goal of increasing trip limits to viable levels, given the low landing target, during seasons when effort is the highest.

No Action: 300 lb per day, 610 lb per week, 1,220 per 2 months
Alt 1: 300 lb per day, 700 lb per week, 1,400 per 2 month for Periods 1-5;
Period 6 is 300 lb per day, 300 lb per week, 600 lbs per 2 months

Limited Entry Fixed Gear Daily Trip Limit South for Sablefish

Adjustments to trip limits were requested by the Groundfish Advisory Subpanel (GAP) to lower the risk of adjustments later in the year.

No Action: 1,880 per week
Alt. 1: 1,800 per week

Open Access Fixed Gear Trip Limits South for Sablefish

One alternative is presented for the OA South, which would round out the current trip limits, with minor increases to projected attainment.

No Action: 300 lb per day, 1,460 per week, 2,920 per 2 months
Alt 1: 300 lb per day, 1,500 per week, 3,000 per 2 months

Washington Recreational

The Washington Department of Fish and Wildlife (WDFW) is recommending changes to recreational bottomfish fisheries for 2013, the changes are described in Agenda Item I.4.b WDFW Report, November 2012.

Introduction

The Groundfish Management Team (GMT) considered the most recent information on the status of ongoing fisheries, research, and requests from industry and provides the following recommendations for 2012 and 2013 inseason adjustments.

The GMT also received guidance from the National Marine Fisheries Service (NMFS) Northwest Region (NWR) regarding timing of implementation of inseason recommendations from this meeting. NMFS anticipates implementing potential routine inseason adjustments to 2012 fishery management measures by December 1, 2012, and inseason adjustments to 2013 fishery management measures by January 1, 2013.

2013 Action Items

2013 Limited Entry and Open Access Sablefish Daily Trip Limit (DTL) Fisheries

This section discusses inseason considerations for the four fixed gear, daily trip limit (DTL) fisheries, including both limited entry (LE) and OA, north and south of 36° N. latitude for 2013. Hereafter, they are referred to as: LE North, LE South, OA North, and OA South. Trip limits under No Action for the four sablefish DTL fisheries are shown in

Table 1.

Table 1. Trip limits in the fixed gear, DTL fisheries under No Action, for 2013.

Area	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
North of 36° N. lat. (U.S./Canada Border to 36° N. lat.)	LE N.	1,100 lb. per week, not to exceed 4,200 lb. per 2 mo.					
	OA N.	300 lb. per day, or 1 landing per week of up to 610 lb., not to exceed 1,220 lb. per 2 mo.					
South of 36° N. lat.	LE S.	1,880 lb. per week					
	OA S.	300 lb. per day, or 1 landing per week of up to 1,460 lb., not to exceed 2,920 lb. per 2 mo.					

2013 LE North Fishery; No Action and Alternative Trip Limits

Projected landings under the No-Action trip limits have changed since the 2013-2014 harvest specifications and management measures analysis was performed nearly a year ago. Current models for this fishery in 2013 have been updated with six months additional landings data, price information, and revised since the analysis for 2013-14 harvest specifications and management measures (throughout the 2012 season, see June and September 2012 GMT statements). Current projections for alternatives in the LE North fishery, including No-Action, along with corresponding trip limits and landing targets are presented in

Table 2. A landing target is a harvest guideline that has been reduced to account for estimated discard mortality.

A range of assumed ex-vessel prices for 2013 are presented to express the range of uncertainty in projected landings due to this variable. Current projected landings for 2013 under the No-Action Alternative, in the LE DTL North Fishery are between 255 mt and 311 mt (between 129 percent and 158 percent of the landing target), depending on which price distribution is assumed (

Table 2, Figure 1). Alternative trip limit schedules are presented according to three different assumptions about sablefish ex-vessel prices in 2013 (low, medium and high). Price is an important assumption to make, since participation in this fishery is closely related to ex-vessel price, and thus fishery landings. The current model utilizes the relationship between price (adjusted for inflation) and participation, along with weekly and bimonthly trip limits and landings per vessel, to predict fishery landings for each bimonthly period.

Table 2. Current annual landings projections, corresponding attainment, and targets, in the LE North sablefish DTL fishery, under No Action (NA), and Alternatives 1, 2 and 3, for 2013 (in mt).

	NA, Low Price	NA, High Price	Alt. 1 Low Price	Alt. 2 Med. Price	Alt. 3 High Price
Projection	255	311	176	177	182
Target (LT)	197	197	197	197	197
Difference	-58	-114	21	20	15
Percent	129%	158%	90%	90%	92%
Bimonthly TL	4,200	4,200	2,850	2,550	2,350
Weekly TL	1,100	1,100	950	850	800
Daily TL	-	-	-	-	-

The potential range of bimonthly price distributions assumed for 2013 is shown in Figure 1; they are between 2010 ("Low", Alternative 1, green dashed line, triangle markers), and the average of 2010 and 2011 ("High", Alternative 3, black solid line, square markers)); the "Medium" price curve represents the average of Low and High assumptions. Prices from 2011 (red dashed line, no markers), and 2012 (blue solid line, open circles) are shown for comparison. All these prices are specific to the LE North fishery. Prices so far in 2012 have been steadily declining, likely due to a market glut of 2011 product. Exactly how long before a price recovery will occur is not known, although there are tentative expectations among some industry and management members.

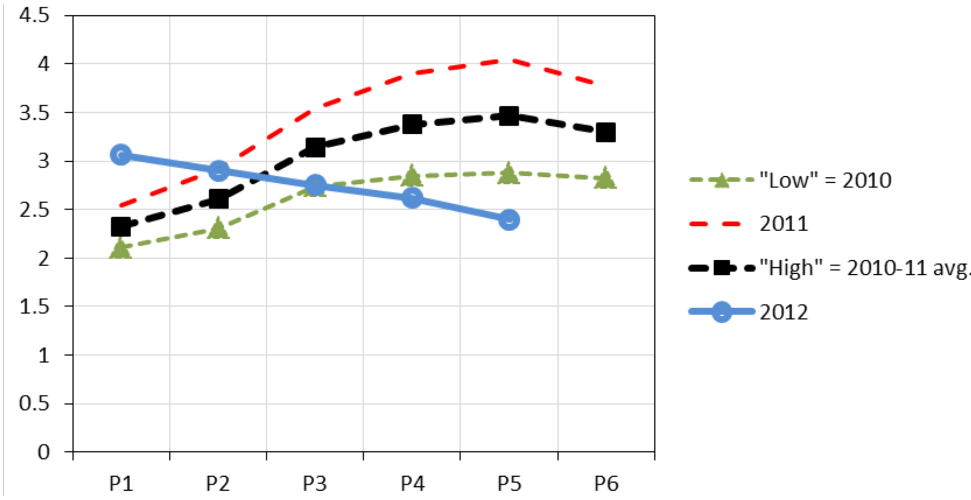


Figure 1. Price assumptions used for forecasting landings in the LE North fishery during 2013. The blue solid line with open circles is the actual average ex-vessel price per pound paid in the LE North fishery during 2012; the estimate for Period 5 is based on partial data for September only. The black dashed line with filled squares is the "high" assumption of the price trend for 2013 (2010-2011 average), while the green dashed line with filled triangles is the "low" assumption of the price trend for 2013 (2010 prices). The red dashed line with no markers (top) is 2011 prices.

The "Low" scenario of Alternative 1 assumes that prices will drop further during Period 6 of 2012, and hit their lowest point in Period 1 of 2013, at $2.11, and then begin to increase gradually, following a typical seasonal curve, to a high of $2.87 in Period 5, dropping slightly again in Period 6 (same as 2010).

The "High" scenario of Alternative 3 assumes a similar distribution to Alternative 1, but with prices bottoming out in Period 6 of 2012 and Period 1 of 2013 at $2.32, and peaking in Period 5 at $3.46 (average of 2010 and 2011 bimonthly prices). Alternative 2 assumes the average of price distributions from alternatives one and two.

Given the high degree of uncertainty regarding prices for 2013, the reduced landing target for this fishery in 2013 (down 26 percent from 2012, from 265 mt to 197 mt, concurrent with the lower northern annual catch limit; ACL), and that bimonthly participation in this fishery has been growing at an average rate of 17 percent annually since 2004, we recommend caution when choosing trip limits for 2013. Some members of the GAP have related a preference to begin 2013 with limits that are potentially conservative rather than liberal (regarding attainment of the landing target), in an attempt to avoid sharp reductions throughout the year, with the possibility for increases instead.

Choosing among the three alternatives, and among the most likely ex-vessel prices for the coming year, is challenging, given that the seasonal price trend during 2012 was strikingly different than the previous eight years. It also requires weighing the risks of starting the year with trip limits that are too high, and needing to reduce them throughout the year (which would forego some fishing at the end of the year), versus starting too low and potentially increasing limits as 2013 unfolds (which would instead forego some fishing at the beginning of the year).

OA North, LE South, and OA South Fisheries

2013 No-Action Alternatives for OA North, LE South, and OA South

Updated No-Action projections have changed little for these three fisheries since the 2013-2014 harvest specifications and management measures analysis. The current 2013 projection for the OA North fishery is 88 percent of the landing target (257 mt versus the 291 mt target,

Table 3). The sum of the projections for the LE South and OA South is 76 percent of the sum of those two landing targets (612 mt sum of predictions versus 808 mt sum of targets. Although the LE South is projected to take 93 percent of its target (413 mt vs. 446 mt), the OA South is currently predicted to take 55 percent of its target (191 mt vs. 362 mt). The Council manages the two southern DTL fisheries under a sharing that has been weighted to the LE. Alternative trip limits are presented for OA South which would inspire some increased landings in that fishery for 2013 (see below). No-Action trip limits for these three sablefish DTL fisheries in 2013 are shown in

Table 3.

Table 3. Current annual landings projections, corresponding attainment, and targets, in the OA North, LE South, and OA South, fixed gear, sablefish DTL fisheries under No Action, for 2013 (in mt). Note that the far right column is the sum of the LE South and the OA South, which are managed together.

	OA N	LE S	OA S	South sum
Projection	257	413	199	612
Target (LT)	291	446	362	808
Difference	34	33	164	196
Percent	88%	93%	55%	76%
Bimonthly limit	1,220	-	2,920	-
Weekly limit	610	1,880	1,460	-
Daily limit	300	-	300	-

2013 Alternative Trip Limits for OA North

In the OA North, members of the GAP requested to see alternatives produced with the goal of increasing the trip limits during the peak season, to facilitate more viable fishing opportunities throughout the season. The current harvest guideline is very low for this fishery, (291 mt in 2013 versus 419 mt in 2012) which leads to prohibitively low trip limits. The approach taken was to reduce trip limits in Period 6, in order to increase the limits for periods 1 through 5.

Alternative 1 would result in trip limits of 700 pounds per week and 1,400 pounds per bimonthly period for January through October, but 300 pounds per week and 600 pounds per bimonthly period for November and December (Table 4). These trip limits are projected to result in landings of 271 mt of the 291 mt landing target, for 93 percent projected attainment, and a remainder of 20 mt (Table 5).

Table 4. Trip limits in the OA North fishery under Alternatives 1, 2 and 3, for 2013.

<table>
<tr><th>Area</th><th>Fishery</th><th>Alternative</th><th>Jan-Feb</th><th>Mar-Apr</th><th>May-Jun</th><th>July-Aug</th><th>Sept-Oct</th><th>Nov-Dec</th></tr>
<tr><td rowspan="2">North of 36° N. lat. (U.S./Canada Border to 36° N. lat.)</td><td>OA N.</td><td>No Action</td><td colspan="6">300 lb. per day, or 1 landing per week of up to 610 lb., not to exceed 1,220 lb. per 2 mo.</td></tr>
<tr><td>OA N.</td><td>Alt. 1</td><td colspan="5">300 lb. per day, or 1 landing per week of up to 700 lb., not to exceed 1,400 lb. per 2 mo.</td><td>*See footnote</td></tr>
</table>

*Period 6 trip limits under Alternative 4 would be 300 lb. per day, or 1 landing per week of up to 300 lb., not to exceed 600 lb. per two months

Table 5. Annual landings projections, corresponding attainment, and targets, in the OA North fishery under the No-Action alternative and Alternatives 1, for 2013 (in mt).

	OA N, NA	OA N, Alt. 1
Projection	257	271
Target (LT)	291	291
Difference	34	20
Percent	88%	93%

2013 Alternative Trip Limits for LE South and OA South Fisheries

For the LE South, members of the GAP requested to see a run in which trip limits were held at the 2012 levels of 1,800 pounds per week, rather than the increased levels of 1,880 pounds modeled in the 2013-2014 harvest specifications and management measures analysis. This results in projected attainment of 83 percent under Alternative 1, versus 93 percent under No-Action. Additional alternatives with higher trip limits, and different assumptions are presented in the subsequent section.

In the OA South, trip limits under Alternative 1 were increased slightly from 1,460 per week to 1,500 pounds per week, and from 2920 to 3,000 pounds per week (Table 6). This is projected to result in a modest increase in attainment of three percent, using current data (Table 7). This change in trip limits to a "round number" may also make it easier for fishermen and enforcement to reference the limits. Members of the GAP have expressed some reluctance to raise the limits in this fishery much above 1500 pounds per week for the entire year, as it has been a threshold over which effort and landings have increased substantially, and often unpredictably, in the past, when effort shifts from the LE South to the OA South occur. The daily limit remains at 300 pounds under Alternative 1.

Table 6. Trip limits in the LE South, and OA South fisheries under Alternative 1, for 2013.

<table>
<tr><th>Area</th><th>Fishery</th><th>Jan-Feb</th><th>Mar-Apr</th><th>May-Jun</th><th>July-Aug</th><th>Sept-Oct</th><th>Nov-Dec</th></tr>
<tr><td rowspan="2">South of 36° N. lat.</td><td>LE S.</td><td colspan="6">1,800 lb. per week</td></tr>
<tr><td>OA S.</td><td colspan="6">300 lb. per day, or 1 landing per week of up to 1,500 lb., not to exceed 3,000 lb. per 2 mo.</td></tr>
</table>

Table 7. Annual landings projections, corresponding attainment, and targets in the LE South and OA South fisheries under Alternative 1, for 2013 (in mt). Note that the far right column is the sum of the LE South and the OA South, which are managed in sum.

	LE S	OA S	South sum
Projection	368	208	576
Target (LT)	446	362	808
Difference	78	154	232
Percent	83%	58%	71%
Bimonthly limit	-	3000	-
Weekly limit	1800	1500	-
Daily limit	-	300	-

2013 Washington Recreational Fishery

The WDFW is recommending changes to recreational bottomfish fisheries for 2013, the changes are described in Agenda Item I.4.b WDFW Report, November 2012. The Washington recreational fishery is projected to exceed the harvest guideline by approximately 0.6 mt in 2012 under the same management measure regime that was in place in 2011. The proposed changes are more restrictive than management measures approved for 2013 and 2014 and are necessary to keep recreational yelloweye rockfish harvest within harvest guidelines. The GMT recommends amending the Washington recreational fishery as specified in the WDFW report.

Informational Items

Scorecards updates

The current scorecard (November 2012) is in Attachment 1, and reflects updates to the yelloweye rockfish impacts from Oregon recreational fishery as described below, and an updated projection for canary rockfish in the California recreational fishery. Attachment 2 is the scorecard for the beginning of 2013 reflecting allocations and projected impacts from the 2013-2014 Harvest Specifications and Management Measures Final Environmental Impact Statement (FEIS). Since widow rockfish is rebuilt starting in 2013, that column has been removed from the scorecard. The California recreational fishery projected impacts for bocaccio and canary rockfish were updated from the values in the FEIS, the change was 0.1 mt for each species.

2012 Limited Entry and Open Access Sablefish Daily Trip Limit (DTL) Fisheries

Projected 2012 harvests for the four sablefish DTL fisheries are tracking within their landing targets, and no action is necessary at this time.

2012 Oregon Recreational Fishery

The scorecard has been updated to reflect a change in the projected impacts to yelloweye rockfish from the Oregon recreational fisheries. Total impact (landed fish plus discard mortality) through August 2012 was 2.70 mt, which exceeds the Oregon recreational harvest guideline of 2.4 mt. At the time the Oregon Department of Fish and Wildlife (ODFW) received the final August data (early October), ODFW made a preliminary projection of impacts through September, and through December, and determined that there would not be an increase in the total yelloweye rockfish impacts (2.9 mt) by remaining open for the remainder of the year due to low effort after October 1. Additional information on the 2012 fishery can be found in the ODFW report (Agenda Item I.4.b.). The overfished species scorecard has been updated to 2.9 mt for yelloweye rockfish from the Oregon recreational fisheries, which reflects the projected total impacts through the end of the year.

Additional Considerations Relative to Yelloweye Rockfish

The GMT notes that both the Washington and Oregon recreational fisheries were affected by yelloweye rockfish harvests in 2012 that exceeded estimates of projected catch and the harvest guidelines. Variability in the estimates are anticipated considering unpredictable changes in fishing effort, and variability in yelloweye rockfish encounters from one year to the next. When these events occur, management is expected to take action to minimize the overage. In the case of the Washington recreational fishery the action was the complete closure of the recreational bottomfish fishery along the North Coast (Marine Catch Areas 3 and 4) beginning after Labor Day through the end of the year. In Oregon, a recreational fishery closure was averted due to the time of the year that the overage occurred whereby a closure would not reduce the impacts.

Recreational fishing closures have significant negative consequences to the coastal communities which depend on these fisheries. For example, businesses must cancel existing reservations, revenue is lost, and unemployment may increase. Recreational fisheries offer a good example of where annual catch targets (ACT) could be used to provide a buffer between the annual catch limit (ACL) which could allow managers to better respond to the variability in the estimates and minimize disruption to communities Agenda Item E.4.b, November 2011. The Council recommended a 17 mt yelloweye ACT, which was a 3 mt buffer from the ACL, as part of the 2011-12 cycle. As we understand it, NMFS disapproved that recommendation, in part, because they believed the analysis did not demonstrate the need for an ACT. That decision, among other reasons, is why the GMT has identified evaluation and communication of variability in the projection models a priority. Variability is important for evaluating the "needs of fishing communities" when setting and adjusting rebuilding plans.

The events in the Washington and Oregon recreational fisheries this season provide an example of the relationship between variability and the "needs of the fishing community". If the "needs of fishing" communities are marked by a certain season structure and the economic benefit that results from it, then a harvest guideline (HG) (i.e. a specific amount of fish) might serve that need differently every year based on variability in catch rates, fishing effort, and perhaps sampling. The ACT and associated HGs the Council recommended were meant to allow more flexibility to address that variability across all sectors. For example, while Washington and Oregon recreational fisheries had high yelloweye interactions this year, impacts in other sectors may have been lower than projected. Actual catch in the California recreational fishery for 2012 provides a contrast to what occurred in Washington and Oregon; California's recreational yelloweye catch through August is estimated to be 0.65 mt compared to a projected catch for the year of 3.1 mt.

In summary, mortality is variable from year to year in spite of our best efforts to project catch and manage to those estimates; the specific situation described for our recreational fisheries this year offers a clear example. This variability is also seen when comparing the November 2011 projected recreational impacts in the Council's overfished species (OFS) scorecard with the final estimates in NOAA's Northwest Science Center's Groundfish Mortality Report for 2011 (

Table 8).

Table 8. Differences in yelloweye rockfish November 2011 projections and 2011 total mortality report estimates for the recreational sectors and all sectors combined.

Yelloweye Rockfish Catch (mt)	WA Rec.	OR Rec.	CA Rec.	All Sectors
OFS Scorecard Projections	2.50	2.30	3.10	14.9
Total Mortality Report	2.35	2.10	2.09	9 .0
Difference	0.15	0.20	1.01	5.9

GMT Recommendations:

1. **The Council choose one of the three alternative trip limit schedules for 2013 in the fixed gear, limited entry sablefish, DTL fishery, north of 36° N. lat.**

2. **The Council consider Alternative 1 in the following fixed gear, sablefish DTL fisheries:**
    a. **Open Access North**
    b. **Limited Entry South**
    c. **Open Access South**

3. **The Council adopt the changes to the Washington recreational bottomfish fishery as described in the WDFW report.**

PFMC
11/05/12

Attachment 1. Scorecard for November of 2012. Allocations[a] and projected mortality impacts (mt) of overfished groundfish species for 2012.

Fishery	Bocaccio b/		Canary		Cowcod b/		Dkbl		Petrale		POP		Widow		Yelloweye	
***Date*: 5 November 2012**	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts
Off the Top Deductions	13.4	2.4	20.0	18.7	0.3	0.1	18.7	17.2	65.4	97.1	12.8	12.8	61.0	64.9	5.9	4.2
EFPc/	11.0	0.0	1.3	0.0	0.2	0.0	1.5	0.0	2.0	0.0	0.1	0.0	11.0	0.0	0.1	0.0
Research d/	1.7	1.7	7.2	7.2	0.1	0.1	2.1	2.1	17.0	17.0	1.8	1.8	1.6	1.6	3.3	1.7
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	15.0	15.0	1.0	0.1	0.0	0.1	3.3	3.3	0.2	0.2
Tribal f/			9.5	9.5			0.1	0.1	45.4	80.0	10.9	10.9	45.0	60.0	2.3	2.3
Trawl Allocations	60.0	60.0	34.8	34.8	1.8	1.8	263.0	263.0	1,060.0	1,060.0	137.0	137.0	491.0	491.0	0.6	0.6
---SB Trawl	60.0	60.0	26.2	26.2	1.8	1.8	248.9	248.9	1,054.6	1,054.6	119.6	119.6	342.1	342.1	0.6	0.6
---At-Sea Trawl			8.6	8.6			14.5	14.5	5.0	5.0	17.4	17.4	147.9	147.9		
a) At-sea whiting MS			3.6	3.4			6.0	6.0			7.2	7.2	61.2	61.2		
b) At-sea whiting CP			5.0	4.8			8.5	8.5			10.2	10.2	86.7	86.7		
Non-Trawl Allocation	189.6	103.4	29.8	26.6	0.9	0.8	14.0	4.3	35.0	0.0	7.0	0.3	49.0	10.0	10.5	11.0
Non-Nearshore	57.9		2.3												1.3	
LE FG				1.5				3.6				0.3		0.1		0.6
OA FG				0.2				0.5				0.0		0.0		0.1
Directed OA: Nearshore	0.7	0.4	4.0	4.8		0.0		0.2						0.2	1.1	1.0
Recreational Groundfish																
WA			2.0	1.0				--		--		--		--	2.6	3.3
OR			7.0	4.6				--		--		--		1.0	2.4	**2.9**
CA	131.0	103.0	14.5	**14.5**		0.8		--		--		--		8.7	3.1	3.1
TOTAL	263.0	165.8	84.6	**80.1**	3.0	2.7	295.7	284.5	1,160.4	1,157.1	156.8	150.1	601.0	565.9	17.0	**15.8**
2012 Harvest Specification g/	**274**	**274**	**107**	**107**	**3.0**	**3.0**	**296**	**296**	**1,160**	**1,160**	**157**	**157**	**600**	**600**	**17**	17
Difference	11.0	108.2	22.4	26.9	0.0	0.3	0.3	11.5	-0.4	2.9	0.2	6.9	-1.0	34.1	0.0	1.2
Percent of OY	96.0%	60.5%	79.1%	74.9%	100.0%	91.0%	99.9%	96.1%	100.0%	99.8%	99.9%	95.6%	100.2%	94.3%	100.0%	92.9%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and are specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended in the 2011-12 EIS process, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 11-12 biennial cycle, which are currently specified in regulation.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2011-2012 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

g/ The POP ACL is 183 mt, while the HG is 157 mt

Attachment 2. Scorecard for beginning of 2013. Allocations [a] and projected mortality impacts (mt) of overfished groundfish species for 2013.

Fishery	Bocaccio b/		Canary		Cowcod b/		Dkbl		Petrale		POP		Yelloweye	
***Date*: 5 November 2012**	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts
Off the Top Deductions	8.4	8.4	17.5	17.5	0.1	0.1	20.8	20.8	234.0	234.0	16.5	16.5	5.8	5.8
EFPc/	6.0	6.0	1.5	1.5	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	1.7	1.7	4.5	4.5	0.1	0.1	2.1	2.1	11.6	11.6	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	18.4	2.4	2.4	0.4	0.4	0.2	0.2
Tribal f/			9.5	9.5			0.1	0.1	220.0	220.0	10.9	10.9	2.3	2.3
Trawl Allocations	74.9	74.9	52.5	52.5	1.0	1.0	281.4	281.4	2,323.0	2,323.0	126.8	126.8	1.0	1.0
---SB Trawl	74.9	74.9	26.2	26.2	1.0	1.0	266.7	266.7	1,054.6	1,054.6	109.4	109.4	0.6	0.6
---At-Sea Trawl			8.6	8.6			14.7	14.7	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			3.6	3.4			6.1	6.1			7.2	7.2		
b) At-sea whiting CP			5.0	4.8			8.6	8.6			10.2	10.2		
Non-Trawl Allocation	236.7	50.3	46.0	22.0	1.9	0.2	14.8	4.3	35.0	0.0	6.7	0.2	11.2	10.2
Non-Nearshore	72.3		3.5										1.1	
LE FG				1.5				3.6				0.2		0.6
OA FG				0.2				0.5				0.0		0.1
Directed OA: Nearshore	0.9	0.5	6.2	3.7		0.0		0.2					1.2	1.2
Recreational Groundfish														
WA			3.1	0.9				--		--		--	2.9	2.4
OR			10.8	4.7				--		--		--	2.6	2.5
CA	163.5	**49.8**	22.4	**11.0**		0.2		--		--		--	3.4	3.4
TOTAL	320.0	**133.6**	116.0	**92.0**	3.0	1.3	317.0	306.5	2,592.0	2,557.0	150.0	143.5	18.0	17.0
2013 Harvest Specification	**320**	**320**	**116**	**116**	**3.0**	**3.0**	**317**	**317**	**2,592**	**2,592**	**150**	**150**	**18**	18
Difference	0.0	186.4	0.0	24.0	0.0	1.7	0.0	10.5	0.0	35.0	0.0	6.5	0.0	1.0
Percent of OY	100.0%	41.8%	100.0%	79.3%	100.0%	43.3%	100.0%	96.7%	100.0%	98.6%	100.0%	95.7%	100.1%	94.6%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and are specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended in the 2013-14 EIS process, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 13-14 biennial cycle, which are currently specified in regulation.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2013-2014 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

IFQ FISHERY CATCH UPDATE

The following is a "snapshot" of catch, effort, participation and retention in the shorebased, groundfish IFQ fishery for the months of January through October of 2011 and 2012. Data were queried from the Pacific Coast Groundfish Individual Fishing Quota (IFQ) Vessel Accounts Database, of the National Marine Fisheries Service (NMFS) on October 30, 2012. Aggregate catch data for each IFQ species category are available from https://www.webapps.nwfsc.noaa.gov/ifq/.

Summary

Near the end of the second year in the IFQ program, there has been little change in non-whiting effort, participation, catch, attainment and retention. Retention of most species remains very high (80-100%) and virtually the same as during 2011. However, retention levels of splitnose rockfish and minor shelf rockfish, north of 40°10' remain low, similar to pre-IFQ (2010) levels. Reasons for higher discard of these species that are related to lack of marketability (e.g. small size) likely remain important.

There has been a drop in whiting effort, participation, and catch, concomitant with the drop in the U.S. whiting TAC and IFQ allocation. Retention rates in the hake fishery are unchanged.

Effort, Participation, Catch, Attainment and Retention

Effort by the non-whiting IFQ fleet during 2012, expressed as number of trips (where a trip is defined as a unique vessel-landing-day), has been very similar during the first ten months of 2012 as 2011 (1,170 versus 1,244, respectively; 94 percent of 2011 levels). The trends in monthly number of trips and total catch per trip have also been very similar (Figure 1, Table 1). Average number of trips so far in 2012 has been 98 percent the level of 2011, and the average catch per trip has been 106 percent of 2011 levels. While the monthly numbers of trips through May were generally higher than during 2011, catch per trip was lower. The reciprocal case was true during the summer and fall, and in the balance, total fleet catch through October was virtually the same as 2011; 2012 was only 2.7 percent higher.

Effort by the shoreside whiting fleet (as number of trips), within the IFQ fishery in 2012, has been somewhat lower than 2011 (74 percent of 2011 levels), while catch per trip is down slightly as well (93 percent of 2011 levels, Figure 2, Table 2). Current hake catch is proportional with the change in allocation size from 2011 to 2012 (at 60 percent of 2011 levels). Thus, there is little difference in whiting attainment (down two percent, which could be partially accounted for by the short lag in discard data).

Monthly participation in the non-whiting fleet has been very similar to 2011 levels (99% of 2012, on average). Average catch per vessel has been only slightly higher than 2011(104% of 2012, Figure 3, Table 3).

Average monthly whiting participation has been slightly lower than last year (91% of 2011), while average monthly catch per vessel has been 75 percent of 2011 levels (Figure 4, Table 4). Again, the lower U.S. TAC and lower IFQ fishery allocation are important.

Total catch and attainment by species category through October 31 of 2011 and October 29 of 2012 are shown in Figure 5 and Table 5. Species with notable differences in attainment levels between 2011 and 2012 include canary rockfish (up 13%), minor slope rockfish south of 40°10' (up 14%), Pacific cod (up 13%), petrale sole (up 13%), sablefish north (down 18%) and south of 36 (down 8%), and yellowtail rockfish (down 12%, Figure 5, Table 5). Lower sablefish attainment rates are likely related to much lower prices in 2012 than 2011, while increases in some other species could reflect increased targeting of other species to compensate for lower sablefish revenue, and/or may suggest some active catch diversification and specialization in general, during the second year of the new management system. More analysis would be needed for a definitive answer.

Retention levels of splitnose rockfish and minor shelf rockfish, north of 40/10 remain low, similar to pre-IFQ (2010) levels (Figure 6, Table 6). Reasons for higher discard of these species are likely similar as pre-IFQ, related to lack of marketability (e.g. small size).

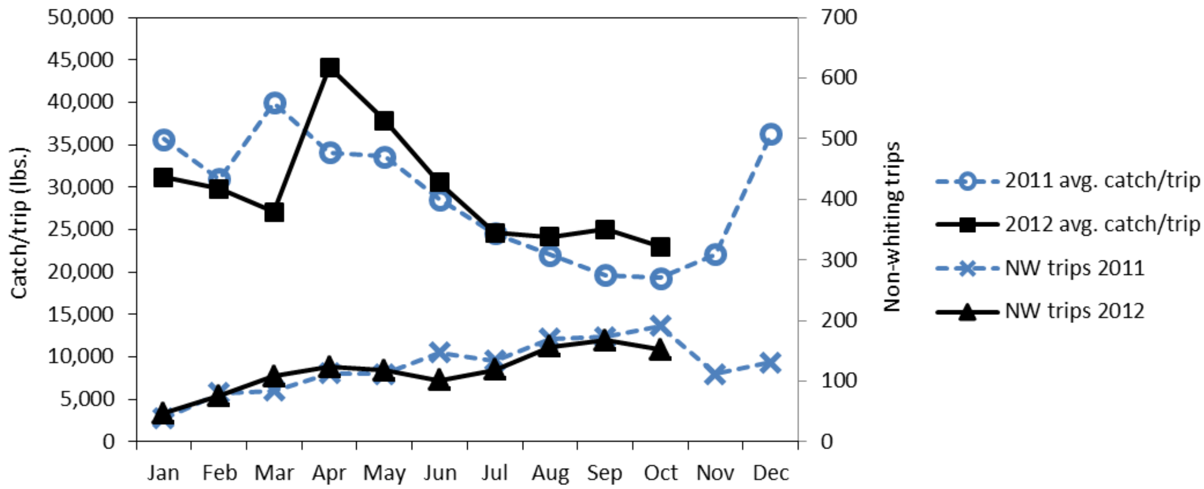


Figure 1. Monthly number of trips and catch per trip (lbs.) by the non-whiting (NW) fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

Table 1. Monthly number of trips and catch per trip (lbs.) by the non-whiting fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

	2011 avg. catch/trip	2012 avg. catch/trip	2012/2011	S.E. 2011	S.E. 2012	NW trips 2011	NW trips 2012	2012/2011
Jan	35,674	31,199	87%	5,712	4,551	39	47	121%
Feb	30,955	29,788	96%	3,439	3,417	81	76	94%
Mar	39,938	27,055	68%	4,358	2,603	84	108	129%
Apr	34,104	44,143	129%	3,208	3,964	113	124	110%
May	33,640	37,866	113%	3,179	3,486	112	118	105%
Jun	28,582	30,555	107%	2,357	3,025	147	102	69%
Jul	24,548	24,616	100%	2,121	2,257	134	119	89%
Aug	22,027	24,161	110%	1,689	1,928	170	157	92%
Sep	19,655	25,064	128%	1,494	1,940	173	167	97%
Oct	19,344	22,975	119%	1,400	1,864	191	152	80%
Nov	22,117			2,090		112		
Dec	36,284			3,170		131		
		Average	106%				Average	98%

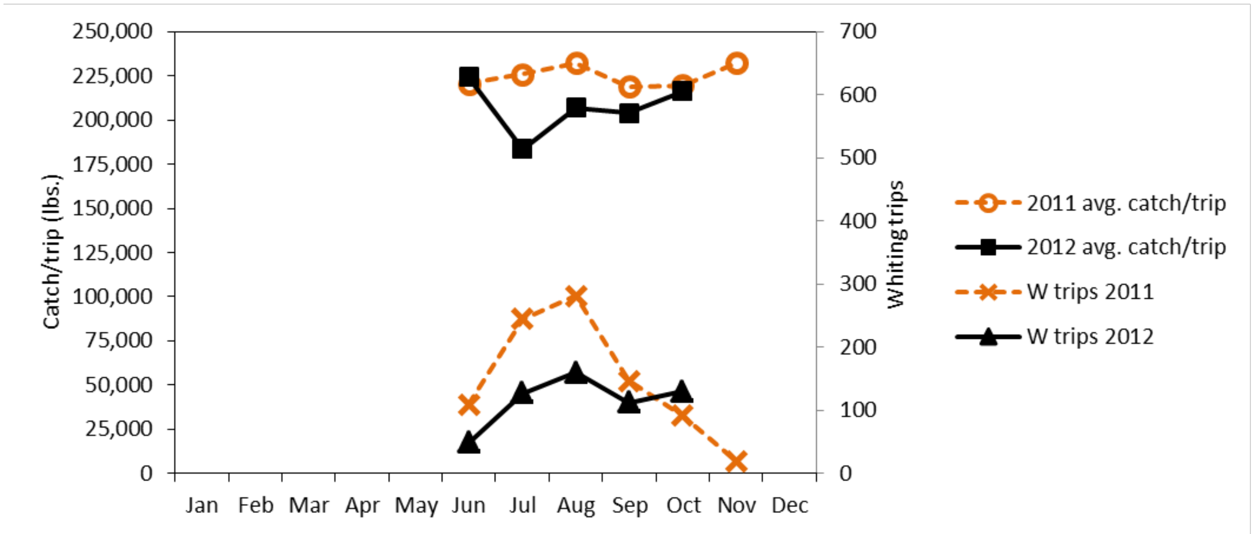


Figure 2. Monthly number of trips and catch per trip (lbs.) by the shoreside whiting fleet (W) within the IFQ groundfish fishery in January through October of 2012 versus 2011.

Table 2. Monthly number of trips and catch per trip (lbs.) by the shoreside whiting fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

	2011 avg. catch/trip	2012 avg. catch/trip	2012/2011	S.E. 2011	S.E. 2012	W trips 2011	W trips 2012	2012/2011
Jan								
Feb								
Mar								
Apr								
May								
Jun	220,712	224,240	102%	21,140	32,034	109	49	45%
Jul	226,014	183,376	81%	14,440	16,272	245	127	52%
Aug	232,162	206,875	89%	13,850	16,355	281	160	57%
Sep	219,001	203,986	93%	18,063	19,275	147	112	76%
Oct	219,555	216,380	99%	22,890	18,978	92	130	141%
Nov	232,388			51,964		20		
Dec								
		Average	93%				Average	74%

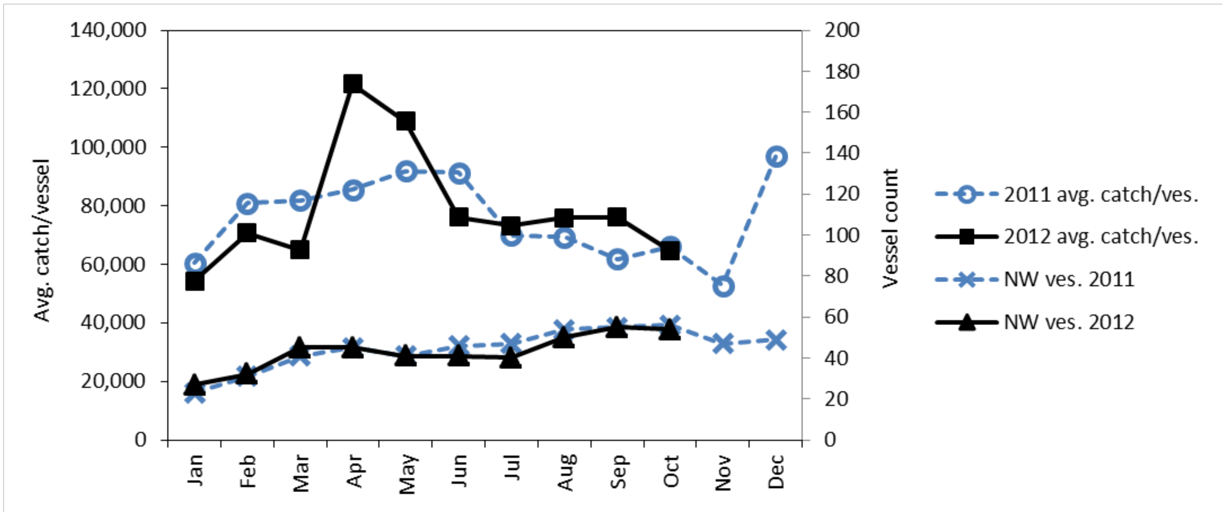


Figure 3. Monthly number of participating vessels and catch per vessel (lbs.) by the non-whiting (NW) fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

Table 3. Monthly number of participating vessels and catch per vessel (lbs.) by the non-whiting (NW) fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

	2011 avg. catch/ves.	2012 avg. catch/ves.	2012/2011	S.E. 2011	S.E. 2012	NW ves. 2011	NW ves. 2012	2012/2011
Jan	60,491	54,309	90%	12,613	10,452	23	27	117%
Feb	80,882	70,747	87%	14,527	12,506	31	32	103%
Mar	81,823	64,932	79%	12,779	9,680	41	45	110%
Apr	85,640	121,639	142%	12,766	18,133	45	45	100%
May	91,894	108,981	119%	14,351	17,020	41	41	100%
Jun	91,338	76,015	83%	13,467	11,871	46	41	89%
Jul	69,989	73,233	105%	10,209	11,579	47	40	85%
Aug	69,343	75,864	109%	9,436	10,729	54	50	93%
Sep	61,822	76,103	123%	8,336	10,262	55	55	100%
Oct	65,978	64,670	98%	8,817	8,800	56	54	96%
Nov	52,704			7,688		47		
Dec	97,005			13,858		49		
		Average	104%				Average	99%

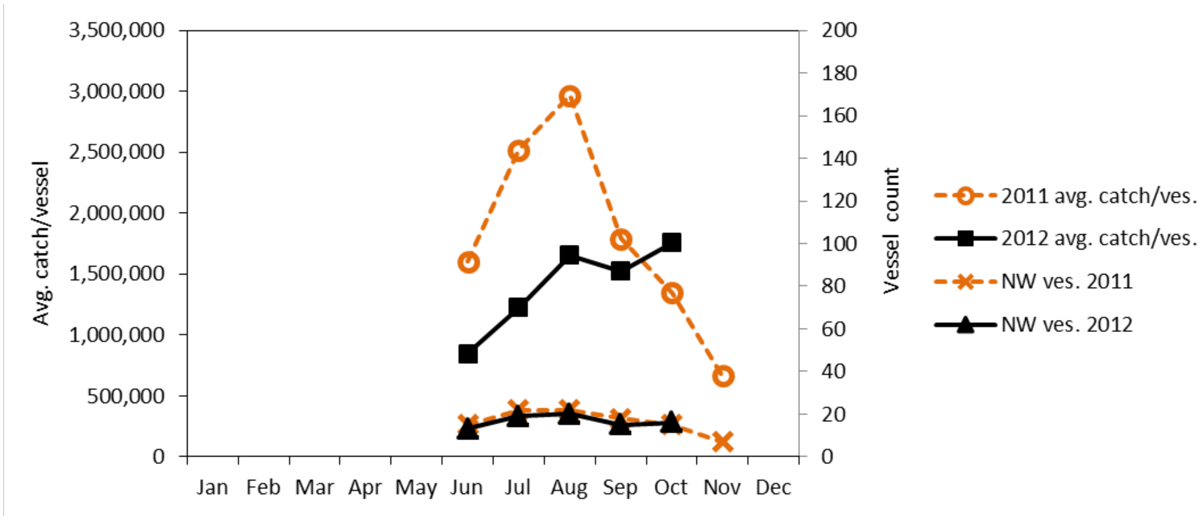


Figure 4. Monthly number of participating vessels and catch per vessel (lbs.) by the shoreside whiting fleet (W) within the IFQ groundfish fishery in January through October of 2012 versus 2011.

Table 4. Monthly number of participating vessels and catch per vessel (lbs.) by the shoreside whiting fleet within the IFQ groundfish fishery in January through October of 2012 versus 2011.

	2011 avg. catch/ves.	2012 avg. catch/ves.	2012/2011	S.E. 2011	S.E. 2012	W ves. 2011	W ves. 2012	2012/2011
Jan								
Feb								
Mar								
Apr								
May								
Jun	1,603,842	845,212	53%	414,110	234,420	15	13	87%
Jul	2,516,977	1,225,723	49%	536,621	281,200	22	19	86%
Aug	2,965,347	1,655,002	56%	632,214	370,070	22	20	91%
Sep	1,788,506	1,523,092	85%	421,555	393,261	18	15	83%
Oct	1,346,604	1,758,086	131%	347,692	439,522	15	16	107%
Nov	663,966			250,956		7		
Dec								
		Average	75%				Average	91%

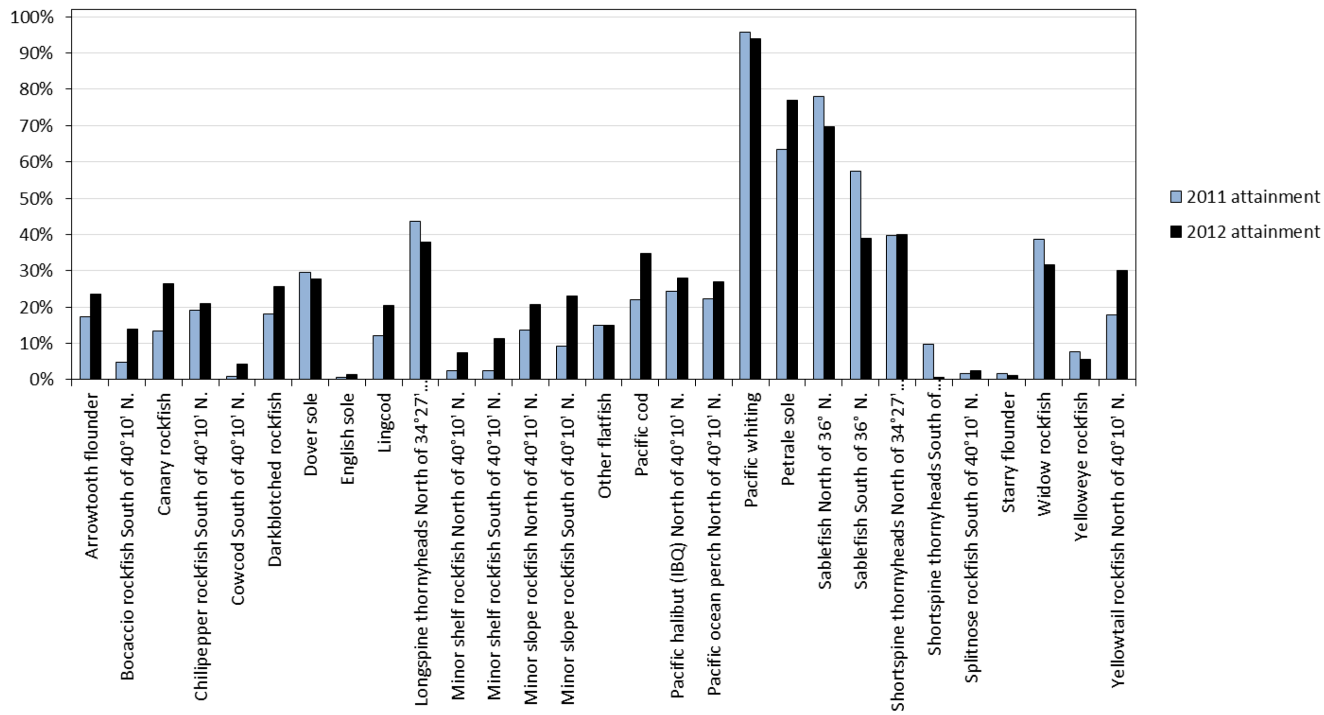


Figure 5. IFQ fishery attainment by species category for January through October of 2011 and 2012.

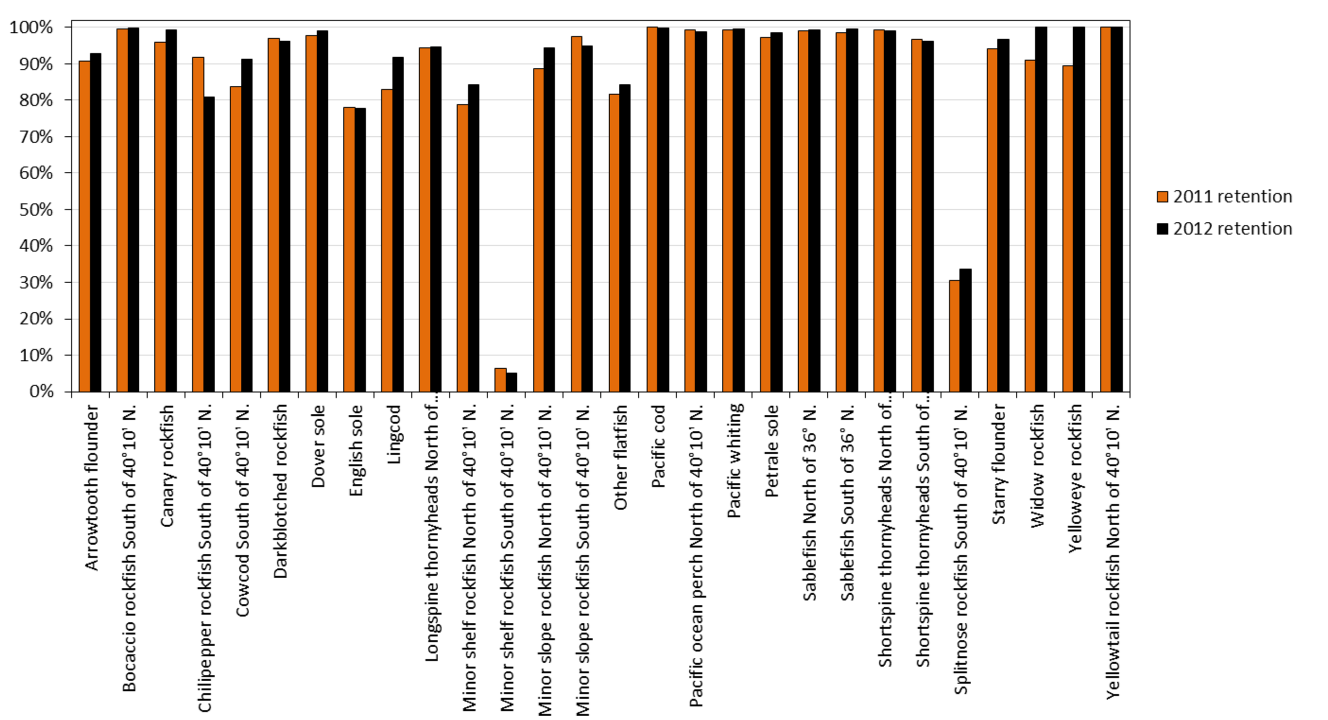


Figure 6. IFQ fishery retention by species category for January through October of 2011 and 2012.

Table 5. IFQ fishery attainment by species category for January through October of 2011 and 2012.

Species Category	2011 NW	2011 W	2011 Total	Allocation	2011 Attain.	2012 NW	2012 W	2012 Total	Allocation	2012 Attain.	Annual dif.	Attain dif. %
Arrowtooth flounder	4,730,486	26,775	4,757,261	27,406,105	17%	4,860,297	52,309	4,912,606	20,861,131	24%	155,345	6%
Bocaccio rockfish South of 40°10' N.	6,332		6,332	132,277	5%	18,285		18,285	132,277	14%	11,953	9%
Canary rockfish	5,724	1,882	7,606	57,100	13%	13,175	2,039	15,214	57,761	26%	7,608	13%
Chilipepper rockfish South of 40°10' N.	625,610		625,610	3,252,370	19%	616,557		616,557	2,934,904	21%	-9,053	2%
Cowcod South of 40°10' N.	37		37	3,968	1%	174		174	3,968	4%	137	3%
Darkblotched rockfish	97,706	2,540	100,246	552,997	18%	133,773	7,445	141,218	548,808	26%	40,972	8%
Dover sole	14,465,056	121	14,465,177	49,018,682	30%	13,567,118	1,315	13,568,433	49,018,682	28%	-896,744	-2%
English sole	266,438	1	266,439	41,166,808	1%	293,591	28	293,619	21,037,611	1%	27,180	1%
Lingcod	485,603	9,882	495,485	4,107,873	12%	807,796	5,734	813,530	3,991,800	20%	318,045	8%
Longspine thornyheads North of 34°27' N.	1,890,660	1	1,890,661	4,334,839	44%	1,596,643	116	1,596,759	4,219,648	38%	-293,902	-6%
Minor shelf rockfish North of 40°10' N.	25,893	1,250	27,143	1,150,813	2%	83,465	1,556	85,021	1,150,813	7%	57,878	5%
Minor shelf rockfish South of 40°10' N.	4,855		4,855	189,598	3%	21,498		21,498	189,598	11%	16,643	9%
Minor slope rockfish North of 40°10' N.	225,532	22,920	248,452	1,828,779	14%	229,056	151,553	380,609	1,828,779	21%	132,157	7%
Minor slope rockfish South of 40°10' N.	76,388		76,388	831,958	9%	190,823		190,823	831,958	23%	114,435	14%
Other flatfish	1,370,580	1,684	1,372,264	9,253,683	15%	1,368,322	9,379	1,377,701	9,253,683	15%	5,437	0%
Pacific cod	545,288	2,548	547,836	2,502,247	22%	868,160	205	868,365	2,502,247	35%	320,529	13%
Pacific halibut (IBQ) North of 40°10' N.	62,009	722	62,731	257,524	24%	64,143	1,289	65,432	232,856	28%	2,701	4%
Pacific ocean perch North of 40°10' N.	58,066	532	58,598	263,148	22%	60,353	10,388	70,741	263,441	27%	12,143	5%
Pacific whiting	378,538	195,756,844	196,135,382	204,628,442	96%	389,502	117,512,765	117,902,267	125,447,480	94%	-78,233,115	-2%
Petrale sole	1,218,343	1	1,218,344	1,920,226	63%	1,787,845	1	1,787,846	2,324,995	77%	569,502	13%
Sablefish North of 36° N.	4,335,810	49,829	4,385,639	5,613,719	78%	3,685,606	103,564	3,789,170	5,438,797	70%	-596,469	-8%
Sablefish South of 36° N.	672,670		672,670	1,170,390	57%	442,144		442,144	1,133,352	39%	-230,526	-18%
Shortspine thornyheads North of 34°27' N.	1,251,141	4,478	1,255,619	3,156,138	40%	1,226,062	18,212	1,244,274	3,120,533	40%	-11,345	0%
Shortspine thornyheads South of 34,°27' N.	10,734		10,734	110,231	10%	762		762	110,231	1%	-9,972	-9%
Splitnose rockfish South of 40°10' N.	46,832		46,832	3,045,245	2%	74,680		74,680	3,206,513	2%	27,848	1%
Starry flounder	25,645		25,645	1,471,586	2%	18,172		18,172	1,480,404	1%	-7,473	-1%
Widow rockfish	47,343	244,838	292,181	755,348	39%	86,340	152,549	238,889	755,352	32%	-53,292	-7%
Yelloweye rockfish	103		103	1,323	8%	74		74	1,323	6%	-29	-2%
Yellowtail rockfish North of 40°10' N.	275,966	934,070	1,210,036	6,821,455	18%	1,606,722	461,634	2,068,356	6,850,556	30%	858,320	12%
Total	33,205,388	197,060,918	230,266,306	375,004,872	61%	34,111,138	118,492,081	152,603,219	268,929,501	57%	-77,663,087	-5%

Table 6. IFQ fishery retention by species category for January through October of 2011 and 2012.

Species category	2011 Total catch	2011 Landed	2011 Discarded	2011 Retention	2012 Total catch	2012 Landed	2012 Discarded	2012 Retention	Retention dif.
Arrowtooth flounder	4,730,486	4,284,607	445,879	91%	4,860,297	4,508,591	351,706	93%	2%
Bocaccio rockfish South of 40°10' N.	6,332	6,312	20	100%	18,285	18,257	28	100%	0%
Canary rockfish	5,724	5,408	316	94%	13,175	13,081	94	99%	5%
Chilipepper rockfish South of 40°10' N.	625,610	574,046	51,564	92%	616,557	498,679	117,878	81%	-11%
Cowcod South of 40°10' N.	37	31	6	84%	174	159	15	91%	8%
Darkblotched rockfish	97,706	94,616	3,090	97%	133,773	128,346	5,427	96%	-1%
Dover sole	14,465,056	14,157,830	307,226	98%	13,567,118	13,441,811	125,307	99%	1%
English sole	266,438	208,084	58,354	78%	293,591	228,156	65,435	78%	0%
Lingcod	485,603	401,604	83,999	83%	807,796	741,360	66,436	92%	9%
Longspine thornyheads North of 34°27' N.	1,890,660	1,784,444	106,216	94%	1,596,643	1,509,643	87,000	95%	0%
Minor shelf rockfish North of 40°10' N.	25,893	20,127	5,766	78%	83,465	70,035	13,430	84%	6%
Minor shelf rockfish South of 40°10' N.	4,855	315	4,540	6%	21,498	1,075	20,423	5%	-1%
Minor slope rockfish North of 40°10' N.	225,532	197,160	28,372	87%	229,056	207,496	21,560	91%	3%
Minor slope rockfish South of 40°10' N.	76,388	74,556	1,832	98%	190,823	181,067	9,756	95%	-3%
Other flatfish	1,370,580	1,119,833	250,747	82%	1,368,322	1,152,180	216,142	84%	2%
Pacific cod	545,288	545,260	28	100%	868,160	866,692	1,468	100%	0%
Pacific halibut (IBQ) North of 40°10' N.	62,009	40	61,969	0%	64,143	136	64,007	0%	0%
Pacific ocean perch North of 40°10' N.	58,066	57,608	458	99%	60,353	59,473	880	99%	-1%
Pacific whiting	378,538	68,002	310,536	18%	389,502	55,676	333,826	14%	-4%
Petrale sole	1,218,343	1,183,425	34,918	97%	1,787,845	1,761,047	26,798	99%	1%
Sablefish North of 36° N.	4,335,810	4,289,935	45,875	99%	3,685,606	3,659,609	25,997	99%	0%
Sablefish South of 36° N.	672,670	662,840	9,830	99%	442,144	440,680	1,464	100%	1%
Shortspine thornyheads North of 34°27' N.	1,251,141	1,240,905	10,236	99%	1,226,062	1,213,049	13,013	99%	0%
Shortspine thornyheads South of 34°27' N.	10,734	10,393	341	97%	762	732	30	96%	-1%
Splitnose rockfish South of 40°10' N.	46,832	14,240	32,592	30%	74,680	25,077	49,603	34%	3%
Starry flounder	25,645	24,107	1,538	94%	18,172	17,595	577	97%	3%
Widow rockfish	47,343	47,189	154	100%	86,340	86,317	23	100%	0%
Yelloweye rockfish	103	92	11	89%	74	74	0	100%	11%
Yellowtail rockfish North of 40°10' N.	275,966	275,950	16	100%	1,606,722	1,606,259	463	100%	0%
Total	33,205,388	31,348,959	1,856,429	94%	34,111,138	32,492,352	1,618,786	95%	1%

Agenda Item I.4.b
WDFW Report
November 2012

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE REPORT ON INSEASON ADJUSTMENTS FOR 2013

In September, the Washington Department of Fish and Wildlife (WDFW) briefed the Council on our expectation that yelloweye catch in our recreational bottomfish fishery would exceed the harvest guideline and that we had taken state emergency action to close the fishery in Neah Bay and La Push beginning September 4th for the remainder of the year. At the time we also updated our projected estimate of the Washington recreational yelloweye catch in the Council's overfished species scorecard to 3.3 mt through the end of the year.

To prevent the Washington recreational bottomfish fishery from exceeding our harvest guideline in 2013 and 2014 we are proposing more restrictive management measures for our north coast area (Marine Areas 3 and 4). Management measures approved for the north coast for 2013-2014, which are the same as what was in place for 2011-2012, restrict the recreational bottomfish fishery to the area shoreward of 20 fm from June 1 to September 30 except on days open to the halibut fishery. WDFW recommends inseason action to revise the start date that the 20 fathom bottomfish restriction is in place to May 1. In addition, on days that the halibut fishery is open, no bottomfish except lingcod, Pacific cod and sablefish could be retained seaward of 20 fathoms.

The proposed changes to recreational management measures are specific to the north coast (Marine Areas 3 and 4) since the majority of our yelloweye encounters occur in this area and restricting the bottomfish fishery to shallower water earlier will reduce encounters with yelloweye and improve survivability of released fish. We expect these more restrictive measures will keep our yelloweye impacts within our 2013-2014 harvest guideline of 2.9 mt but we will continue to track our catch inseason and make adjustments if needed.

TRAWL RATIONALIZATION TRAILING ACTIONS AND UPDATES

Under this agenda item, the Council will continued consideration of a number of trailing actions, including those which have come back to the Council for further guidance and those on which work has been delayed due to the need to reconsider the trawl rationalization program's initial whiting quota allocations. A list of all current trailing candidate action issues is provided as Agenda Item I.5.a, Attachment 1 – Trailing Actions.

Chafing Gear. The gear regulations have recently been interpreted to allow chafing gear to be applied only to the last 50 meshes of the codend on midwater gear (in addition to chafers attached at skirt locations). Midwater gear is used primarily in the whiting fishery. Active Trawlers have been using chafing gear along the entire length of the codend in a series of 50 mesh panels—providing protection for the net material and the opportunity for cod-end escapement to flow through the aft end of the panels. Gear regulations allow the chafing gear to encircle only 50% of the net. The Council took its original final action on chafing gear at its April 2012 meeting, recommending that a single panel of chafing gear be allowed to cover all but the top panel of the codend. At its September 2012 meeting, the Council scheduled a reconsideration of its original recommendation in response to a NMFS request. The purpose of the reconsideration is to allow the Council to consider an alternative that would extend the allowable length of the chafing gear to more than the last 50 meshes (to allow coverage the entire length of the cod-end) but maintain the restriction that then chafing gear encircle only 50% of the net. This alternative and the Council's original recommendations are analyzed in an environmental assessment, the executive summary for which is provided as Agenda Item I.5.a, Attachment 2 – Chafing Gear ES, and the entirety of which is provided in electronic format (Agenda Item I.5.a, Attachment 3 – Chafing Gear EA). Related to chafing gear issue are the other gear issues on which a workshop was conducted in August 29-30, 2012. The Council has re-scheduled action on these issues for next September but the gear workshop report is provided here as an informational item (Agenda Item I.5.a, Attachment 4 – Gear Workshop).

Safe Harbors from Quota Share Accumulation Limit Control Limits for Lenders. When NMFS finalized the quota share (QS) control rules, it provided exceptions for lenders ("banks and other financial institutions") but there has been uncertainty about who qualifies as a lender and about the scope of the exceptions provided (some activities for which an exception is provided overlap with activities for which an exception is not provided). At its March 2012 meeting, the Council selected preliminary preferred alternatives to address this issue. Selection of a final preferred alternative is scheduled for this meeting. An analysis is provided as Agenda Item I.5.a, Attachment 5 – Lender Issues. Action on other lender issues (such as some form of a lien registry) has been postponed to allow time for further assessment of the needs and, if needed, development of some alternatives for Council consideration. A letter on this issue is provided in public comment.

Whiting Season Date. A substantial portion of the regulatory relief that the trawl rationalization program provided to the shore-based trawl fishery was the near elimination of the system of 2-month trip limits which was used to control harvest of nonwhiting species under the previous management regime. However, the trawl rationalization program made no automatic adjustments to the season structure used to control harvest in the shore-based and at-sea whiting fishery. At its March 2012 meeting, the Council selected a preliminary preferred alternative that would move the shoreside whiting season opening date from June 15 to May 15 and eliminate the early season openings provided for California (along with the 5% cap on the harvest taken in those openings). At its April meeting, the Council decided to defer selection of a final preferred alternative in order to receive more analysis. An analysis of the whiting season issue is provided in Agenda Item I.5.a, Attachment 6 – Whiting Season. If the Council does select a final preferred alternative at this meeting, it might not be possible to produce the final environmental assessment (EA) on time for the whiting rulemaking deadline scheduled for this winter. Under such circumstances, implementation would be delayed until 2014.

Widow Rockfish Reallocation. The trawl rationalization program specifies that QS for an overfished species may be reallocated once that species is rebuilt, as QS allocation during the rebuilding period was specified by expected incidental catch rates and did not consider catch histry prior to the overfished status designation. Widow rockfish has now been rebuilt and the Council has specified a process for considering a reallocation. Under that process, the Council will select a suite of options for analysis at this meeting, select a preliminary preferred alternative in March or April 2012, and a final alternative in June 2012. A preliminary set of alternatives has been put forward by the GAP. Those alternatives and an initial analysis is provided in Agenda Item I.5.a, Attachment 7 – Widow Reallocation.

Whiting Carryover. The surplus quota pound (QP) carryover provisions for the shoreside individual fishing quota (IFQ) program were carried out in 2012 (carrying QP over from 2011) for all species except whiting. On Friday November 2nd a workshop was held to explore possibilities for implementing the whiting carryover under the flexibility provided by the Agreement with Canada on Pacific Whiting. Background information provided at that workshop is provided here as Agenda Item I.5.a, Attachment 8 – Whiting Carryover. The results of that workshop will be provided for Council consideration under this agenda item, as a supplemental report provided at the Council meeting.

Electronic Monitoring. At the June 2012 Council meeting, a generalized plan was laid out for how the Council might move forward with consideration of electronic monitoring as a replacement for 100% observer coverage (Agenda Item I.5.a, Attachment 9 – Electronic Monitoring). There has been field work under way in 2012 to study this issue—work being conducted as a NMFS/PSMFC project. At this meeting, the Council was scheduled to review preliminary plans for the 2013 field season and to begin exploring other policy issues not dependent on the outcome of the field study. A list of these can be found in Item I.5.a, Attachment 9 – Electronic Monitoring. There are likely other issues which need to be considered as well, such as the expected financial effects for first and second generation QS holders. However, whiting allocation reconsideration, other trailing action priorities, and lack of deicated funding have forestalled the development of the background materials necessary for a productive Council discussion on this issue at this Council meeting. This forestalled progress is not expected to change in the near future unless additional funding resources are identified to carryout this work.

Cost Recovery. At its September meeting the Council revisited and revised some of its original recommendations and decided that in order to create a more efficient system that integrates with the current buyback loan fee system, cost recovery for trawl rationalization should cover all species of groundfish rather than just those covered by individual fishing quota species and

Pacific whiting. Additionally, the Council encouraged NMFS to make adjustments so that the same form can be used for buyback and trawl rationalization cost recovery and agreed with NMFS that if the owner or operator of a vessel registered to a mothership or catcher processor endorsed limited entry (LE) permit is not the same as the LE permit owner, and the owner or operator of the vessel is found to be responsible for non-payment, then the LE permit could still be renewed. These recommendations clarify the Council's previous final action (http://www.pcouncil.org/wp-content/uploads/H2a_ATT1_COSTRECOV_FNL_SEP2012BB.pdf). As of the briefing book deadline, NMFS is continuing to develop draft regulations for implementing the cost recovery rule. Cost recovery has been included in this agenda item as a place holder in case any issues arise that would make deeming of the rule by the Executive Director problematic.

Adaptive Management Program. The IFQ program set aside 10% of the nonwhiting QS/QP allocated to the shorebased fishery for distribution through an adaptive management program (AMP). Currently those QP are being passed through to QS holders in proportion to QS held. The Council has authorized continuation of this pass-through through 2014. How those QP will be distributed beginning in 2015 has yet to be determined. NMFS will provide a brief report on this issue regarding possible ways to proceed (Agenda Item I.5.b, Supplemental NMFS Report).

Council Action:

1. Adopt Final Alternatives for
   a. Chafing Gear
   b. Safe Harbors from QS Control Limits for Lenders
      i. Lending Entities Qualifying for an Exception
      ii. Scope of the exception provided.
   c. Whiting Season Opening Date and Southern Allocation
2. Adopt Range of Alternatives for Analysis of Widow Reallocation
3. Provide Guidance, as needed, for
   a. Carry-over (whiting)
   b. Electronic Monitoring
   c. Cost Recovery
   d. Adaptive Management Program

Reference Materials:

1. Agenda Item I.5.a, Attachment 1 –Trailing Actions, Status Of Trailing Actions And Calendar.
2. Agenda Item I.5.a, Attachment 2 – Chafing Gear ES, Chafing Gear Draft Environmental Assessment Executive Summary.
3. Agenda Item I.5.a, Attachment 3 – Chafing Gear EA, Trawl Rationalization Trailing Actions: Chafing Gear Draft Environmental Assessment **(Provided Only Electronically).**
4. Agenda Item I.5.a, Attachment 4 – Gear Workshop, Trawl Gear Regulation Change Proposals Developed at Trawl Fishery Gear Workshop.
5. Agenda Item I.5.a, Attachment 5 – Lender Issues, Trawl Rationalization Trailing Actions Issue: Lenders. *Draft* Council Decision Analysis Document.
6. Agenda Item I.5.a, Attachment 6 – Whiting Season, Trawl Rationalization Trailing Actions Issue: Whiting Season and Southern Allocation, *Draft* Council Decision Analysis Document.

7. Agenda Item I.5.a, Attachment 7 – Widow Reallocation, Trawl Rationalization Trailing Actions Issue: Widow Rockfish QS Reallocation, *Draft* Council Decision Analysis Document.
8. Agenda Item I.5.a, Attachment 8 – Whiting Carryover. Pacific Whiting Carryover Implementation.
9. Agenda Item I.5.a, Attachment 9 – Electronic Monitoring, Possible Regulation Amendment Process for Consideration of Electronic Monitoring as a Replacement for the 100% Observer Coverage Requirement.
10. Agenda Item I.5.b, Supplemental NMFS Report, Summary of Adaptive Management Program.
11. Agenda Item I.5.c, Public Comment.

<u>Agenda Order:</u>

a. Agenda Item Overview — Jim Seger
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Adopt Final Alternatives for Chafing Gear, Lenders, and Whiting Season Opening Date; Adopt Range of Alternatives for Analysis of Widow Reallocation; Provide Guidance for Carry-over, Electronic Monitoring, and Cost Recovery; and Consider Update on Adaptive Management

PFMC
10/17/12

Agenda Item I.5.a
Attachment 1 – Trailing Actions
November 2012

STATUS OF TRAILING ACTIONS AND CALENDAR

Calendar on Trawl Rationalization Actions and Pending Workload

Table. Council schedule for trawl rationalization related actions.

	Nov	Mar	Apr	June	Sept
Current Trailing Actions					
Chafing Gear	Reconsideration				
Gear (Delayed)	Gear Workshop Results				Prioritization
Lender Issues	FPA				
Other Lender Issues (Delayed)					
Whiting Season Date	FPA				
Widow QS Reallocation Amendment	Range of Alternatives	PPA		FPA	
Surplus QP Carryover – Whiting	Guidance				
Surplus QP Carry-over –nonwhiting (2012 surplus QP for all nonwhiting was issued in 2011)					
Electronic Monitoring	~~Scoping~~	Study Report			
Adaptive Management Program QP Distribution Methodology (Implement by 2015)					
PIE 3 (Implementation in 2015)					Scoping

a/ Final Action required by April 2014 for implementation by January 1, 2015.

Environmental assessments to be completed when NMFS is ready for transmittal

- Risk pools (Council final action complete)
- Trawl/Fixed gear permit stacking (except for fixed gear freezer vessels in trawl fishery) (Council final action complete)

Other pending Council tasks

- Update Appendix E to the Fishery Management Plan to reflect recent regulatory amendments.

Status on Other Delayed Actions

Gear Issues – Gear issues include multiple gears on a trip, gear modifications to increase efficiency, and restrictions on areas in which gears may be used. Action on all of gear issues (except chafing gear) was delayed pending the results from a one day gear workshop to be convened by the Enforcement Consultants. That workshop, originally scheduled for the the June Council meeting, has now been tentatively rescheduled for September.

Other Lender Issues – The Council has not selected a PPA for other lender issues. The topics under this category have been narrowed to the question of whether the NMFS quota share (QS) tracking system should include a capability that would allow the QS owner and lender to attach lender information to the QS account. In March, the Groundfish Advisory Subpanel recommended no action on this issue. Council and NMFS staff have scheduled further discussion on this for December, aimed at determining the degree to which the current system meets lender needs and, if not, identifying some cost effective alternatives for addressing those needs.

Status on Other Actions Completed and Moving Forward for Implementation

Cost Recovery – Regulations to be developed for deeming. National Marine Fisheries Service (NMFS) is requesting clarification at this meeting.

Status for other issues on which the Council took final action at its April 2012 meeting. See Agenda Item I.4, April 2012 for a complete description of these items.

	Council Action	**Implementation Status**
PIE Rule 2, Council list		
1. Change the opt-out requirement for QP deficits	Approved FPA	Pending
2. Eliminate the double filing of co-op reports	Approved FPA	Pending
PIE Rule 2, NMFS list		
1. First receive site license changes	Approved NMFS Proposed Change	Pending
2. Catch monitor certification requirements	Approved NMFS Proposed Change	Pending
3. Start renewal process 9/15 for LE permit, vessel account, and QS permits	Approved NMFS Proposed Change	**Completed**
4. Remove 12/15-31 ban on QP transfer	Approved NMFS Proposed Change	Pending
5. Observer provider certification	Approved NMFS Proposed Change	Pending
6. Clarify processor obligation	Approved NMFS Proposed Change	Pending
7. Observer program regulatory changes	Approved NMFS Proposed Change	Pending
8. Change “permit holder” to “vessel owner”	Approved NMFS Proposed Change	Pending
9. Process for changes vessel ownership	Approved NMFS Proposed Change	Pending

A corrections rule was also completed in 2012.

PFMC
10/15/12

CHAFING GEAR DRAFT ENVIRONMENTAL ASSESSMENT EXECUTIVE SUMMARY

The proposed action is to modify the provisions for chafing gear (chafer) coverage on the codends of midwater trawl nets used in the West Coast groundfish fishery. The codend is the terminal closed end of the net where captured fish accumulate. Chafer can be made from a variety of materials. It is usually applied to the bottom of trawl nets for protection against contact with the ocean bottom and/or onboard abrasion sources.

The need for this action is two-fold. First, up until recently the current regulations were interpreted and enforced in a manner that allowed fishermen to cover the entire length of their codend using a series of 50—mesh panels. Recently, these regulations have been reinterpreted as allowing the use of only a single 50-mesh panel. This reinterpretation, if enforced, would have considerable economic cost due to increasing wear on the net. The second need for this modification arises out of the differences between the chafing gear restrictions for Alaska and the West Coast. Vessel owners have reported that the nets that they use in the Alaska fishery (for pollock) do not conform to PFMC area midwater trawl regulations (PFMC 2011a). In large part this is because the NPFMC regulations are very liberal as they apply to chafing gear placement on the net; they only prohibit “chafe protection attachment” to the footrope or fishing line (50 CFR 679.2). The PFMC regulations are complex in comparison. For example, the regulations limit chafing gear coverage of the codend to 50% of the terminal 50 meshes. (50 CFR 660.130). These latter restrictions are the most difficult for the vessel owners to comply with because the nets they use in the NPFMC area have greater chafing gear coverage on the codend than PFMC regulations allow.

This document analyzes alternative chafing gear regulations for midwater trawl nets used to harvest Pacific whiting and some rockfish species. The analyses compare potential impacts of the alternatives including the no action alternative relative to various physical, biological, and soci-economic criteria.

The history of the chafing gear regulations as they apply to the West Coast midwater trawl fishery is described in the text. It shows that as of 1992 up to 50% of the codend of West Coast midwater trawl nets could be covered with chafing gear regardless of codend length. As of 2007, chafing gear coverage on all West Coast groundfish trawl nets was restricted to 50% of the terminal 50 meshes. When the transition occurred between the 1992 chafing gear restraints and the 2007 restraints has not yet been confirmed. There are various restrictions relative to the application of protective materials to the codends of West Coast groundfish nets. These are shown in Table ES-1.

Table ES-1. Current trawl net protection provisions
(1) Chafing gear may encircle no more than 50 percent of the net's circumference (§660.130(b)(3)).
(2) No section of chafing gear may be longer than 50 meshes of the net to which it is attached (§660.130(b)(3)).
(3) Chafing gear (when used on the codend) may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend (§660.130(b)(3)).
(4) Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net (the terminal end is the end farthest from the mouth of the net). Chafing gear must be attached outside any riblines and restraining straps (§660.130(b)(3)).
(5) There is no limit on the number of sections of chafing gear on a net (§660.130(b)(3)).
(6) A band of mesh may encircle the net under transfer cables, lifting or splitting straps, but must be: over riblines and restraining straps and of the same mesh size and coincide knot-to-knot with the net to which it is attached (§660.130(b)(6)).

Alternatives

Several Council discussions and scoping meetings have been held since September 2011 related to the chafing gear issue. At the April 2012 Council meeting three alternatives were presented for Council consideration and a decision was made on a final preferred alternative. At the September 2012 meeting the NMFS asked the Council to remove one of the alternatives (no restriction on chafing gear placement) that was in the April 2012 decision document and to replace it with an alternative which would allow coverage of the full length of the codend but maintain the 50% restriction. The Council's Groundfish Advisory Panel assisted in the process by recommending and the Council adopting a replacement alternative as described below.

The alternatives covered in this document are as follows.

Status Quo: No change to current regulations.

> Under status quo, the environmental impact mechanism would be that enforcement officers would begin to enforce the new regulatory interpretation that chafing gear can be applied to only the last 50 meshes of the codend of mid-water gear (enforcement of this regulation has been deprioritized while this policy evaluation is underway).

Alternative 1 (previous final preferred alternative): Allow for broader and longer chafing gear coverage on the codend.

The proposed policy:

> Chafer may cover the bottom and sides of the codend in either one or more sections. Chafers can only be attached at the open end of the codend (end closest to trawl mouth) and sides. The terminal end (end closest to terminal end of codend) or the end of each chafer section if using multiple chafers must be left unattached. The only chafer allowed on the top codend panel would be reinforced netting panels under lifting and constraining straps. All chafers will conform to codend mesh size regulations.

This alternative allows for chafer placement on the entire length of the codend but the gear would be limited to the bottom and side sections. Chafer panels would have to be open on the terminal ends, but there would be no restriction on the length of individual panels.

Alternative 2: Allow for longer chafing gear coverage and flexibility in chafer panel size and application on the codend.

The proposed policy

> Eliminate the restriction which limits the application of chafing gear to the last 50 meshes of the codend (maintain restriction limiting chafing gear coverage to no more than 50% of the net circumference (circle).
>
> Option a) Eliminate the restriction on the length of a single chafer panel.
> Option b) Maintain the requirement that any single panel of chafing gear not exceed 50 meshes in length of the codend.

The action and no action (status quo) alternatives analyzed in this EA are compared in Table ES-2. The alternatives have many restrictions in common.

Table ES-2. Comparison of chafing gear alternatives relative to the elements of current regulations

	Element							
	Net circle limitation	**Limitation on single panels**	**Net coverage limitation**	**Attachment procedure**	**Lift strap limitation**	**Minimum mesh size**	**Panel attachment procedure**	**No. panels**
Status Quo	50%	50 codend meshes	50 end meshes	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 1 (FPA)	Side and bottom of codend (75% if sections equal size)	no limit	codend	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 2	50%	**Option a)** no limit **Option b)** 50 codend meshes	codend	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit

Chapter 3 of this EA describes the affected environment including physical environment, biological environment and soci-economic environment. None of the alternatives analyzed in this EA are projected to have a potentially adverse impacts on the affected environment except as described in Chapter 4, which is summarized in the following.

The direct and indirect impacts of the actions being considered are addressed for each target species or species group in Sections 4.1 (Pacific whiting) and 4.2 (Rockfish). Impacts on communities and agencies including the public decision process are covered in Sections 4.3 and 4.4. Cumulative impacts are discussed in Section 4.5. The alternatives analyzed in this EA differ with regard to the amount of chafer coverage allowed on the length and breadth of the codend and the maximum length of chafer panels allowed (Table ES-3).

Table ES-3. Relative amounts of chafing gear coverage allowed under no action and action alternatives

Alternatives	Codend coverage	Maximum chafer panel length
SQ	50% of terminal 50 meshes	50 meshes of codend (1 panel could cover a 50 mesh codend)
A-1	75% of entire codend, which can be >500 meshes long	Entire length of codend may be covered with a single panel or multiple panels
A2a	50% of entire codend, which can be >500 meshes long	Entire length of codend may be covered with a single panel or multiple panels
A2b	50% of entire codend, which can be >500 meshes long	50 meshes of codend (10 panels required for 500 mesh codend)

Baseline for Comparison. In this Executive Summary, the reference point for assessment of the analysis differs from the current version of the EA. Here the baseline used for comparison is the current conditions on the water. Currently, the fishery uses codends which are compliant with the regulations that would be promulgated under Alternative 1b. In the EA, the baseline for comparison is a fishery in which chafing gear coverage on codends is restricted to encircling not more than 50% of the last 50 meshes of the codend. The approach taken in the Executive Summary answers the question “How will the environment be different from it is at present, depending on the option selected by the Council?” Because it assesses impacts relative to present conditions, data is available to describe the baseline comparison point from which changes will be assessed. The approach taken in the body of the EA takes as its comparison point the hypothetical conditions which might prevail if current regulations were enforced and then assesses how those conditions would be different under each action alternative. The relative differences between the alternatives are the same between the two approaches.

Pacific Whiting Fishery (Section 4.1)

No or very small change in impacts to the physical environment is expected under any of the action alternatives compared to the no action alternative (Table ES-4). One possible exception would be with regard to the potential for decreased bottom contact by the net if a reduction in the use of chafer gear is required (status quo). This would be because the vessel operators would be more reluctant to fish near the bottom with less chafing gear providing protection to the net from pinnacles, rocks and other such formations. Data are presented in the text showing that bottom contact from whiting tows during 2000-2010 after adjusting for patchy distribution of sponges and corals has probably been close to 5% of tows. This amount would go down under the enforcement of status quo regulations.

Table ES-4. Potential impacts of action alternatives compared to status quo restrictions in the directed whiting fishery: Physical Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	**Broader and longer chafing gear on codend; unlimited chafer panel size**	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; SQ chafer panel size**
West Coast Marine Ecosystem	nc	nc	nc	nc
Physical and Biological Oceanography	nc	nc	nc	nc
Interannual and Interdecadal Climate Forcing	nc	nc	nc	nc
Biogeography	nc	nc	nc	nc
Essential Fish Habitat	nc	nc	nc	nc
Distribution of Midwater Fishery and Habitat Interactions	P 1/	nc	nc	nc

nc=no change P=positive impact. Projections are not scaled.

1/ Potential for decreased bottom contact due to lesser chafer coverage and greater vessel operator attention to staying off bottom.

Escape of undersized fish is important to reduce waste of non-marketable size fish, smaller forage fish species and eulachon, a threatened species under the ESA. Data and analysis are presented in the text that question whether small fish, such as eulachon, can safely escape from codends of nets used in high volume trawl fisheries due to “blinding” effect of impinged fish which reduce escape routes for small fish. If this “blinding” effect occurs for high volume tows then any effect that the amount of chafer gear has on bycatch escapement would be reduced.

For the biological analysis, comparison of the alternatives assume 1) small fish are able to escape through codend meshes, but are impeded by chafer panel coverage and 2) once inside the chafer panel their chances of safely exiting the panel terminal opening is affected by panel length.

For target species and non-target species excluding protected and ecologically sensitive species, marine mammals and seabirds, there would be no difference in projected impacts among the alternatives because placement of chafing gear on the codend primarily affects escape of small fish not the retention of fish overall in the codend (Table ES-5). For protected species there could be a positive impacts from maintaining status quo because of potential for less chafer gear coverage to increase escapement through codend meshes of eulachon, a small threatened species under the ESA (see Appendix B). The impact assessment is not different among the action alternatives because whiting fishery impacts are already very small with one pound of eulachon captured in the at-sea fishery for every 5.1 million pounds of whiting on average during 2006-2011 (Table 3-4 of text). Relative to the current fishery impacts to small forage fish (ecological sensitive species) would not be changed under Alternative 2b. If Status Quo is left in place and enforced impacts to small forage fish might decline. The other action alternatives may increase impacts. Alternative 1 would likely have the greatest negative impact because up to 75% of the entire codend could be covered in a single chafer panel, which would have only one escape opening. Alternative 2a would have lesser impact compared to Alternative 1 because the chafer coverage would be limited to 50% of the codend circle.

Table ES-5. Potential impacts of action alternatives compared to current baseline conditions in the directed whiting fishery: Biological Environment 1/				
	Status quo	**Alternative 1**	**Alternative 2a:**	**Alternative 2b:**
	Limited to 50 end meshes	**Broader and longer chafing gear on codend; unlimited chafer panel size**	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; SQ chafer panel size**
Target Species	nc	nc	nc	nc
Nontarget Species (excluding protected and ecological species)	nc	nc	nc	nc
Protected Species (ESA, MMPA, MBTA)	P 2/	nc	nc	nc
Marine Mammals and Seabirds	nc	nc	nc	nc
Ecosystem considerations	P 3/	NN 4/	N 5/	nc

nc=no change N=negative impact (NN means more impact than N). P = positive impact. Projections are not scaled.

1/ All assessments assume small fish are able to escape codend meshes and that chafing gear impedes small fish escape and survival once inside the chafer panel; studies of high volume fisheries have shown nets become impinged with fish and small fish have few escape routes.

2/ Decreased impacts to eulachon due to decreased chafer coverage. There is no difference between the action alternatives because fishery impacts on eulachon have been very small (about 5.1 million pounds of whiting caught for every pound of eulachon caught on average in at-sea fisheries during 2006-2011. Table 3-4). Therefore while it is possible that under status quo there could be a decreased impact, that impact is quite small.

3/ Decreased impacts on small forage fish due to decreased coverage of the cod-end with the enforcement of the new interpretation of the chafer gear regulations.

4/ Increased impacts on small forage fish due to 75% codend chafer coverage; only one escape opening once inside the chafer panel. Table 3-4 shows that, excluding Humboldt squid, an average of 1,239 pounds of whiting was caught in at-sea fisheries for every pound of forage fish caught on average in the at-sea whiting fishery during 2006-2011.

5/ Increased impacts to small forage fish due to only one escape opening required once inside the chafer panel.

The assessment of harvest sector impacts for the status quo (no action) alternative shows a negative impact to vessel owners because owners will have to remove chafing gear from the nets they use in Alaska for pollock to fish in the West Coast whiting fishery (Table ES-6). Data in the text shows that 62% of West Coast whiting vessels also fished off Alaska during 2004-2010. The minimum cost estimate to remove chafer from a pollock/whiting fishery codend based on net builder interviews was $5,000 (Table 3-16 of text), which is about a 5% net revenue impact for a fishery that showed average net revenues per shoreside whiting vessel in 2008 of $100,103 (Carl Lian, NMFS, pers. comm.). The greater cost to the vessel and net owners may be the wear and tear on the codend of the net from onboard abrasion sources exacerbated by the heavy weight of fish inside the codend. Based on net builder interviews, codends used in the pollock/whiting midwater trawl fisheries can cost anywhere from $10,000 to $200,000 to purchase (Table 3-16 of text). The midpoint of that range rounds to $100,000. If codends without full bottom half chafer coverage last only 2 years, the economic impact would be $50,000 per year. If the net life can be extended to four or six years by the application of chafer panels to the bottom half of the codend, the cost per year drops to $25,000 and about $17,000, respectively.

Relative to current conditions in the fishery, the projected impacts of the action alternatives on the harvester sector ranged from very positive (PP) under Alternative 1 to very good (P) under Alternative 2a and no change under Alternative 2b (Table ES-6). Alternative 1 had a more positive impact because it is less prescriptive than the other action alternatives; the regulation only says chafer panels may be attached to the side and bottom panel and does not specify a specific maximum amount of coverage (though we have used 75% coverage for analytical purposes). The other action alternatives specify that chafer may not exceed 50% of the net circle. Under the action alternatives it would be expected that the nets that they use in the Alaska pollock fishery could be used in the West Coast whiting fishery provided they do not have chafer coverage in excess of the specified coverage amounts. This would not seem to be a problem for vessel owners because the 50% net circumference (circle) restriction was in place for many years prior.

Table ES-6. Potential impacts of action alternatives compared to status quo restrictions in directed whiting fishery: Socio-economic Environment 1/

	Status quo	**Alternative 1**	**Alternative 2a:**	**Alternative 2b:**
	Limited to 50 end meshes	**Broader and longer chafing gear on codend; unlimited chafer panel size**	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; SQ chafer panel size**
Pacific whiting harvester sector	N	PP	P	nc
Processor sector	nc	nc	nc	nc

1/ nc=no change N=negative impact P=positive impact (PP has more impact than P); assessments are not scaled

No impact to the processor sector is projected under any of the alternatives, which is explained in the text.

Rockfish Fishery (Section 4.2)

Some midwater trawling for certain rockfish species resumed in 2011 (for yellowtail rockfish) and is likely to increase further in 2013 with the increases in allowable harvests of widow rockfish that accompanied the declaration that widow rockfish has rebuilt and is no longer in the overfished species category. The fishery, when it resumes, will largely take place north of 40˚ 10' N. lat. as was the situation in the past (see Table 3-11 of text).

The future rockfish fleet can be expected to be smaller in size than the historical fleet because of the trawl fleet buyback program and the implementation of the IFQ program. Smaller nets, compared to whiting nets, will be used to fish for rockfish by non-whiting boats. This is because they are more maneuverable to fish in habitats where rockfish are most abundant. These smaller nets will also have smaller codends that might not need more chafing gear coverage than current regulations allow; i.e., they are close to or ≤50 meshes long. In the following it is assumed there will be a mix of net sizes in the fishery: some with codends ≤50 meshes long and some with codends >50 meshes long. It is the fishers that use the longer codends that would be most affected by the imposition of the status quo chafing gear restrictions.

There are no projected impacts from any of the alternatives on the physical environment, with one exception: the potential for bottom contact may be lower in the rockfish fishery under status quo depending on whether the codend used would be greater than 50 meshes in length. This is because the nets used by non-whiting trawl vessels to targeting on rockfish will be smaller and less expensive to build than whiting nets and the vessels will be able to use them throughout the EEZ rather than being confined to seaward or shoreward of the RCA, as is the case with bottom trawl gear. In many cases these additional nets may have no need for chafing gear coverage on more than the 50 terminal meshes. Under such circumstances status quo and the action alternatives are projected to have similar impacts (Table ES-7).

Table ES-7. Potential impacts of action alternatives compared to status quo restrictions for directed rockfish trawling: Physical Environment 1/

	Status quo	**Alternative 1**	**Alternative 2a:**	**Alternative 2b:**
	Limited to 50 end meshes	**Broader and longer chafing gear on codend; unlimited chafer panel size**	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; SQ chafer panel size**
West Coast Marine Ecosystem	nc	nc	nc	nc
Physical and Biological Oceanography	nc	nc	nc	nc
Interannual and Interdecadal Climate Forcing	nc	nc	nc	nc
Biogeography	nc	nc	nc	nc
Essential Fish Habitat	nc	nc	nc	nc
Distribution of Midwater Fishery and Habitat Interactions	P or nc 2/	nc or N 3/	nc	nc

1/ nc=no change N=negative impact P=positive impact

2/ Potential for decreased bottom contact due to less chafer coverage on codends >50 meshes long and more attention by vessel operator to staying off bottom. nc for vessels using codends less than 50 meshes in length.

3/ nc for vessels with codends ≤50 meshes long; N for vessels with codends >50 meshes long depending on whether there is a difference in the incentive for bottom contact by having coverage on the sides of the nets.

One important concern for a midwater trawl rockfish fishery is impacts on eulachon, a threatened species under the ESA. It is a small fish weighing less than 2 oz., on average as a spawning adult based (Columbia River data, Appendix B). The escape of these fish through the meshes of trawl nets is an important consideration and any modification of the net that affects their chance of escape and survival is important to be evaluated. It is likely that the resumption of midwater trawling for rockfish will result in some eulachon being captured or escaping through the net meshes. Forage fish, such as the ones listed in Table 3- 4 of the text will also likely be caught in the fishery or escape through the net meshes. Because this midwater fishery has not been active since the WCGOP went into place there is little current information on bycatch rates in the fishery.

Alternatives 1 and 2a have the potential to reduce escapement of eulachon through the codend meshes compared to Alternative 2b (Table ES-8). For Alternative 1 this would occur because the chafing gear would be allowed to cover 75% of the circumference of the codend. There would also be some negative effect to the degree that codends used in this fishery are longer than 50 meshes. Under such circumstances, both Alternative 1 and 2a could have negative effects relative to the baseline because under the baseline (Alternative 2b regulations) there is a break between panels in the chafing gear (every 50 meshes). If the codends used in the fishery are ≤50 meshes long or very close to that length there should be no change in impact under status quo regulations which allow for chafing gear coverage only on the terminal 50 meshes. If the codends used are >50 meshes then status quo would have a positive impact relative to Alternative 2b, which would not impose a change on the current fishery.

In a fishery in which the codend length is less than 50 meshes, the projected impact to forage fish (ecosystem component species) is negative under Alternative 1 and there is no difference between Status Quo, Alternative 2a, and Alternative 2 b. In a fishery in which the codend length is less than 50 meshes, Alternatives 1 and 2a could adversely affect forage fish because of the absence of any breaks in the chafing gear panel (and greater coverage under Alternative 1), status quo would have a positive effect and Alternative 2b would be neutral. The significance of the differences among the alternatives would depend on the overall levels of impacts on forage fish.

The assessment of impact to the harvest sector under application of Status Quo regulations will depend on the length of codend that vessel owners use. For codends of 50 meshes or shorter, there would be no difference between status quo and Alternatives 2a and 2b. For owners with substantially longer codends the impact of restricting chafing gear to the last 50 meshes could be substantial. The lowest cost estimate for chafer removal and reapplication based on net builder interviews was $5,000, which would be significant to a smaller harvesting operation.

Alternatives 1 and 2a show positive impacts to vessel owners ranging from very positive under Alternative 1 to good (or no change) under Alternative 2b (Table ES-8). Alternative 1 was given a higher rating than the other action alternatives because it is less prescriptive. It would also allow for greater chafing gear coverage of the codend circumference (75% if all panels are equal size) compared to status quo regulations which limit the coverage to 50% of the net circle. The other two action alternatives allow for chafing gear coverage the entire length of the codend and not limited to the terminal 50 meshes which is the requirement under status quo regulations.

Table ES-8. Potential impacts of action alternatives compared to status quo restrictions for directed rockfish trawling: Socio-economic Environment 1/				
	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Rockfish harvester sector	N or nc 2/	PP	P or nc 2/	nc
Rockfish processor sector	nc	nc	nc	nc

1/ nc=no change N=negative impact P=positive impact (PP has more impact than P); assessments are not scaled
2/ nc if all rockfish trawl codends are ≤50 meshes

The impacts to the processor sector are the same as the impacts projected for the whiting fishery processing sector; i.e., no impact is likely under any of the alternatives (Table ES-8). This is because IFQ management makes every holder of quota pounds accountable for their overfished species impacts and the at-sea sectors have allowable catch levels that cover their overfished species needs based on their historical maximum catches.

Impacts on Communities (Section 4.3)

The proposed action items relate to the escape and survival of small fish from the nets of midwater trawl nets. There will be no expected impact to communities from the adoption of any of the alternatives.

Impacts on Agencies and Public Decision Processes (Section 4.4)

Adoption of any of the action alternatives would reconcile the regulation change that limited chafer gear coverage to the terminal 50 meshes. This will allow enforcement agencies to move forward with regulation enforcement of all trawl gear restrictions, including chafer coverage on the codends of midwater trawl nets, which will be a positive development for both the harvesting sector and the enforcement agencies.

Adoption of any of the alternatives is not expected to have any impact on the public decision process because this action relates to the escape of small fish from the codends of nets used in the West Coast midwater trawl fishery, which is a fishery management issue.

Cumulative Impacts (Section 4.5)

The levels of whiting harvests will be declining in the near future for the short term (see 2013-2014 biennial specifications for the groundfish fishery). This will result in reduced harvest opportunity for whiting by all fishers.

The Council is also in the process of evaluating a change in the allocation of widow rockfish QS. Like whiting, widow rockfish the directed widow rockfish fishery is conducted primarily with midwater gear. Up through recent years and in the Amendment 20 QS allocation, widow has been used primarily to cover bycatch. Because of the transferability of QS and QP, whether or not widow is reallocated is unlikely to have much effect on how the available QP are taken. The QP will be used in those harvest modes in which it can be most efficiently caught. It may have a compounding economic effect with any negative effect which occurs pursuant to this action. Any change in profitability of the fishery will ultimately be passed through to the QS owners as changing QS values.

The Council is considering the adoption of a Fishery Ecosystem Plan (FEP) which would broaden its current authority to species and issues not currently addressed in existing FMPs, including the groundfish plan. The scope of the plan is still under consideration.

Implementation of an FEP could have positive environmental and biological impacts associated with forage fish and unmanaged fish protection. Such protections could accrue benefits to managed species such as groundfish which depend on forage fish and some unmanaged fish for their survival and reproduction. It could potentially have negative short-term soci-economic impacts if actions taken to protect forage species and unmanaged species resulted in reduced harvest opportunity for managed species.

Chapter 5: West Coast Groundfish FMP and MSA National Standards and Requirements

Chapter 5 of this EA will address how the process followed and the alternatives analyzed in Chapter 4 are consistent with various policy or legal requirements as follows:

- MSA National Standards
- NMFS National Standard Guidelines
- Goals and Objectives of FMP
- Goals and Objectives of Amendment 20 to the FMP (Trawl Rationalization)
- Other Council Statements of Intent.

The expectation is that the processed followed and the alternatives analyzed will be determined to be consistent with the above directives and guidelines.

TRAWL RATIONALIZATION TRAILING ACTIONS: Chafing Gear

Draft Environmental Assessment (PROVIDED ONLY ELECTRONICALLY)

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

AND

NATIONAL MARINE FISHERIES SERVICE
7600 SAND POINT WAY NE, BIN C15700
SEATTLE, WA 98115-0070
206-256-6150

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CHAPTER 1 INTRODUCTION

1.1 How This Document is Organized

This document proposes alternative regulations (Chapter 2), describes the current biological and socio-economic environment (Chapter 3), and analyzes alternative chafing gear regulations for midwater trawl nets, currently used to harvest Pacific whiting and chilipepper rockfish (Chapter 4). The analyses in Chapter 4 compare the alternative regulation changes with existing gear restrictions in the PFMC and NPFMC management areas; provide possible rationale for proposed changes; and provide an assessment of potential impacts relative to specified biological, ecological, fishery management and socio-economic criteria.

1.2 Proposed Action

The proposed action is modification of regulations which restrict chafing gear coverage on the codends of midwater trawl nets used in the Pacific coast groundfish fishery.

The proposed change pertains to chafing gear coverage allowance for midwater (pelagic) trawl nets. No other regulations (i.e. restrictions or limitation of target fisheries that can use midwater gear) will be reconsidered or altered in relation to this proposed action except as necessary to maintain the intent and purpose of other provisions of the program.

1.3 Purpose and Need

The purpose of the action is to consider establishing chafing gear restrictions in the Pacific Coast groundfish fishery that allow coverage of the entire length of the codend and are more compatible with those for the Gulf of Alaska groundfish and Bering Sea and Aleutian Islands groundfish fisheries (Alaska Fisheries), taking into account various impact criteria, explained below. The proposed action also takes into account consistency of the proposed change with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), other applicable law, and the goals and objectives of the Pacific Coast Groundfish Fishery Management Plan, including Amendment 20 to that plan (the trawl rationalization program).

The need for this action is two-fold. First, up until recently the current regulations were interpreted and enforced in a manner that allowed fishermen to cover the entire length of their cod-end using a series of 50—mesh panels. Recently, these regulations have been reinterpreted as allowing the use of only a single 50-mesh panel. Chafing gear can be described as any of a variety of materials, usually heavy gauge webbing, that can be attached to the underside of the fishing net to protect it from abrasion sources, either when fishing or when hauled on deck, without unduly restricting the escapement of fish through the webbing (NMFS 2012). This reinterpretation, if enforced, would have considerable economic cost as the result of increasing wear on the net. The second need for this regulation arises out of the differences between the chafing gear restrictions for Alaska and the West Coast. Vessel owners have reported that the nets that they use in the Alaska fishery (for pollock) do not conform to PFMC area midwater trawl regulations (PFMC 2011a). In large part this is because the NPFMC regulations are very liberal as they apply to chafing gear placement on the net; they only prohibit "chafe protection attachment" to the footrope or fishing line (50 CFR 679.2). The PFMC regulations are complex in comparison. For example, the regulations limit chafing gear coverage of the codend to 50% of the net circumference (50 CFR 660.130).[1] These latter restrictions are the most difficult for the vessel owners to comply with because the nets they use in the NPFMC area have greater chafing gear coverage on the codend than PFMC regulations allow.

1.4 Background

The NMFS implemented the trawl rationalization program (IFQ program) for the Pacific coast groundfish fishery's trawl fleet effective January 1, 2011 (see 75 FR 78344; Dec. 15, 2010). The program was adopted through Amendment 20 to the Pacific Coast Groundfish Fishery Management Plan (FMP) and consists of an IFQ program for the shoreside trawl fleet (including whiting and non-whiting fisheries); and cooperative (coop) programs for the at-sea mothership (MS) and catcher/processor (C/P) trawl fleets (whiting only).

Prior to IFQ program implementation (PFMC 2010), the Council began a series of trailing actions for the IFQ program which have continued up through the present. These trailing actions address issues of concern which were outstanding as of the completion of the Council's initial work on the program. The actions address provisions needed to complete or clarify the final program and new concerns identified during and after program implementation. Work on a number of trailing actions is in progress or have already been completed (PFMC 2012). One such action was to address the current level of restrictiveness of chafing gear regulations for the midwater trawl fishery.

The midwater trawl net chafing gear issue was brought to light in testimony provided by midwater trawl fishermen at the Council's September 2011 meeting. It was reported that the current chafing gear regulations, if enforced, would be very costly to the whiting industry (PFMC 2011 a). This is because the nets that they use in the Alaska pollock fishery have greater chafing gear coverage than Council area regulations allow to harvest whiting (which is discussed in the following section). A comparison of North Pacific Fishery Management Council (NPFMC) and Pacific Fishery Management Council (PFMC) regulations as they apply to midwater (pelagic) trawl gear is provided in Appendix A. The comparison shows the NPFMC regulations provide for unlimited coverage of the codend of midwater trawl nets while the PFMC regulations are much more restrictive (Appendix A) The NMFS provided a report on the regulatory history of chafing gear restrictions in the PFMC management area in that same meeting (PFMC 2011b).

An image of the codend of a whiting tow showing the net being brought up the vessel ramp appears below.

Image of codend with whiting catch being hauled up stern ramp (courtesy of David Jincks).

[1] In addition, as previously mentioned, the West Coast regulations limit chafing gear placement on the codend to the 50 most terminal meshes regardless of codend length.

The trawl fishery chafing gear regulation changes over the years have primarily related to the use of chafing gear on the codend of the net. The codend is the terminal, closed end of a trawl net (50 cfr 600.10 Definitions). The most problematic conflict in NPFMC and PFMC area regulations pertain to the use of chafing gear in the PFMC area (Appendix A). A summary of the PFMC area chafing gear and pertinent codend regulation changes over the years follows. The current provisions for trawl net protection are shown in Table 1-1.

1980's: Minimum mesh sizes regulations were adopted; it was clarified that the minimum mesh size of 3 inches for pelagic trawl nets applied to the codend. Federal regulations defined the codend as the terminal 50 meshes of the trawl net (49 FR 11640; March 27, 1984.) (NMFS 2012).

Amendment 4 to the Groundfish FMP (August 1990) specified that the minimum mesh size for pelagic trawl of 3 inches applied to the last 50 meshes of the net ending at the terminal closed end of the codend (PFMC 1990). There was no limitation on chafing gear coverage on nets.

1991: For pelagic trawls, chafing gear covering the top side of the codend had a minimum mesh size restriction of 6 inches (NMFS 2012). Chafing gear regulations requiring that chafing gear be of large mesh material were implemented in an attempt to prevent the use of chafing gear materials and fastening methods that effectively reduce the escapement of small fish through the mesh of the net.

1992: The chafing gear regulations were changed to limit chafing gear coverage on all nets to no more than 50 percent of the net circumference, with no section being longer than 50 meshes and no connection at the terminal end of the net. There was a chafing gear exception for transfer cables and chokers on pelagic trawl nets (NMFS 2012). The chafing gear changes were intended to ensure that the use of chafing gear did not modify the effects of the codend mesh regulations. The purpose of chafing gear was described as protection of the underside of the net without unduly or intentionally restricting escapement of fish through the webbing. Chaffing gear was to be allowed only on the outside of the net. A new definition for pelagic gear was also considered for a net as they were not intended to come in contact with the sea floor.

The 1996 gear restrictions specified that the minimum mesh size restrictions for trawl gear applied throughout the net. Those regulations (61 FR 34590; July 2, 1996) also put in place the current chafing gear wording, not including the provision limiting chafing gear coverage to the last 50 meshes of the net (Table 1, Chafing (chafe) gear (3)), which was added later.

In 2002 limited entry trawl gear restrictions were modified and regulatory language added that indicates that chafing gear is prohibited on the body of small footrope trawls. The current chafing gear regulations were in place except for the provision that limited chafing gear coverage to the last 50 meshes (Table 1, The reader was referred to a section addressing small footrope trawls (nets with footrope diameter of 8 inches or smaller). This was done to discourage trawling with small footrope trawl nets in rocky areas (NMFS 2012)

In 2003, the regulation paragraphs were renumbered. The pelagic trawl description was moved from paragraph 660.322 (b)(5) to paragraph 660.322 (b)(6). As a result of the change, the cross reference for the pelagic trawl exception referring to the allowance for a band of mesh (a skirt) encircling the net under transfer cables, lifting or splitting straps (chokers) no longer referenced the pelagic trawl paragraph, but rather referenced the large and small footrope trawl gear paragraph.

At the start of 2005, the trawl footrope regulations were modified so that large and small footrope trawl nets were defined in separate paragraphs and the definition of selective flatfish was added (69 FR 77034; December 23, 2004). The cross reference for the pelagic trawl exception for a "skirt" remained in error.
In 2006 Chafing gear changes were considered with the 2007-2008 harvest specifications. The Council's GMT reviewed the proposed trawl regulations (which were the same as current regulations) and concluded the regulations formerly in place for midwater trawl gear had been inadvertently removed from the regulations. The Council recommended that the regulation be revised to ensure they are reinstated for midwater trawl gear and maintained for small footrope trawl.

In the proposed rule, NMFS reiterated that groundfish trawl nets are regulated to minimum mesh sizes to ensure that juvenile fish may escape through the trawl mesh. Depending on how chafing gear is configured on a trawl net, it can have the effect of reducing the mesh size and result in increased small fish bycatch (71 FR 78657; September 29, 2006).

2007-Present: Current regulations have been in place.

Table 1-1. Current trawl net protection provisions

(1)	Chafing gear may encircle no more than 50 percent of the net's circumference (§660.130(b)(3))
(2)	No section of chafing gear may be longer than 50 meshes of the net to which it is attached (§660.130(b)(3)).
(3)	Chafing gear (when used on the codend) may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend (§660.130(b)(3)).
(4)	Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net (the terminal end is the end farthest from the mouth of the net). Chafing gear must be attached outside any riblines and restraining straps (§660.130(b)(3)).
(5)	There is no limit on the number of sections of chafing gear on a net (§660.130(b)(3)).
(6)	A band of mesh may encircle the net under transfer cables, lifting or splitting straps, but must be: over riblines and restraining straps and of the same mesh size and coincide knot-to-knot with the net to which it is attached (§660.130(b)(6)).

1.5 Council and Agency Scoping

Chronology of meetings and actions leading to chafing gear regulation change proposal

Date	Meeting	Action
September 14-19, 2011	Council meeting, San Mateo, CA	Public comment is received describing chafing gear regulation conflict; Council action is taken to prioritize future trailing actions including chafing gear issue; Trawl Rationalization Regulation Evaluation Committee (TRREC) is tasked with providing comments on issues identified for implementation in 2013 including chafing gear issue.
October 27, 2011	TRREC meeting, Portland, OR	Recommendation 5: At November Council meeting adopt a general alternative to status quo midwater gear requirements including chafing gear; Council staff should work with industry to develop a midwater trawl regulation for presentation at the March 2012 Council meeting.
November 2-7, 2011	Council meeting, Costa Mesa, CA	TRREC report is presented; Council voted to move forward with TRREC recommendations
March 2-7, 2012	Council meeting, Sacramento, CA	The chafing gear regulation proposal was presented as part of a broader trawl gear regulation review; Council voted to move forward with the chafing gear issue ASAP using alternative 2 (Industry recommendation) as the preliminary preferred.
April 1-6, 2012	Council meeting, Seattle, WA	A decision document was presented with analyses provided for two action alternatives addressing the chafing gear issue; the industry alternative is adopted as the final preferred alternative.
September 14-18, 2012	Council meeting, Boise, ID	NMFS asked Council to reconsider the range of alternatives in its Final Preferred Alternative (FPA) for chafing gear action; Council removed the alternative that would eliminate all chafing gear restrictions and replaced it with one recommended by the Groundfish Advisory Panel.
November 2-7, 2012	Council meeting, Costa Mesa, CA	Council action to reconsider FPA

CHAPTER 2 DESCRIPTION OF ALTERNATIVES

2.1 Alternatives

The proposed alternatives are based on industry and Pacific Fishery Management Council (PFMC; Council) and advisory body input, and comparison of PFMC and North Pacific Fishery Management Council (NPFMC) regulations pertaining to chafing gear coverage allowance for midwater (pelagic) trawl nets. There are two action alternatives under consideration in addition to the No Action alternative for the proposed action. The alternatives are as follows.

2.1.1 No Action Alternative

Current regulations affecting chafing gear coverage of the codends of trawl nets, including midwater nets, used in the Council area are shown in Table 1-1. This regulation set has been in place since the 2007 season; prior to that season the limitation on chafing gear coverage to the last 50 meshes only applied to small footrope trawl nets (NMFS 2012).

> **Definition at §660:** Chafing gear means webbing or other material attached to the codend of a trawl net to protect the codend from wear.
>
> (The definition of codend at §600.10 would remain unchanged - Codend means the terminal, closed end of a trawl net.)
>
> 660.130 Trawl fishery—management measures.
> (b) Trawl gear requirements and restrictions. . ..
> (3) Chafing gear. Chafing gear may encircle no more than 50 percent of the net's circumference. No section of chafing gear may be longer than 50 meshes of the net to which it is attached. **Chafing gear may be used only on the last 50 meshes**, measured from the terminal (closed) end of the codend. Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net. (The terminal end is the end farthest from the mouth of the net.) Chafing gear must be attached outside any riblines and restraining straps. **There is no limit on the number of sections of chafing gear on a net.**
> **. . . .**
> (6) Midwater (or pelagic) trawl gear. . . . A band of mesh (a "skirt") may encircle the net under transfer cables, lifting or splitting straps (chokers), but must be: over riblines and restraining straps; the same mesh size and coincide knot-to-knot with the net to which it is attached; and no wider than 16 meshes.

Under status quo, the environmental impact mechanism would be that enforcement officers would begin to enforce the new regulatory interpretation that chafing gear can be applied to only the last 50 meshes of the codend of mid-water gear (enforcement of this regulation has been deprioritized while this policy evaluation is underway).

2.1.2 Action Alternatives

The action alternatives described below are proposed to apply to midwater codends used in the PFMC management area. Current regulations (§ 660.130 (c)(3) restrict the use of midwater codends in the area, as follows:

- Midwater trawl nets may be used in the entire EEZ north of 40˚ 10' N. lat., but only by vessels participating in and during the primary whiting season[2].
- South of 40˚ 10' N. lat. midwater trawl nets may be used year round but only seaward of the RCA.

Modifications to midwater gear will affect the use of that gear not only when targeting whiting but when targeting other species as well. Prior to 2002, there was an active midwater trawl fishery for widow rockfish, yellowtail rockfish and, to a lesser extent, chilipepper rockfish. When widow rockfish became overfished, the use of midwater gear in northern waters was restricted to the whiting fishery. Fishery management policies that were developed to rebuild widow attempted to restrict widow harvest to bycatch. Targeting opportunities were eliminated by restricting the use of midwater gear to the whiting fishery and trip limits for widow and yellowtail rockfish (which are often caught jointly with widow) were reduced to prevent targeting on widow during whiting fishing opportunities. The trawl rationalization program created the opportunity for individual vessels to be fully responsible for their groundfish catch, including discards. With that policy change, the restrictive trip limits that prevented widow and yellowtail harvesting during the primary fishery were eliminated. In order to target any species with midwater gear, a vessel only needed to acquire sufficient QP to cover its catch (moreover, it was required to have sufficient QP to cover bycatch in whiting targeted tows). This presence of this non-whiting midwater fishing opportunity was identified in Council discussions during deliberations on the 2011-2012 biennial specifications and there was a qualitative discussion of potential impacts this fishing opportunity might have on overfished species in the 2011-2012 EIS. Given the current regulatory structure, change in the regulations affecting midwater trawl will affect the use of that gear in targeting any species of groundfish during the whiting season (as limited by the availability of QP to cover catch).[3]

Alternative 1 (previous final preferred alternative): Allow for broader and longer chafing gear coverage on the codend

The proposed policy:

> Chafer may cover the bottom and sides of the codend in either one or more sections. Chafers can only be attached at the open end of the codend (end closest to trawl mouth)

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[3] Over the last year, there have been discussions (TRREC and September 2012 Gear Workshop) of the possibility of changing regulations to allow the use of midwater gear outside the whiting season.

and sides. The terminal end (end closest to terminal end of codend) or the end of each chafer section if using multiple chafers must be left unattached. The only chafer allowed on the top codend panel would be reinforced netting panels under lifting, and constraining straps. All chafers will conform to codend mesh size regulations.

The purpose of the chafer panels is to minimize damage to the codend netting from wear against the stern ramp and trawl alley during net retrieval. This alternative would allow for chafing gear coverage on the entire length of the codend in addition to coverage of the bottom and sides of thecodend. Current restrictions limit the coverage to 50% if the net circumference; the proposed change would allow for 75% coverage of the codend circumference assuming each codend panel is equal in size. Current regulations limit chafer gear coverage to the last 50 meshes of the codend; the proposed change would allow chafer coverage the entire length of the codend, which for large whiting nets could be 130 ft (>500 meshes for a 3 inch stretch mesh net) or longer.[4] Under this alternative there would be no limitation on size of chafer panel that can be used on the codend; a single panel or multiple panels could be used to cover the entire length of codend. This alternative would still be more restrictive than the Alaskan regulations but would be sufficiently flexible to allow gear to be used in both areas (based on Alaskan practices as reported by industry)

Alternative 2: Allow for longer chafing gear coverage and flexibility in chafer panel size and application on the codend

The proposed policy

Eliminate the restriction which limits the application of chafing gear to the last 50 meshes of the panel.

Option a) Eliminate the restriction on the length of a single chafer panel.
Option b) Maintain the requirement that any single panel of chafing gear not exceed 50 meshes in length

This action alternative was developed by the Council's Groundfish Advisory Panel (GAP). This alternative differs from Alternative 1 by retaining the current net circumference limitation of 50%, but allows for chafer coverage on the entire length of the codend. This alternative would also allow to either (1) remove the current limitation on size of chafer panels that can be used on the codend (Alternative 2a) or (2) retain the current limitation on size of chafer panel that can be used on the codend (Alternative 2b).

The provision to allow for chafer coverage the entire length of the codend is the same as provided in Alternative 1 and differs from current regulations, which limit the coverage to the terminal 50 meshes. Current regulations limit chafer panel size to no more 50 codend meshes. Under Alternative 2a there would no restriction on size of chafe panel size but would still require that the terminal end of each panel be open for small fish to escape; this alternative would allow for a single chafer panel on the codend. Under alternatives 2a and 2b, there would continue to be

[4] Information on legnth of nets from personal communications with Sara Skamser, Foulweather Trawl, Newport OR; David Jincks, GAP, September, 2012.

no limitation on number of chafer panels. A comparison of current net protection provisions and the action alternatives is provided in Tablem 2-1. This alternative would be more restrictive than the Alaskan regulations and would no allow all gear configured for the Alaskan fishery to be used on the West Coast. It may be adequate to provide for most of the desired amount of codend coverage. However, given that covering a greater percentage of the net is not costless, and that in the north, where there are no restrictions in this regard, fishermen sometimes cover 75% of the circumference of their nets, there are likely to be less cost reduction from this alternative as compared to Alternative 1.

Table 2-1. Comparison of chafing gear alternatives relative to the elements of current regulations (Alaska regulations are provide in Appendix A)

	Element							
Alternatives	Net circle limitation	Limitation on single panels	Net coverage limitation	Attachment procedure	Lift strap limitation	Minimum mesh size	Panel attachment procedure	No. panels
Status Quo	50%	50 codend meshes	50 end meshes	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 1 (FPA)	Side and bottom of codend, (assumes up tp 75% if sections equal size)	no limit	codend	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 2	50%	Option a) no limit Option b) 50 codend meshes	codend	Outside riblines and straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit

2.1.3 Alternatives Considered But Rejected From Further Analysis

One alternative would be would be the same as status quo regulations, but would allow for 75% chafing gear coverage of the codend. This alternative is virtually the same as the current alternative which allows bottom and side panels to be covered, assuming that the cross section of the mesh is square. Alternative 1 provides more flexibility to optimally protect the portions of the cod-end most likely to be subject to wear in situations where a cross section of the net is not perfectly square.

An alternative was considered to eliminate all chafing gear restrictions as they apply to midwater trawl gear (PFMC 2012). This alternative is comparable to the chafing gear regulations in place in the NPFMC area (Appendix A). The NPFMC regulations are very liberal as they apply to chafing gear placement on the net; they only prohibit "chafe protection attachment" to the footrope or fishing line (50 CFR 679.2) (Appendix A, Table 1). There is no restriction on the placement of chafing gear on the codend. The PFMC regulations are complex in comparison. For example, the regulations limit chafing gear placement on the codend to the 50 most terminal meshes regardless of codend length and limit chafing gear coverage of the codend to 50% of the net circumference (Table 1-1). These latter restrictions are the most difficult for the vessel owners to comply with because the nets that they use in the NPFMC area have greater chafing gear coverage on the codend than PFMC regulations allow. According to one industry member, chafing gear used in Alaska is applied to the bottom and sides of the codend and sometimes to a straight tubular netting section ahead of the codend. The purpose of chafer panels is to minimize damage to the codend netting from wear against the stern ramp and trawl alley during net retrieval and from occasional contact with the ocean floor. This alternative was rejected from considerations because it would allow for up to 100% chafing gear coverage of the net, including the main body and the codend, which could be damaging to biota escaping the net and could encourage fishing on or near the ocean bottom with associated adverse impacts to bottom habitats and bottom organisms. Moreover, such a provision would likely be in conflict with the Council's bycatch mitigation program (Amendment 18).

CHAPTER 3 AFFECTED ENVIRONMENT

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.

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 discussion below is taken from: Final EA on Trailing Actions for Pacific Coast Groundfish Trawl Rationalization Program (PDF 1.3MB—(October 2011) and from the13-14Spex DEIS (May 2012)

3.1 Physical Environment, including Essential Fish Habitat and Ecosystem

3.1.1 Physical Oceanography

A divergence in prevailing wind patterns causes the west wind drift (North Pacific Current) when it reaches the North American Continent, 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 California Current 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). A more detailed description of the physical and biological oceanography of west coast marine ecosystems can be found in Volume 1 of the 2008 SAFE document (Council, 2008c)

3.1.2 Interannual and Interdecadal Climate Forcing

The effects of climate on the biota of the California Current ecosystem have been recognized for some time (Hubbs, 1948). The El Niño/Southern Oscillation (ENSO) is widely recognized to be the dominant mode of interannual variability in the equatorial Pacific, with impacts throughout the rest of the Pacific basin and the globe (Mann and Lazier 1996). During the negative (El Niño) phase of the ENSO cycle, jet stream winds are typically diverted northward, often resulting in increased exposure of the west coast of the U.S. to subtropical weather systems. The impacts of these events to the coastal ocean generally include reduced upwelling winds, deepening of the thermocline, intrusion of offshore (subtropical) waters, dramatic declines in primary and secondary production, poor recruitment, reduced growth and survival of many resident species (such as salmon and groundfish), and northward extensions in the range of many tropical species

(McGowan, et al. 1998; Pearcy 2002; Pearcy and Schoener 1987; Wooster, et al. 1985). There is reduced availability of many forage species, particularly market squid, and juvenile survival of most rockfish is extremely low. Concurrently, top predators such as seabirds and pinnipeds often exhibit reproductive failure. In addition to interannual variability in ocean conditions, the North Pacific seems to exhibit substantial interdecadal variability, which is referred to as the Pacific (inter) Decadal Oscillation (PDO).

Within the California Current itself, Mendelssohn, et al. 2003) described long-term warming trends in the upper 50 to 75 m of the water column. Recent paleoecological studies from marine sediments have indicated that 20th century warming trend in the California Current have exceeded natural variability in ocean temperatures over the last 1,400 years. Statistical analyses of past climate data have improved our understanding of how climate has affected North Pacific ecosystems and associated marine species productivities. Our ability to predict future impacts on the ecosystem stemming from climate forcing events remains poor at best.

3.1.3 Biogeography

Along the U.S. west coast within the California Current system, spatial patterns of biological distribution (Biogeography) have been observed to be influenced by various factors including depth, ocean conditions, and latitude. Each is discussed in Volume 1 of the 2008 groundfish SAFE document (Council 2008c), and is hereby incorporated by reference.

3.1.4 Essential Fish Habitat

EFH has been described within the project area for highly migratory species, CPS, salmon, and groundfish. The MSA defines EFH to mean "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802 sec. 3(10)). Regulatory guidelines elaborate that the words "essential" and "necessary" mean EFH should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem." The regulatory guidelines also establish authority for Councils to designate Habitat Areas of Particular Concern (HAPC) based on the vulnerability and ecological value of specific habitat types. Councils are required to minimize, to the extent practicable, the potentially adverse of fishing on EFH and HAPCs. EFH for highly migratory species, CPS, and salmon are discussed in detail in Volume 1 of the 2008 groundfish SAFE document (Council 2008c), which is incorporated herein by reference.

3.1.5 Distribution of Midwater Fishery and Habitat Interactions

The MSA requires Fishery Management Councils for each Fishery Management Plan to identify fishing activities that may adversely affect Essential Fish Habitat (EFH) and to minimize adverse effects of those activities to the extent practicable. Fishing activities include those regulated under the Pacific Coast Groundfish FMP that affect EFH identified under other FMPs, as well as fishing activities regulated under other FMPs that affect EFH designated under the Pacific Coast Groundfish FMP. The most common and direct effect of fishing on groundfish EFH results from fishing gear coming in contact with bottom habitats. Fishing gears can cause physical harm to corals, sponges, rocky reefs, sandy ocean floor, eelgrass beds, and other components of seafloor habitats.

Chemical effects from fishing activities could derive from anti-fouling paint, oil or gas spills, bilge waste, or other potential contaminants associated with commercial or recreational vessels operating in freshwater, estuaries, or the marine environment. Biological effects include introducing invasive species from bilge waters in fishing vessels that can disrupt communities upon which managed fish species rely.

Fishing gear used in groundfish fisheries have the potential to adversely affect EFH for Pacific Coast groundfish. These include fishing activities not managed under the MSA that may adversely affect groundfish EFH.

Mid water trawls are used to harvest Pacific whitingand some pelagic rockfish speciesunder the FMP(chilipepper, widow, yellowtail)). Like bottom trawling, it is managed under the Pacific groundfish FMP. Effects are generally limited to the effects of (1) removal of prey species, (2) direct removal of adult and juvenile groundfish, (3) occasional, usually unintentional, contact with the bottom (Devit 2011), and (4) effects resulting from loss of trawl gear, potentially resulting in impacts to bottom habitats and ghost

The following figures show the distribution of whiting fishing based on port of departure for the 2007 season. . For purpose of analysis, the coast was divided up into eight geographic regions and tows were assigned to each region based on the starting point of the tow. Each dot represents one tow within the respective regional polygon shown in the figures, but the dots are randomly distributed within each polygon. (The polygons bound all tow locations within the given year.) In general, polygons with no dots indicate areas where data was excluded for confidentiality (less than 3 vessels fishing in those areas.

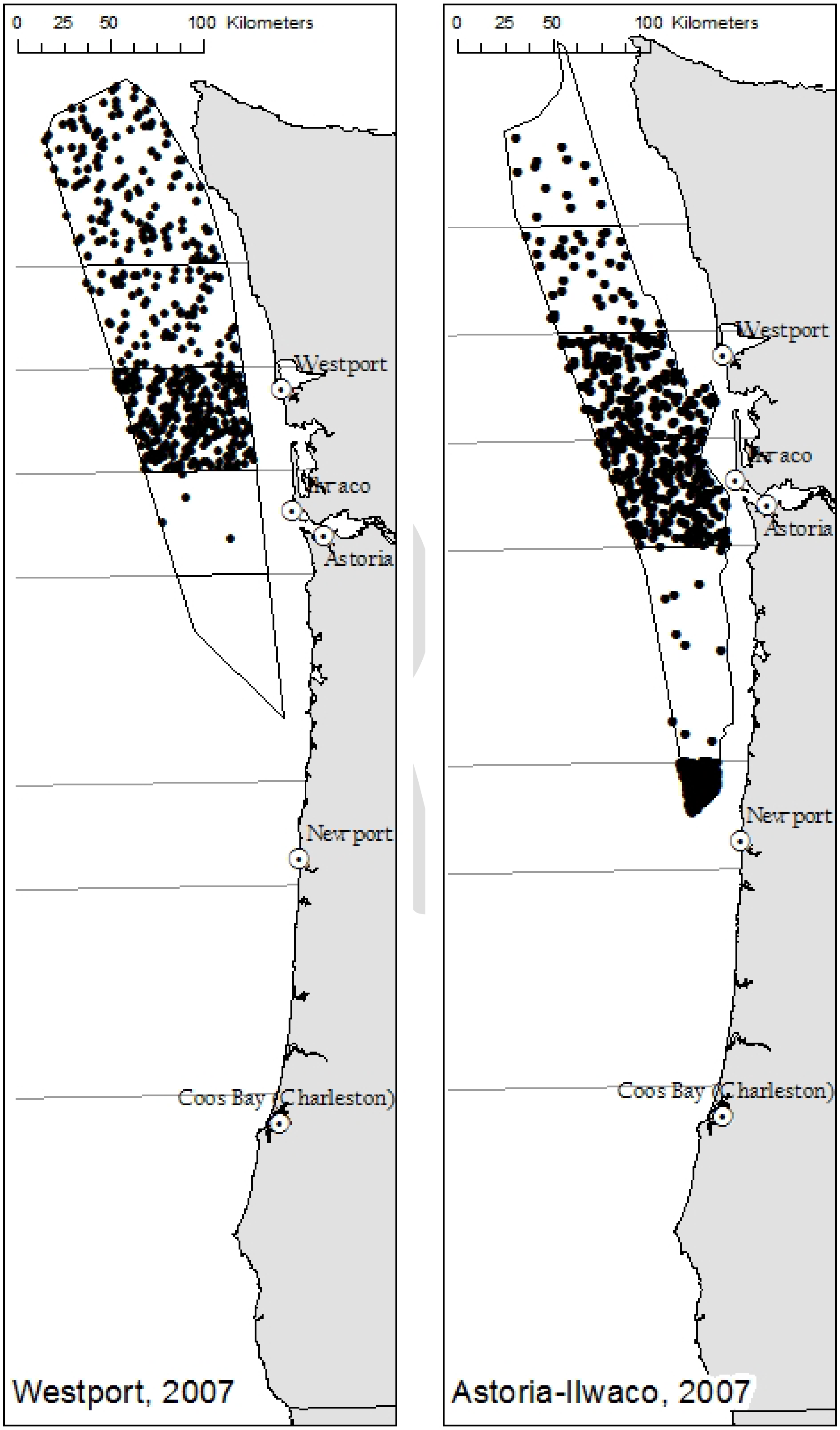


Figure 3-1. Westport and Astoria 2007: tows on trips for vessels departing from and returning to the same port (one dot per tow, randomly distributed within the region in which the tow occurred, blanks indicate confidential areas (areas where fewer than 3 vessels operated).

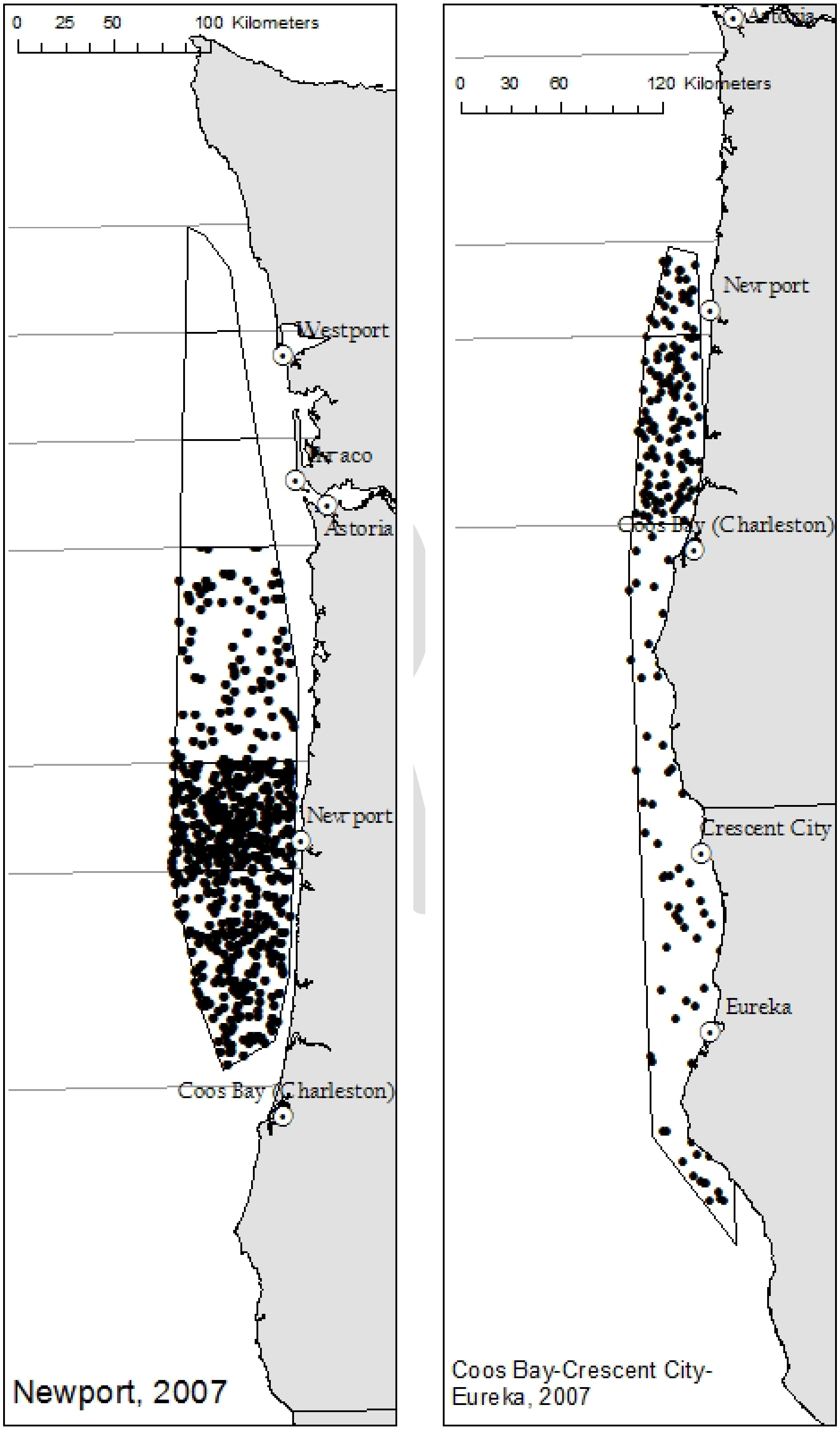
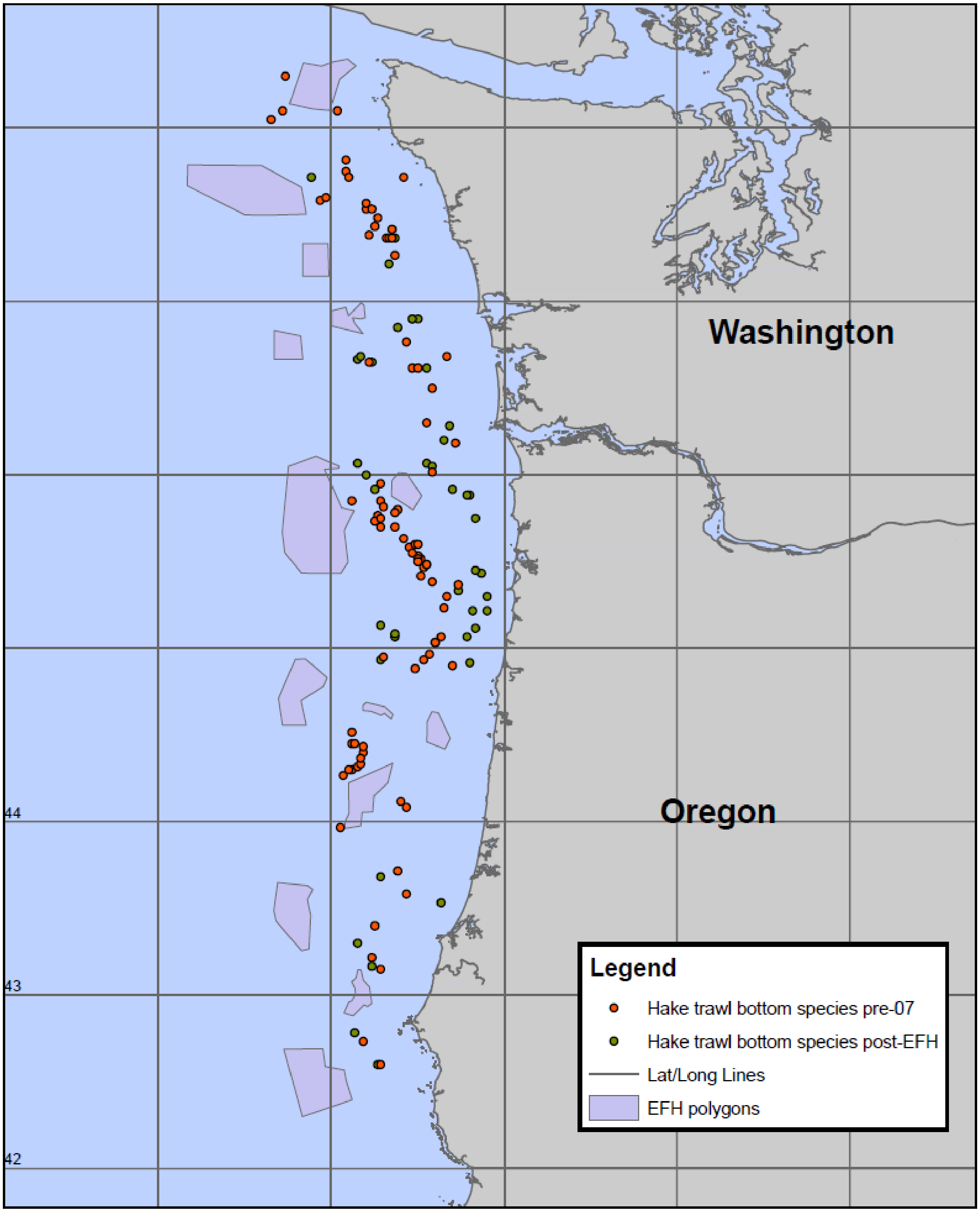


Figure 3-2. Newport and Coos Bay-Crescent City and Eureka 2007: tows on trips for vessels departing from and returning to the same port (one dot per tow, randomly distributed within the region in which the tow occurred, blanks indicate confidential areas (areas where fewer than 3 vessels operated).



Locations of bottom species caught
in the Whiting Trawl Fishery

Peterson, R. 10.13.2011

Bycatch of corals and sponges in the at-sea hake fleet (C/Ps, MPs & TPs), as recorded by observers of the At-Sea Hake Observer Program (ASHOP)[5], is relatively rare (Table 3-1). This is most likely due to the fact that the at-sea hake fleet uses mid-water trawl gear, which typically does not contact the seafloor. Between 2000 and 2010, 38 kg of combined bycatch of corals, bryozoans, sea pens/whips and sponges have been recorded for vessels in the at-sea sector. Bycatch was recorded in 0.4 percent of all observed tows in that 11-year period. Although frequency and standardized catch (CPUE) have decreased in the last 5 years, the relatively low rate of bycatch makes it difficult to interpret any meaning from that change.

Table 3-1: Summary of coral and sponge bycatch metrics for observed tows using mid-water trawl gears as part of the At-Sea Hake Observer Program (ASHOP), comparing two time periods: 2000-05 and 2006-10. "#" denotes number of tows where bycatch was recorded; "FREQ" denotes ratio of tows with bycatch to total tows observed; "Weight" denotes bycatch (kg); "CPUE" denotes bycatch per unit of effort (units: kg/hr.). Tow counts represent only those where corals or sponges were present in the catch. 2000-05

	2000-2005				2006-2010				2000-2010			
Taxon	#	FREQ	Weight	CPUE	#	FREQ	Weight	CPUE	#	FREQ	Weight	CPUE
coral/bryozoan			9.8	3.60E-04			0.4	1.10E-05			10.2	1.70E-04
sea pen/whip			17.3	6.40E-04			10.9	3.20E-04			28.1	4.60E-04
sponge			0.1	1.90E-06			0	NA			0.1	8.20E-07
Combined	67	0.50%	27.2	1.00E-03	33	0.20%	11.2	3.30E-04	100	0.40%	38.4	6.30E-04

The above data support the belief that there is very little bottom contact by midwater nets as currently used in the by the at-sea fleets.

3.2 Biological Resources

Federal regulations at 50 CFR 600.10 define the term "fishery management unit" to mean: "a fishery or that portion of a fishery identified in an FMP relevant to the FMP's management objectives. The choice of an FMU depends on the focus of the FMP's objectives, and may be organized around biological, geographic, economic, technical, social, or ecological perspectives."Fish stocks that are classified as FMU species are considered to be in the fishery, whether as target or non-target species. Federal regulations at 50 CFR 600.310(d)(3) and (4) provide the following definitions for "target stocks" and "non-target species," both of which are considered FMU species:"Target stocks" are stocks that fishers seek to catch for sale or personal use, including "economic discards" as defined under Magnuson-Stevens Act section 3(9)."Non-target species" and "non-target stocks" are fish caught incidentally during the pursuit of target stocks in a fishery, including "regulatory discards" as defined under Magnuson-Stevens Act section 3(38). They may or may not be retained for sale or personal use. Non-target species may be included in a fishery and, if so, they should be identified at the stock level. Some nontarget species may be identified in an FMP as ecosystem component (EC) species or stocks.

[5] Unlike the limited-entry trawl sectors, observer coverage in the at-sea hake fleet is very near 100 percent.

3.2.1 Target Species

The primary target species of the midwater trawl fishery since 2001 has been Pacific whiting (whiting) chilipepper rockfish. However, historically (pre-2000) the pelagis rockfish species were more commonly targeted with midwater and bottom trawl gear. Since 2011 and the implementation of trawl rationalization, interest in targeting widow and yellowtail rockfish by vessel participating in the whiting fishery has increased. The midwater trawl fishery has been essentially limited to whiting because of restrictions aimed at protecting overfished rockfish species, widow rockfish in particular. That situation is expected to change in the near future because widow rockfish has been declared to be recovered from overfishing and the OY increased to allow for directed rockfish fishing using midwater trawl gear. As the widow rockfish ACL increases more targeting by whiting vessels is expected to occur. The midwater trawl regulations will allow for directed rockfish fishing during the primary whiting season (May 15 or June 15 depending on fishery sector) north of 40˚ 10' N. lat. The regulations already allow for directed rockfish fishing south of that landmark but the fishery using midwater gear is limited to waters seaward of the RCA where abundance of the three target species is relatively low.

Pacific Hake (Whiting)

The following is from CDFG 2001a. Pacific hake are distributed from the Gulf of Alaska to the Gulf of California. Four major stocks have been identified within this area. The most abundant and widely distributed stock (which is the subject of this report) spawns between central California and northern Baja California and is referred to as the “coastal stock.” Two of these stocks are generally referred to as the “inside stocks;” they live and spawn in Puget Sound and the Strait of Georgia. A fourth major stock occurs off the west coast of southern Baja California. The oceanic coastal stock of adult Pacific hake is migratory and inhabits the continental slope and shelf within the California Current system from Baja California to British Columbia. It is often classified as a demersal species (living on or near the sea bed), but its distribution and behavior suggests a pelagic existence. It exhibits extreme night and day movement during spring and summer feeding migrations as it feeds on a variety of pelagic fishes or zooplankton. It is commonly found at depths of 160 to 1,500 feet but has been found from the surface to 2,600 feet. Coastal Pacific hake are pelagic spawners that appear to spawn from January to March. The location of spawning appears to center on the Southern California Bight, but spawning may take place within an area from San Francisco to Baja California at depths of 660 to 1,600 feet and as far as 300 miles offshore. Active spawners aggregate in loose, stationary bands that can be up to 150 feet thick.

Coastal stock females mature at 16 inches total length or larger, and at weights greater than 0.9 pounds. These minimum sizes are achieved by some three-year-old fish and most four-year-old fish. Fecundity estimates range from 80,000 to 500,000 eggs per female, depending on body size. The pelagic eggs drift with the ocean currents and hatch in about three days. Larval hake are abundant from December through April within 25 miles of the coast from central California to northern Baja California. Peak occurrences of eggs and small larvae pinpoint January and February as the chief spawning months. The majority of eggs and larvae are found over the areas of the continental slope where bottom depths ranged from 430 to 1,640 feet. Hake reach about 70 to 75 percent of their maximum length and about 50 percent of their maximum weight by age 4.3 years. As hake get older, differential growth is observed between the sexes with females attaining larger lengths and weight at age than males. Average maximum sizes are 22 inches fork length (FL) and 2.25 pounds for males, and 24 inches FL and three pounds for females. The largest female hake measured off California was 34 inches FL.

In late winter, following spawning, adult hake migrate north in deep water overlying the continental slope to the summer feeding grounds off northern California, Oregon, Washington, and Vancouver Island. The peak period of northward migration appears to be in March and April. The migration behavior of hake is strongly age dependent, and influenced by oceanographic conditions. In warm years, a significant portion (up to 50 percent) of the stock may move into Canadian waters off Vancouver Island. Large adults may travel up to 1,100 miles, while newly mature hake may travel a maximum of 900 miles from southern California spawning grounds during the summer feeding period. Hake caught from Oregon to Vancouver Island range from 16 to 18 inches FL and are four to 10 years old.

Young-of-the-year are usually concentrated off central and northern California, and one year old hake are found in nearshore waters from central California to northern Oregon. Range extensions to the north occur during El Niños, as evidenced by reports of whiting from southeast Alaska during warm water years. During the warm periods experienced in 1990s, there have been changes in typical patterns of distribution. Spawning activity has been recorded north of California, and frequent reports of unusual numbers of juveniles from Oregon to British Columbia suggest that juvenile settlement patterns have also shifted northward. Because of this, juveniles may be subjected to increased predation from cannibalism and to increased vulnerability to fishing mortality.

When northward-migrating hake inhabit waters overlying the continental shelf and slope, they form schools, which may be characterized as long, narrow bands whose axis is usually oriented parallel to the depth contours. Exceptions to this generality are those schools that align perpendicular to the edge of the continental shelf and extend offshore at a uniform depth, such that they are high-off the bottom over the continental slope. School sizes may vary in length from several hundred feet to 12 miles. The widths of schools have reached 7.5 miles at times. Most schools usually have a vertical height of 20 to 70 feet. During the summer, when feeding adults are distributed over the continental shelf, schools exhibit pronounced movement into midwater associated with nighttime feeding activities. Hake feed during the evening on euphausiids, shrimp, and pelagic fishes. Vertical movement away from the sea bed occurs at nightfall and descent back towards the bottom occurs near dawn. At dawn, coastal hake descend and begin to regroup into schools near the sea bed (seven to 70 feet above the ocean floor), usually in the same area where they were the day before. The degree to which hake congregate during the day appears to be related to the type of food that was available during the feeding period. Schools are more dispersed when feeding on fish and other mobile nekton, but more compact when feeding on euphausiids.

The southward spawning migrations of the adults appears to occur in November and December, just prior to the spawning period. Availability of Pacific hake to bottom and midwater trawls off

Oregon, Washington, and Vancouver Island drops sharply in November and is practically nil during winter. Hake are a favorite prey for a great many creatures, especially marine mammals such as seals, sea lions, porpoises, and small whales. Hake have also been found in the stomachs of swordfish, lingcod, soupfin sharks, Pacific halibut, electric rays, and an assortment of other piscivorous fishes.

The most recent stock assessment for whiting was in 2011 (IJTCPH. 2012). The base-case stock assessment model indicated that the Pacific hake female spawning biomass was well below the average unfished equilibrium in the 1960s and 1970s. The stock is estimated to have increased rapidly after two or more large recruitments in the early 1980s, and then declined rapidly after a peak in the mid- to late 1980s to a low in 2000. This long period of decline was followed by a brief increase to a peak in 2003 (median estimate of 1.29 million mt in the SS model) as the exceptionally large 1999 year class matured. The stock is then estimated to have declined with the aging 1999 year class to a time-series low of 0.38 million mt in 2009. This recent decline is much more extreme than that estimated in the 2011 assessment. The current median posterior spawning biomass is estimated to be 32.6% of the average unfished equilibrium level (*SB0*). However, this estimate is quite uncertain, with 95% posterior credibility intervals ranging from historical lows to above the average unfished equilibrium levels. The estimate of 2012 is 0.62 million mt, much smaller than the two estimates in the 2011 assessment (1.87, and 2.18 million mt). This change is largely driven by the very low 2011 acoustic survey biomass index.

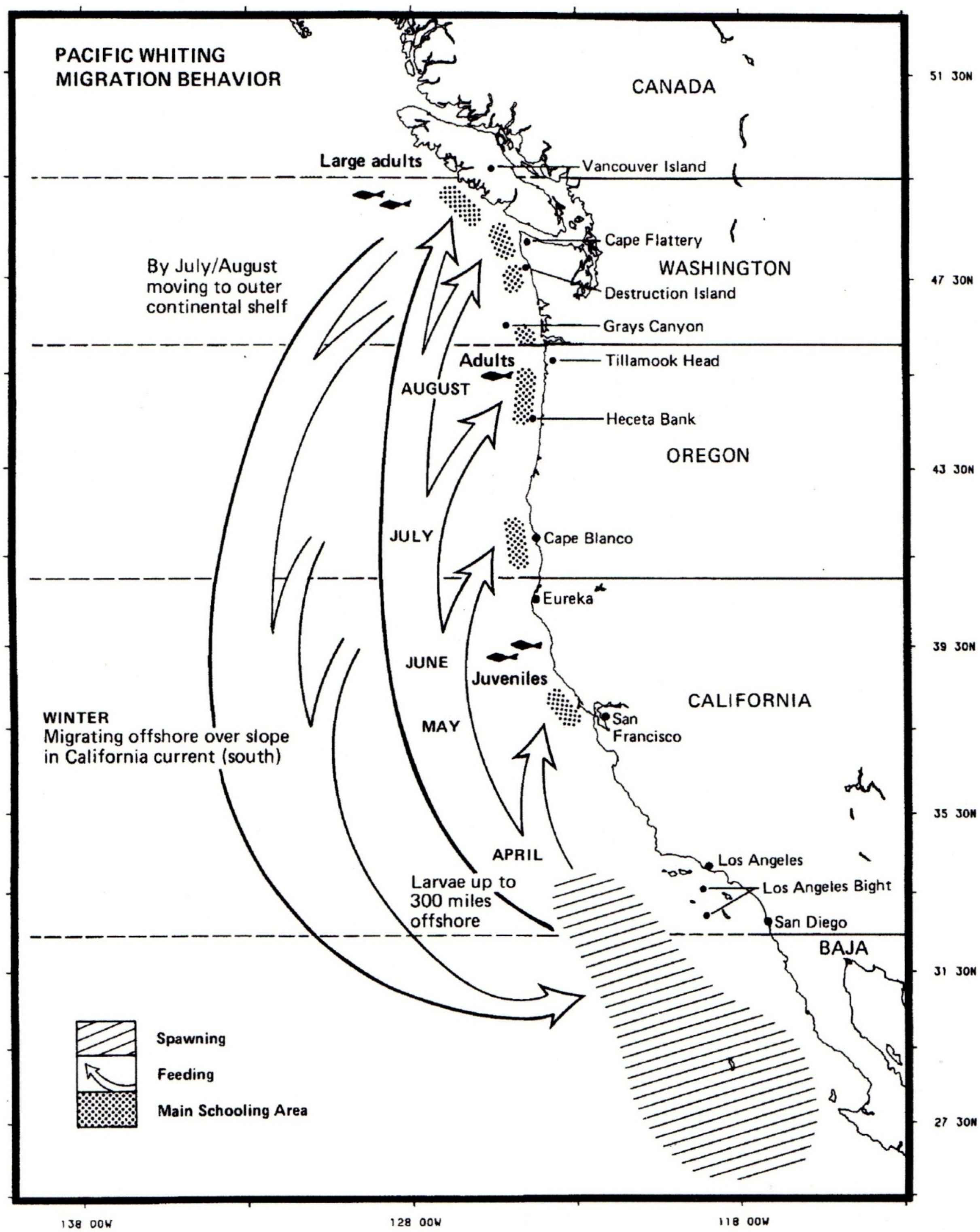


Figure 3-3. Migratory pattern of Pacific whiting (Bailey et al 1982)

Widow rockfish:

The widow rockfish *(Sebastes entomelas)* was an untargeted species in northern California prior to 1979. Before that it had been taken primarily with bottom trawl from widely spaced aggregations in 40-140 fathoms. These aggregations produced high catch rates during the fall and spring, which are the mating and spawning seasons for the species. In 1979 a highly directed midwater trawl fishery developed for widow rockfish. New technology, incorporating the use of electronic navigation, fish finding equipment, and midwater nets, extended fishing operations into previously unfished areas and enabled vessels to follow shifts in widow rockfish concentrations throughout the year. (Quirollo 1987, Demory 1987). Schooling behavior of widow rockfish allows them to be targeted easily by fishermen, and catches (when the fishery was active) were often 100% widow rockfish. Species most commonly caught incidentally to widow rockfish include yellowtail rockfish and Pacific whiting. Other *Sebastes* landed with widow rockfish include Pacific ocean perch, bocaccio, canary rockfish*),*and sharpchin rockfish (Tagart 1987).

The following is from CDFG 2001b. Widow rockfish are found from Todos Santos Bay, Baja California, to Kodiak Island, Alaska. Peak abundance is off northern Oregon and southern Washington, with significant aggregations occurring south to central California. While many commercial catches occur at bottom depths between 450 and 750 feet, young fish occur near the surface in shallow waters, and adults have been caught over bottom depths to 1,200 feet. Widow rockfish often form midwater schools, usually at night, over bottom features such as ridges or large mounds near the shelf break. The schooling behavior of widow rockfish is quite dynamic and probably related to feeding and oceanographic conditions. There appears to be some seasonal movement of fish among adjacent grounds, and there is evidence that fish move from area to area as they age, with fish of the same size tending to stay together. The maximum recorded age for widow rockfish is 59 years, but fish older than 20 years are now uncommon. Most are less than 21 inches long, corresponding to a weight of just under five pounds. The maximum size is 24 inches or about 7.3 pounds. At first, growth is fairly rapid and by age five widow rockfish average 13.5 inches. By age 15, growth slows greatly, when the average size is about 19 inches for females and 17.5 inches for males. Widow rockfish do not become reproductive until years after birth. For example, only 50 percent are mature by age five, but almost all are mature by age eight when they are 16.5 inches long. Off California, fecundity ranged from 55,600 eggs for a 12.8-inch female to 915,200 eggs for an 18.8-inch fish. The release of larvae by widow rockfish peaks in January-February and appears to occur in the same areas where they are caught during that season. The larvae are about 0.2 inch when released. The young fish lead a pelagic existence until they are about five months old. During the latter part of the pelagic stage, the two-inch fish feed mostly on copepods and small stages of euphausiids. Adult widow rockfish feed on midwater prey such as lantern fish, small Pacific whiting euphausiids, sergestid (deep-water) shrimp, and salps. Juvenile rockfish, including widow rockfish, are important prey items for sea birds and Chinook salmon in May and June. Little is known about predation of adult widow rockfish.

The most recent widow rockfish assessment in 2011 applied to widow rockfish (*Sebastes entomelas*) located in the territorial waters of the U.S., including the Vancouver, Columbia, Eureka, Monterey, and Conception areas. The stock is assumed to be a single mixed stock and subject to five major fisheries (He et al 2011). Stock spawning biomass of widow rockfish showed a steady decline between 1980 and 2001, soon after major commercial fisheries for widow rockfish began. The stock was declared overfished in 2001. A stock that has declined to less than 25% of its unfished spawning biomass is considered "overfished" until it rebuilds to 40% of its unfished spawning biomass. The most recent stock assessment showed that the stock had rebuilt to a depletion level of 51 % and a spawning stock size of 36,342 mt. The assessment showed that the stock has rebuilt (He et al 2011).

Yellowtail rockfish

The following is from CDFG 2001c. Yellowtail rockfish are found from Kodiak Island, Alaska to San Diego, although they are rare south of Point Conception. They are wide-ranging and are reported to occur from the surface to 1,800 feet and are known to form large schools, either alone or in association with other rockfish, including widow rockfish, canary rockfish, redstripe rockfish, and silvergray rockfish. They are primarily distributed over deep reefs on the continental shelf, especially near the shelf break, where they feed on krill and other micronekton. Some allozyme and parasitological evidence supports the view that multiple stocks exist, whereas other genetic data indicate one single coastal stock. Like many other species of rockfish, yellowtail is long lived. The age distribution of fish sampled in commercial fisheries off Oregon and Washington can span six decades, with the oldest known specimen a 64-year-old male. They typically reach their maximum size at about 15 years of age and the largest recorded specimen was a 28-inch female. Females begin to mature at 10 to 15 inches, with half reaching maturity by a size of 15 to 18 inches; males do not grow quite as large as females.

The most recent stock assessment for yellowtail rockfish showed the following: The estimated age 4+ biomass in 2004 for the stock north of 40 10 N. lat. was estimated to be 72,152 mt with a 26% CV, an increase from 58,025 mt in 2003. The spawning biomass has remained above 40% of unfished spawning biomass since 1995. Annual fishing mortalities have been less than FMSY since 1997, due to more restrictive regulations put in place to rebuild other overfished rockfishes (Wallace and Lai 2005).

Chilipepper rockfish

Chilipepper range from Queen Charlotte Sound, British Columbia to Magdalena Bay, Baja California. The area of greatest abundance is found between Point Conception and Cape Mendocino, California (Field 2007). Adults are found on deep rocky reefs, as well as on sand and mud bottoms, from 150 to 1,400 feet; juveniles school and are frequently found in shallow nearshore waters, particularly in kelp beds. Spawning occurs from September to April with a peak occurring in December and January. About 50 percent of female chilipepper are sexually mature at four years when they are between 11 and 12 inches, while males mature at two years and between eight and nine inches. Chilipepper attain a maximum age of 35 years and a size of up to 23 inches, with females growing substantially larger than males. Adults feed on krill and other small crustaceans, squid, and a variety of small fishes. Probable predators of chilipepper include marine birds and mammals, Chinook salmon, lingcod, Pacific hake, sablefish, and other rockfish (CDFG 2001d).

The last stock assessment of chilipepper in 2007 indicated the stock was in quite good condition. The base model in that assessment suggested a spawning biomass of 23,889 tons in 2006, corresponding to approximately 70% of the unfished spawning biomass of 33,390 tons and representing a near tripling of spawning biomass from the estimated low of 8,696 tons (26% of unfished) in 1999 (Field 2007). Although chilipepper rockfish have been a commercially important species in California waters since well before the second World War, the exploitation rate has rarely exceeded the current target exploitation rate (SPR 50%). The highest exploitation rates occurred from the late 1980s through the mid 1990s, when they were above target levels and the stock was approaching it's lowest estimated historical levels. From the late 1990s through the present, exploitation rates have been declining significantly, as a result of management measures implemented to rebuild other depleted rockfish species (Field 2007).

3.2.2 Nontarget Species

The biological resources covered in this subsection include those species that share the same marine environment both temporally and spatially with Pacific whiting (coastal stock), a principal species under consideration in this assessment. 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 (Table 3-3). When measured as a percentage of the amount of whiting taken, the 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 3-3:. Nontribal at-sea Pacific whiting catch (mt) by species and year, 1995-2007 (PFMC 2011).

Year	Pacific Whiting	Yellowtail Rockfish	Widow Rockfish	Dogfish	Squid	Chub Mackerel	Other	Bycatch proportion
1995	100,383	780	218	186	25	0	318	0.015
1996	110,931	618	256	87	16	239	248	0.013
1997	120,964	300	198	208	9	51	175	0.008
1998	120,039	398	295	220	70	452	457	0.016
1999	115,046	693	161	272	23	1	614	0.015
2000	114,460	537	226	79	95	16	488	0.012
2001	94,250	123	167	77	80	47	400	0.009
2002	62,935	14	135	37	35	0	103	0.005
2003	67,236	2	12	11	101	0	110	0.003
2004	97,277	18	20	341	1,123	0	159	0.017
2005	127,421	73	79	70	745	0	240	0.009
2006	134,219	63	139	23	92	4	156	0.004
2007	121,075	68	145	86	66	0	131	0.004
Avg	106,634	284	158	131	191	62	277	0.010

The fish species of special conservation or allocation concern in this report include canary, darkblotched and widow rockfish, Pacific ocean perch, Pacific salmon, green sturgeon, eulachon, and Pacific halibut. While the weight of these fish is small in comparison to the whiting catch, the impact is important in terms of species protection and recovery and/or fishery allocation objectives.

Groundfish

Section 3.1.1 in the Groundfish Harvest Specifications FEIS' (Council 2011, Council 2012) describes the species and stocks managed under the Groundfish FMP. This information is incorporated by reference and summarized below. More than 90 fish species are managed under the Groundfish FMP: The remaining discussion on Biological Resources is taken from the Council DEIS (2012). Presented below are only those species specifically associated with the whiting fishery.

Overfished Groundfish

The most recent stock assessments for overfished groundfish species that are impacted in the Pacific whiting fishery has shown improving recovery trends (measured as a percent of unfished stock) for canary and darkblotched rockfish (from 10 percent for both species to 24 percent and

30.2 percent, respectively) and that widow rockfish has successfully rebuilt (51.1 percent of unfished). The status trend for POP continues to show very low recovery rate (19.1 percent of unfished), which is substantially below the status objective for all rockfish stocks of 50 percent of unfished population size (NMFS 2012).

Other Groundfish

Other roundfish species not discussed above are occasionally caught in the at-sea whiting fisheries including yellowtail rockfish, dogfish, lingcod, sablefish, and thornyheads. Except for yellowtail rockfish and dogfish, their numbers are typically very small, but their occurrences are not unusual.

Pacific Halibut

Pacific halibut (Hippoglossus stenolepis) belong to a family of flounders called Pleuronectidae. Pacific halibut are managed by the bilateral (U.S./Canada) International IPHC with implementing regulations set by Canada and the U.S. in their own waters. The Pacific Halibut Catch Sharing Plan for waters off Washington, Oregon, and California (Area 2A) specifies IPHC management measures for Pacific halibut on the west coast. Pacific halibut are occasionally caught in the whiting fishery.

Coastal Pelagic Species (CPS)

CPS are taken incidentally in the groundfish fishery, and are believed to be most vulnerable to midwater trawl gear compared to other groundfish gear types. Estimates of total catch in the mothership, catcher/processor, shoreside and tribal whiting fisheries from 2007-2010 ranged from nil for Pacific mackerel in 2009 to 1,226 mt for squid (unidentified) in 2008.

Highly Migratory Species and Salmon

Highly migratory species, such as albacore, are rarely encountered in the at-sea whiting fishery while salmon are not unusual in the catch, especially when trawling during May and June shoreward of the continental slope (PFMC 2008). The major concern with salmon interception has to do with listed species impacts, which are discussed below.

3.2.2.5 Misc. non-groundfishm

3.2.3 Protected Species, including ESA

A variety of species are protected by applicable law (other than the MSA) with the objective of sustaining or rebuilding their populations from critically depleted levels. The applicability of these laws to the action area is described in Chapter 5. Section 3.3 of the 2011-2012 Groundfish Harvest Specifications FEIS and Section 3.18 and 3.19 (Council, 2011) of the Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery FEIS (Council, 2010b) describe protected species in the action area that interact with groundfish fisheries. This information is incorporated by reference and summarized here.

ESA-listed Salmon and Steelhead

Salmon caught in West Coast groundfish fisheries originate in fresh water streams and rivers from Central California to Alaska. NMFS has identified seven ESUs that are mostly likely to be more affected by the groundfish fisheries ranging geographically from the Sacramento River (winter-run) to Puget Sound (NMFS 2006b)). Salmonids caught in the whiting fishery during 2005-2010 ranged from 2,740 in 2009 to 11,916 in 2005. Chinook were by far those most common salmonid in the whiting fishery catch ranging from 82 percent in 2007 to 99 percent in 2010 (NMFS). Salmon bycatch rates tend to be higher closer to shore and earlier in the season. This may explain the higher bycatch rate for the tribal mothership sector since these vessels fish within the tribal usual and accustomed areas, and have less flexibility to make spatial adjustments in response to salmon bycatch. The shorebased sector, for cost and operational reasons, tends to fish closer to shore. However, no such factors adequately account for inter-annual variation in bycatch. Previous work found no “obvious or consistent correlation” between annual Chinook abundance and bycatch (page 19 in NMFS 2006b). Ocean conditions may play a role, but specific causative factors, at least any that can be used predicatively, cannot be identified.

Green Sturgeon

The southern distinct population segment (DPS) of North American green sturgeon was listed as threatened under the ESA in 2006 (71 FR 17757), and critical habitat was designated in 2009 (74 FR 52300). Green sturgeon bycatch in the at-sea hake fishery was very low, as the At-Sea Hake Observer Program only recorded a total of 3 green sturgeon from 2002-2010.

Eulachon

Eulachon are found in the eastern North Pacific Ocean from northern California to southwest Alaska and into the southeastern Bering Sea. The southern DPS of eulachon was listed as threatened under the ESA in 2010 (75 FR 13012). The eulachon southern DPS is defined from the Mad River in northern California, north to the Skeena River in British Columbia. A summary of the BRT report on eulachon is attached as Appendix B. Eulachon are an anadromous fish. Adults migrate from the ocean to freshwater creeks and rivers where they spawn from late winter through early summer. The offspring hatch and migrate back to the ocean to forage until maturity. Once juvenile eulachon enter the ocean, they move from shallow nearshore areas to deeper areas over the continental shelf. There is little information available about eulachon movements in nearshore marine areas and the open ocean. Eulachon are incidentally caught in the groundfish trawl fisheries and are shown below.

Table 3-1 shows estimates of the number of eulachon caught by trawl fisheries 2002-2011. Eulachon appears to be encountered in the at-sea hake fishery as bycatch with more occurring in the catcher-processor sector of the fishery than the other sectors (Table 3-1). The highest eulachon bycatch in this mid-water trawl fishery was in 2011 with 1,322 individuals being caught. The depth distribution of observed tows encountering eulachon bycatch from 2002-2010, inclusive, indicates that 86 percent of tows that encountered eulachon, as well as 86 percent of the eulachon encountered, were in the depth range of 60-90 fm. The shallowest observed tow that encountered eulachon was at 19.5 fm and the deepest observed tow was at 118.5 fm.

Table 3-1. Eulachon catch estimates by fishery 2002- 2010. (Al-Humaidhi et al. 2011).

	Bycatch estimate by fishery (number of fish) a/b/		
Year	LE trawlc/	At-sea whiting (mothership and catcher/processor	Tribal Whiting
2002	821	0	0
2003	52	0	0
2004	5	0	0
2005	0	0	1
2006	0	145	0
2007	72	10	0
2008	0	43	0
2009	67	36	32
2010	21	0	0
2011	not available	1,322	160

a/ Point estimates of bycatch fluctuate due to a number of non-biological factors, including annual variation in observer coverage rates, fishing behavior, and various physical characteristics. Estimates of observer data uncertainty are presented the form of confidence intervals around bycatch estimates.
b/ Does not include data representing catch in the shoreside whiting fishery
c/ includes all LE trawl not just those vessels targeting whiting

3.2.4 Marine Mammals and Seabirds, including MMPA and MBTA

Marine Mammals

U.S. West Coast waters support a variety of marine mammals. Approximately 30 species, including seals, sea lions, sea otters, whales, dolphins, and porpoise, occur within the EEZ. Many species seasonally migrate through west coast waters, while others are year-round residents. Two of nine listed marine mammal species that occur in the Council area have a higher probability of encounter in groundfish fisheries: sperm whales (Endangered) and Stellar sea lions (Threatened) (Council 2012).

Among the marine mammals catches estimated in groundfish trawl fisheries, bycatch estimates have been highest for California sea lions, which were caught primarily in trawl nets in the limited entry trawl (bottom and whiting) (Council, 2012). Steller sea lions were the next highest, which were also caught in trawl nets in the at-sea whiting sectors, the limited entry trawl (bottom trawl and whiting) and California halibut trawl fisheries. Stellar sea lions taken on the west coast are believed to be primarily from the eastern stock (east of 140° west longitude). The majority of elephant seals were taken in the at-sea whiting fisheries (Council, 2012).

Seabirds

The California current system supports a diverse array of seabird species. Species found on the west coast include resident species and transitory species (migrating or foraging). All the California Current system seabirds are highly mobile and require an abundant food source to support their high metabolic rates (Ainley, et al. 2005). A total of 10 species or species groups of seabirds were documented to interact with the groundfish fishery during 2002-2009. The at-sea whiting fishery interactions were with blackfooted albatross (0-3 per year), common murre (0-3 per year), northern fulmar (0-to about 50 per year), sooty shearwater (0-8 per year), unspecified tubenose species (0-6 per year) and unspecified alcid species (0-3 per year) (Council 2012).

3.2.5 Ecosystem Considerations

3.2.6 West Coast Marine Ecosystems

The California Current Ecosystem (CCE) is loosely defined as encompassing most of the U.S. and Canada west coasts, from the northern end of Vancouver Island, British Columbia, to Point Conception, California. The trophic interactions in the CCE are extremely complex, with large fluctuations over years and decades (Mann and Lazier 1996; Parrish, et al. 1981).

To some degree, food webs are structured around coastal pelagic species (CPS) that exhibit boom-bust cycles over decadal time scales in response to low frequency climate variability (Bakun 1996; Schwartzlose, et al. 1999), although this is a broad generalization of the trophic dynamics. Similarly, the top trophic levels of such ecosystems are often dominated by highly migratory species 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. For this description of the affected environment, the ecosystem is considered in terms of physical and biological oceanography, climate, biogeography, and essential fish habitat (EFH). A more detailed description of these elements of the environment is found in Council, 2008.

The Council is considering ecosystem-based approaches to fishery management and is in the process of developing a Fishery Ecosystem Plan (FEP) as a vehicle for bringing ecosystem-based principles into the Council decision-making process under its existing Fishery Management Plans (FMPs). The Council has also been exploring the plan's potential to broaden its current authority to species and issues not currently addressed in existing FMPs.

In June of 2011, the Council moved to develop an FEP with the adopted purpose of *"[enhancing] the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations and management policies that coordinate Council management across its FMPs and the California Current Ecosystem (CCE). An FEP should provide a framework for considering policy choices and trade-offs as they affect FMP species and the broader CCE."*

In November of 2011, the Council reviewed a draft FEP outline and considered the scope of the plan and provided the following guidance on tasks for 2012 and beyond:

- Develop an FEP that would be primarily advisory in nature, with the potential to expand the plan to include regulatory authority in the future, should the Council so desire;

- Continue to manage stocks and fisheries through existing FMPs, including developing potential new management measures for forage fish species through those FMPs, as the Council deems appropriate;
- Develop a list of West Coast species that are currently not included in any FMP, not managed under state authority, and not listed under the Endangered Species Act to, in part, define species by their trophic associations and ecological roles.
- Complete an analysis of unmanaged species and the potential processes and mechanisms for their potential management.

In November 2011, and again in April 2012, the Council requested that the Ecosystem Plan Development Team (EPDT) provide the Council with a report describing and analyzing the various possible regulatory authorities or mechanisms available to prohibit fishing for, or otherwise protect unfished species. The EPDT discussed this issue at its April 12, 2012 meeting in Seattle, WA. At that meeting, the EPDT identified four authorities to partially or wholly restrict fishing for unfished species.

(A) Existing tools available to the Council – using the Federal List of Authorized Fisheries and Gear

(B) Using FMP amendments to add species to fishery management plans (FMPs)

(C) Developing a new Ecosystem FMP

(D) Authorities available to entities outside of or ancillary to the Council process

The NPFMC has classified large groups of ecosystem component (EC) species that do not have close taxonomic associations with FMU species. The NPFMC chose its groups of forage fish species based on data from the groundfish trawl fisheries, where lower trophic level species were occurring as minimal bycatch. The FMPs prohibited directed fishing for the forage species categories and restricted the fisheries to minimal levels of bycatch for these species. The species within both of the NPFMC Groundfish FMPs' forage fish species categories are:

Osmeridae family (eulachon, capelin, and other smelts)
Myctophidae family (lanternfishes)
Bathylagidae family (deep-sea smelts)
Ammodytidae family (Pacific sand lance)
Trichodontidae family (Pacific sand fish)
Pholidae family (gunnels)
Stichaeidae family (pricklebacks, warbonnets, eelblennys, cockscombs, and shannys)
Gonostomatidae family (bristlemouths, lightfishes, and anglemouths)
Order Euphausiacea (krill)

The NPFMC does not establish annual harvest limits for its forage fish species and both FMPs state that there is insufficient information to provide EFH descriptions for forage fish species. Under Federal regulations at 50 CFR 679.20(i)(3): "directed fishing for forage fish is prohibited within the Bering Sea, Aleutian Islands, and Gulf of Alaska; the sale, barter, trade, or processing of forage fish is prohibited except as fishmeal; and, retained catch of forage fish not exceeding maximum retainable bycatch amounts set in Federal regulations at 50 CFR 679, Table 10 may be processed into fishmeal for sale, barter, or trade." NMFS's Alaska Fisheries Science Center reports on the life histories of and data available on the FMP forage fish species, but does not have adequate data to conduct stock assessments for these species groups (Ormseth 2011).[4]

For the NPFMC, the link between its groups of forage fish species and its Groundfish FMPs was that these forage fish species were being taken at minimal bycatch levels within their groundfish fisheries. To develop a similar list of forage fish as EC species for one or more of its FMPs, the Pacific Council might request that NMFS and the states review catch and landings data to assess which forage fish species or species groups might reasonably be considered bycatch within West Coast fisheries. Although EC species do not necessarily need to be bycatch species, there does need to be some nexus between an EC species or species group and the FMP that is used to regulate that species or species group. Assessing the need to minimize bycatch of EC species is one of the key reasons fishery management councils give for designating an EC species, but as described above, Federal regulations provide other potential reasons for identifying a species as an EC species.

The NMFS has compiled data on fish caught in the at-sea whiting fishery, which preliminarily, are considered forage fish species (Table 3-4). These are lower trophic level species that are preyed upon by higher level species such as most groundfish species, including Pacific whiting. The data for 2006-2011 show large swings in forage fish bycatch in the at-sea fishery measured in pounds from about 300 thousand in 2011 to 9.7 million in 2009. These wide swings in total catch were primarily attributable to catch of Humboldt squid. Removing Humboldt squid from the calculations leaves an annual range of forage fish catch of from 103 thousand to 335 thousand pounds and an average of 213,000 pounds. Several of the species identified as forage species are managed under Council FMPs including Coastal Pelagic Species (jack mackerel, northern anchovy, Pacific mackerel, and Pacific sardine) and Groundfish (shortbelly rockfish). The remaining species are under state management authority except for eulachon, which is classified as Threatened under the ESA.

The ratios of average whiting pounds to average species pounds for the years 2006-2011were highly variable between the different forage fish species. The range was from about 2.4 billion pounds of whiting, on average, for every pound of Pacific sandlance captured to 81 pounds of whiting, on average, for every pound of Humboldt squid captured. For all species combined, excluding Humboldt squid, about 1,239 pounds of whiting were caught, on average, for every pound, on average, of forage fish captured.

Eulachon were present in catches in small quantities in most of the years during 2006-2011. A total of 293 pounds was caught in 2011, the largest catch in any single year. That equates to about 3,600 fish assuming the fish averaged 1.31 oz each, which is, reportedly, the average weight of spawning Columbia River eulachon (BRT 2008). The ratio of average whiting pounds caught during 2006 to 2001 to average weight of eulachon caught during the same period was about 5.1 million pound of whiting for every one pound of eulachon (Table 3-4).

Table 3-4: At-sea catch of Pacific whiting and forage fish 2006-2011 NorPac 9/7/12 (Page 1)

ALL AT-SEA (MS, CP, TP)	Management status	Weight in lbs							
		2006	2007	2008	2009	2010	2011	Average	RATIO: WHITING AVG TO SPECIES AVERAGE
PACIFIC WHITING		308,126,510	278,309,024	397,925,092	159,094,198	159,094,198	282,354,502	264,150,587	1
AMERICAN SHAD	State managed	54,434	31,878	1,973	2,362	575	77,324	28,091	9,403
JACK MACKEREL	CPS FMP	22,453	804	8,705	3,085	3,256	31,473	11,629	22,714
LANTERNFISH UNIDENTIFIED	State managed	179	602	804	213	177	2,089	677	389,927
NORTHERN ANCHOVY	CPS FMP	0	0	1	0	2	1	1	514,579,066
PACIFIC HERRING	State managed	21,170	114	27	47	170	525	3,675	71,869
PACIFIC MACKEREL	CPS FMP	8,178	303	0	4	225	235	1,491	177,180
PACIFIC SAND LANCE	State managed	0	0	0	0	0	1	0	2,401,368,974
PACIFIC SANDDAB	Groundfish FMP	1	0	4	8	0	2	2	105,730,722
PACIFIC SARDINE	CPS FMP	630	833	555	2	221	33	379	696,885
PACIFIC SAURY	State managed	0	0	45	0	1	1	8	34,076,618
SHORTBELLY ROCKFISH	Groundfish FMP	25,047	15	0	0	7	0	4,178	63,222
SHRIMP UNIDENTIFIED	State managed	1	1	6	2	3	46	10	27,129,468
SMELT - DEEPSEA UNIDENTIFIED	State managed	0	0	22	16	1	245	47	5,581,629

Table 3-4: At-sea catch of Pacific whiting and forage fish 2006-2011 NorPac 9/7/12 (Page 2)

		Weight in lbs							
ALL AT-SEA (MS, CP, TP)	Management status	2006	2007	2008	2009	2010	2011	Average	RATIO: WHITING AVG TO SPECIES AVERAGE
SMELT - EULACHON	**ESA Threatened**	3	1	6	10	0	293	52	5,077,053
SMELT - RAINBOW	State managed	0	0	0	0	0	2	0	654,918,811
SMELT UNIDENTIFIED	State managed	0	0	0	1	0	3	1	378,258,597
SQUID HUMBOLT	State managed	1,881,557	1,614,883	6,090,081	9,583,561	323,465	24	3,248,929	81
SQUID UNIDENTIFIED	State managed	202,619	145,645	188,692	97,671	168,411	174,972	163,002	1,621
SMELT/HERRING UNIDENTIFIED	State managed	0	1	80	0	0	0	14	19,429,981
TOTAL		2,216,272	1,795,079	6,291,000	9,686,982	496,513	287,269	3,462,186	76
TOTAL W/O HUMBOLDT SQUID		334,715	180,196	200,920	103,421	173,048	287,245	213,257	1,239
RATIO: WHITING TO TOTAL		139	155	63	16	320	983	280	NA
RATIO: WHITING TO TOTAL W/O HUMBOLDT SQUID		921	1,544	1,981	1,538	919	983	1,314	NA

3.3 Description of the Socio-economic Environment

Section 3.2 in the 2013-14 Groundfish Harvest Specifications DEIS (PFMC 2012) describes commercial fisheries targeting groundfish. Associated with that description is a series of tables summarizing landings and ex-vessel revenues in the groundfish fisheries, landings, and revenue by port, and indicators of fishery participation. The DEIS, and associated tables, and data developed by Council staff using PacFIN and NorPac data are the primary sources of information for this Section. The document also provides information on Tribal and Recreational groundfish fisheries and Fishing Communities.

3.3.1 Pacific Whiting

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. The mothership sector depends on catcher vessels to deliver product to them. The catcher-processor sector is comprised of vessels that both catch Pacific whiting and process it on board. The Pacific whiting fishery is managed within the Groundfish Limited Entry Program. This program restricts the number of vessels that may use specified gear types to catch allocated groundfish. Limited entry permits define the groundfish trawl sector (further subdivided between vessels delivering catch shoreside, catcher vessels delivering Pacific whiting to at-sea mothership processors, and at-sea Pacific whiting catcher-processors) and the limited entry fixed gear sector, which uses longline and pot gear, mainly to catch sablefish.

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. Incidental catch of nonwhiting groundfish species in the Pacific whiting fishery 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.

To allow the Pacific whiting industry to have the opportunity to harvest the full Pacific whiting optimum yield (OY), the nontribal commercial fishery is managed with at-sea (CP & MP together) allocations for certain overfished species. Allocations are established for darkblotched rockfish, canary rockfish, POP, and widow rockfish. Regulations provide for the automatic closure of the commercial (nontribal) portion of the Pacific whiting fishery upon attainment of an overfished species allocation .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 or are projected to be caught. Althought, the authority has not been used to date.

Unlike set-asides that are taken as off-the-top deductions after setting the ACL, set-asides for some species are taken from the trawl allocation to accommodate bycatch in the at-sea whiting fishery (catcher-processor and mothership). Like other set-asides, these catches are not actively managed inseason, therefore the set-aside amounts need to be set high enough to accommodate the historical maximum or any increased catch that is anticipated. The at-sea sector initial set-asides were based on 2009-2010 catch evaluations. S set-asides are reconsidered with the biennial specification process.. The species include: Arrowtooth Flounder (Coastwide), Dover Sole (Coastwide) English Sole (Coastwide), Lingcod (N. of 40°10 N. lat.), Longnose Skate (Coastwide), Longspine Thornyhead (N. of 34°27 N. lat.), Minor Shelf Rockfish (N. of 40°10 N. lat.), Minor Slope Rockfish (N. of 40°10 N. lat.), Other Fish (Coastwide), Other Flatfish, (Coastwide), Pacific Cod (Coastwide), Pacific Halibut (Coastwide), Petrale Sole (Coastwide), Sablefish, (N. of 36° N. lat.), Shortspine Thornyhead (N. of 34°27 N. lat.), Starry Flounder (Coastwide), and Yellowtail rockfish (N. of 40°10 N. lat.).

Prior to 2011, the primary control rules used were sector allocations of whiting and key bycatch species, season start dates, and limited entry permits. The catcher-processor fishery was managed via an industry sponsored co-op. Under the Trawl Rationalization Program, the catch control rules now include whiting IFQs for the shoreside whiting sector (allocated to both processors and limited entry permit holders), co-ops for the at-sea sectors, catch history endorsements for mothership catcher-vessels, and limited entry permits for the mothership processors. Prior to 2011, the major monitoring methods were video cameras for shoreside sector, and observers on board the mothership processors and catcher-processors. There was no direct monitoring of mothership catcher vessels either by camera or observer. Shorebased processors or landing stations that wish to receive whiting from shoreside whiting trawlers now have to meet certain monitoring requirements including the use of catch monitors who observe the offload of the vessels and double check the accuracy of the fish tickets associated with the offload.

3.3.2 Whiting Harvests, Revenues, Prices

Whiting Harvests

Notes and Observations on Whiting Harvests (Figure 3-4)

- Total whiting harvests have varied over the years.
- Harvests track closely with HG/OY/ACL levels.
- Highest harvests (2006 - 589 million lbs) and lowest harvests (2009 - 268 million lbs) both occurred after 2003.

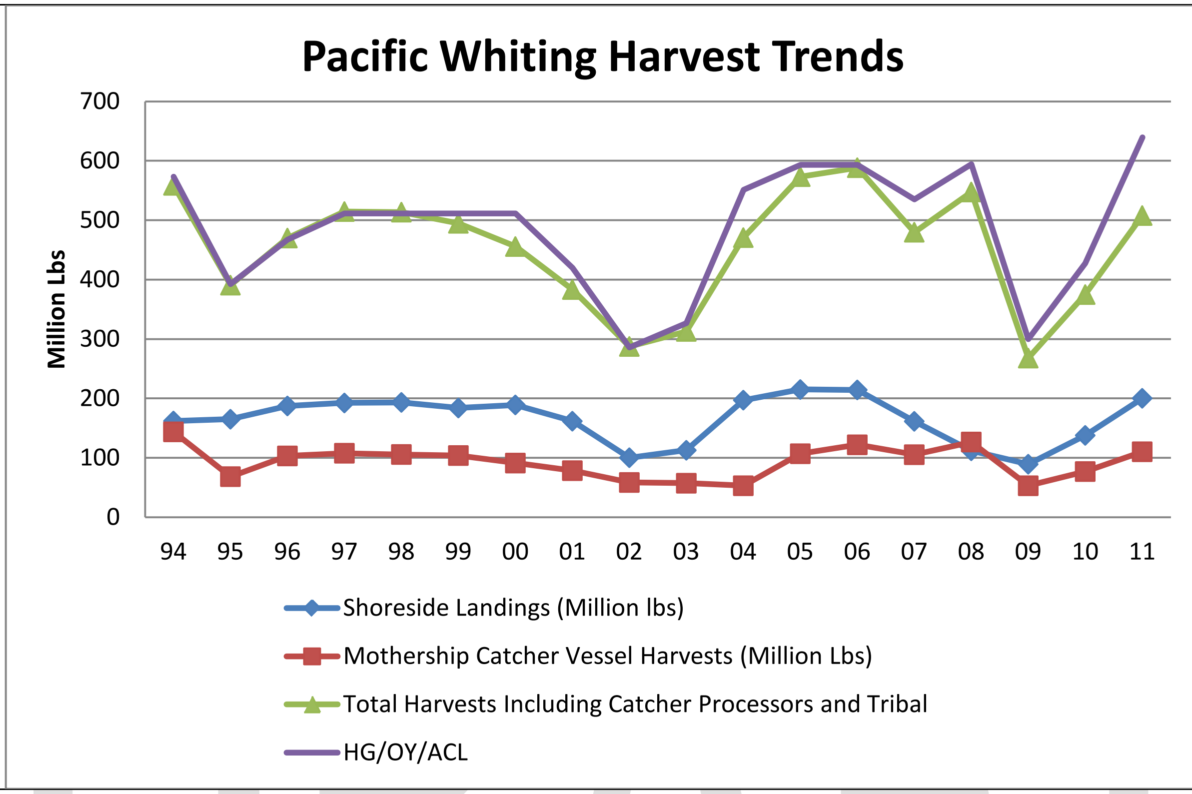


Figure 3-4. Pacific Whiting harvest trends.

Notes and Observations on Pacific Whiting Ex-vessel Revenues (Figures 3-5 and 3-6):

- Whiting ex-vessel revenues (including imputed exvessel revenues for CP sector) have ranged from a low of $12 million in 1996 to a peak of $60 million in 2008.
- Ex-vessel revenues began an increasing trend in 2003. It is presumed that the declines in 2009 and 2010 are due to the status of world economy and with OY/ACL levels. (See ex-vessel price and export trend below)
- When adjusted for inflation trends are similar trends.

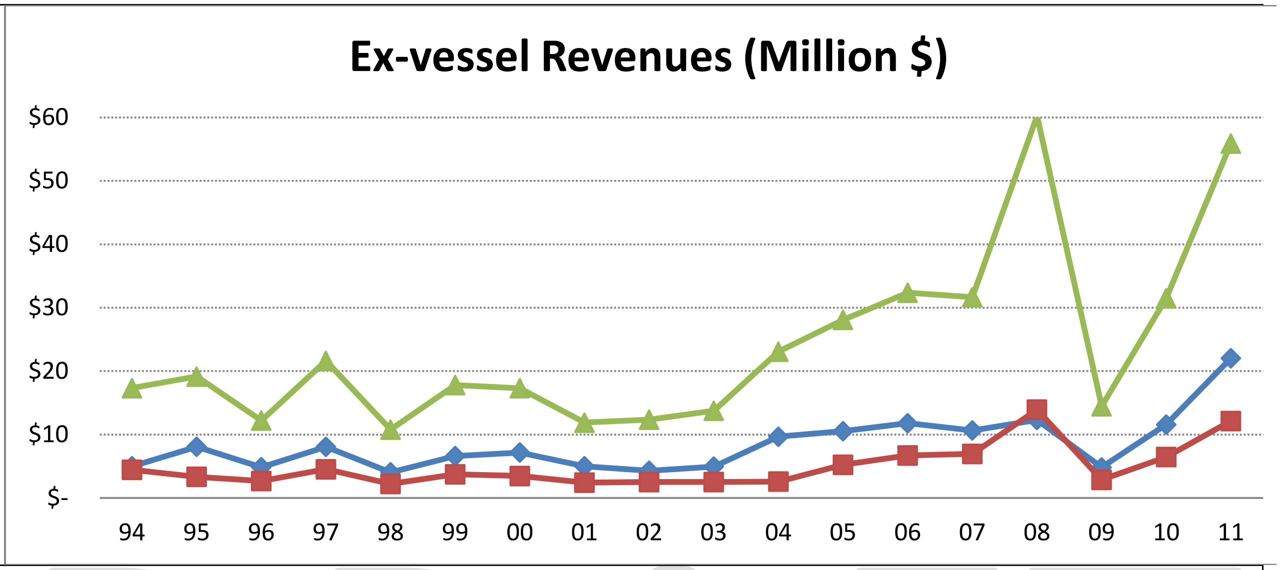


Figure 3-5. Pacific whiting ex-vessel revenue trends.

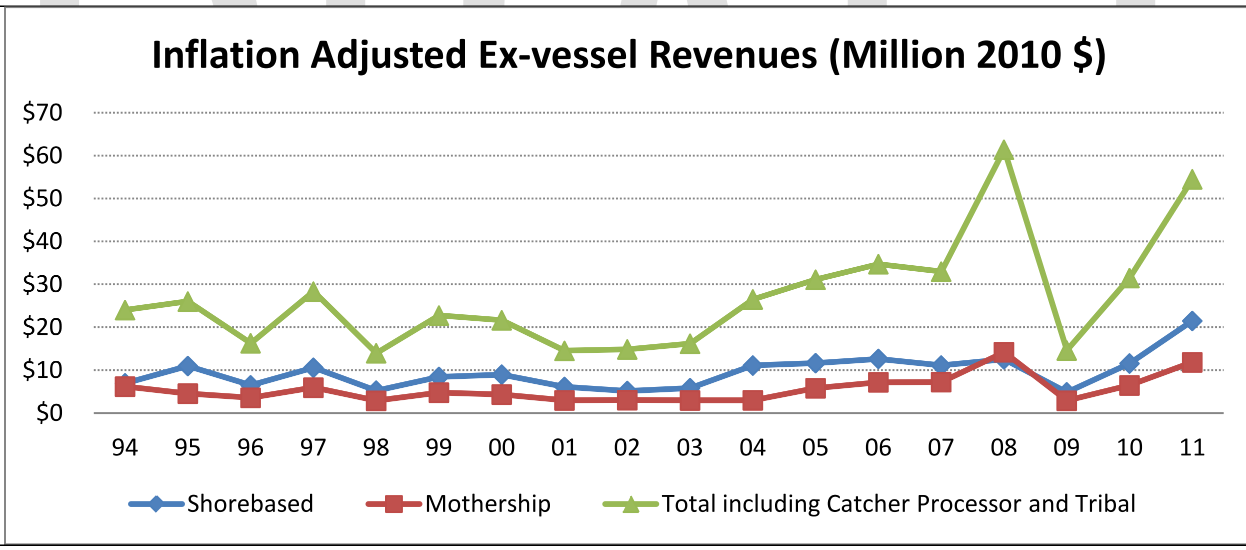


Figure 3-6. Pacific whiting ex-vessel revenue trends-inflation adjusted.

Notes and Observations on Whiting Ex-vessel Prices (Figure 3-7):

- Ex-Vessel price trends are similar to revenue trends.

- After taking into account the world recession in 2008- 2011, ex-vessel prices have been increasing since 2003, even as total harvests also increased.

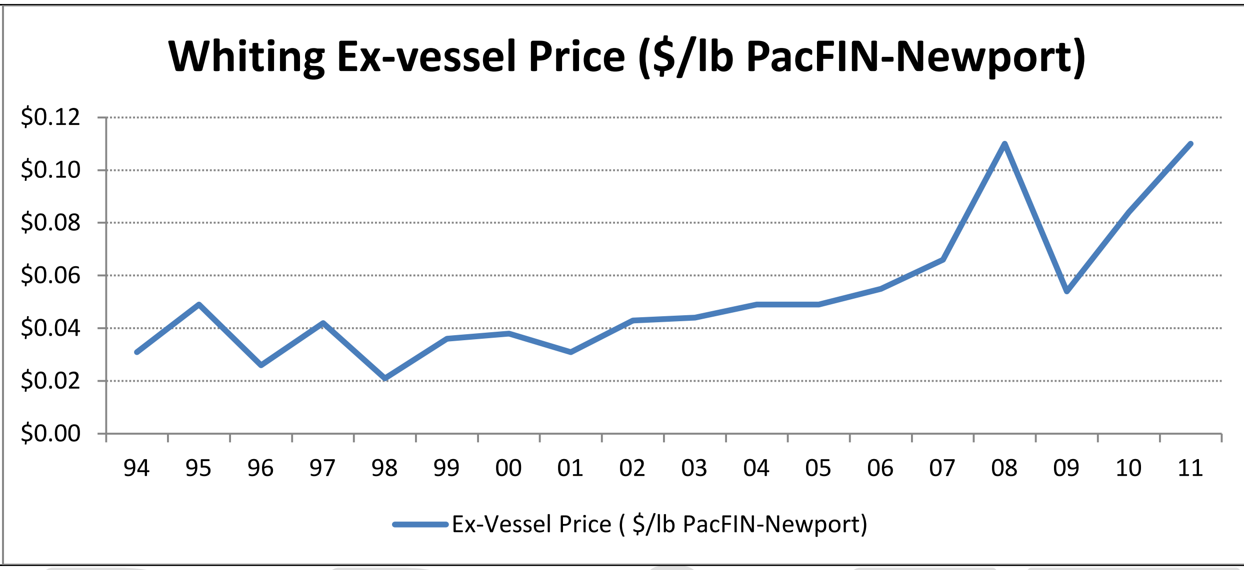


Figure 3-7. Pacific whiting ex-vessel price trends.

At-sea Sectors

The at-sea whiting sectors accounted for 21.9 percent of coastwide revenue during the baseline period, averaging $18.8 million per year (Table 3-5). The catcher-processor component garnered almost two-thirds of this revenue. Whiting fisheries had the highest year-to-year variability, with the catcher-processor and mothership catcher vessel components ranking third and fourth respectively behind only the tribal whiting sectors. Preliminary estimates for 2011 show 9 vessels participated in the whiting catcher-processor fishery, and 18 catcher vessels (and 5 motherships) participated in the mothership whiting sector.

Table 3-5. Groundfish ex-vessel revenue (inflation adjusted), 2005-2010, by fishery sector (top panel) and year-to-year percent change in revenue. (Source: PacFIN vdrfd table, 10/31/11.)

Sector	2005	2006	2007	2008	2009	2010	Ann. Avg.	Pct Total
At-sea catcher processors	$9,428,186	$10,134,108	$11,080,172	$24,517,340	$4,011,936	$9,546,576	$11,453,053	13.30%
At-sea mothership catcher vessels	$5,728,696	$6,930,776	$7,123,228	$15,400,000	$2,844,808	$6,169,777	$7,366,214	8.60%
Shoreside whiting trawl	$12,157,911	$13,606,554	$12,039,922	$11,891,171	$5,531,348	$10,033,034	$10,876,657	12.70%
Shoreside nonwhiting bottom trawl	$23,943,395	$24,390,064	$26,308,400	$32,115,396	$30,866,692	$25,344,495	$27,161,407	31.60%
Sector	2005	2006	2007	2008	2009	2010	Max	Min
At-sea catcher processors	0%	7%	9%	121%	-84%	138%	138%	-84%
At-sea mothership catcher vessels	0%	21%	3%	116%	-82%	117%	117%	-82%
Shoreside whiting trawl	0%	12%	-12%	-1%	-53%	81%	81%	-53%
Shoreside nonwhiting bottom trawl	0%	2%	8%	22%	-4%	-18%	22%	-18%

Because of the schooling, semi-pelagic nature of Pacific whiting, the whiting fisheries have proportionately little incidental catch. Nonwhiting species accounted for 1 percent of the catch during 2007-2010 (PFMC 2012). Because these fisheries encounter overfished species that have relatively low ACLs, the fisheries both have an allocation or set-aside for selected species and engage in a variety of bycatch avoidance strategies. Past ESA section 7 consultations have set a bycatch threshold of 8,000 Chinook salmon, which, if exceeded, trigger a re-initiation of consultations. The co-ops in each sector enforce bycatch avoidance measures for both overfished rockfish and Chinook salmon through their contract agreements.

Shoreside Sector

During the baseline period the shoreside side of the groundfish trawl sector accounted for the biggest share of coastwide groundfish revenue at 44.3 percent for both whiting and nonwhiting (bottom trawl) components (Table 3-5). At $27.1 million per year (on average) the nonwhiting fishery earned almost two-thirds of the combined revenue of the whiting and nonwhiting components. In terms of year-to-year variability the nonwhiting component showed less variability than whiting fisheries. The largest increase, from 2007 to 2008, was 22 percent while the largest decrease, from 2009 to 2010, was -18 percent. This contrasts with the shoreside whiting fishery, where year on variation ranged from 81 to -53 percent during the baseline period.

The whiting component of the shoreside trawl fishery, like the at-sea whiting sectors, catches proportionately few incidental species. During 2007-2010, the shoreside whiting fishery's incidental catch rate of nonwhiting species was just over 1 percent, averaging 697 mt annually (PFMC 2012).

Table 3-6 shows that 127 vessels participating in the shoreside trawl sector in 2008 could average $19,474 in accounting net revenues from the shoreside whiting fishery. Similarly, participation in nonwhiting trawl fisheries produced average accounting net revenues of $32,360. However, note that these estimates spread total revenues and total costs across all 127 vessels engaged in the shoreside trawl fishery that year and so are intended for comparison purposes only.

For application here, it is appropriate to consider net revenue earned in the whiting fishery, averaged over only vessels that participate in the whiting fishery. Vessels participating in the shoreside whiting fishery earn average net revenue of $384,656 in all fisheries. When the cost allocation procedure used for the 2013-14 groundfish specifications analysis is followed , an average of $100,103 of the $384,656 net revenue per vessel was earned in the West Coast whiting fishery (Carl Lian, NMFS, pers. comm..).

Table 3-6. Estimated average accounting net revenue per vessel for vessel types participating in West Coast shoreside groundfish fisheries in 2008.*

Vessel Type	Vessel Count	Average Revenue from Groundfish	Average Reported Costs	Average Accounting Net Revenue
Shoreside Whiting	127	78,896	59,422	19,474
Shoreside Nonwhiting Trawl	127	264,885	232,525	32,360
Shoreside LE Fixed Gear	128	87,050	77,423	9,627
Shoreside Open Access	231	35,370	30,920	4,450

* Source: Source: NWFSC vessel cost-earnings survey .

Table 3-7 shows that in 2008 about 37 vessels actually participated in the shoreside whiting fishery while about 120 vessels made landings in the nonwhiting trawl fishery. (Note: 13 shoreside whiting vessels also participated in the at-sea mothership whiting sector and 28 participated in shoreside nonwhiting trawl fisheries.) Therefore the actual distribution of revenues, costs and accounting net revenues for vessels participating in the shoreside whiting sector is probably considerably more skewed than the averages shown in Table 3-7. Preliminary estimates for 2011 show 26 vessels participated in the shoreside whiting fishery, and 129 vessels were counted in the nonwhiting trawl sector.

Table 3-7. Counts of vessels participating in groundfish fishery sectors: 2005-2011.*

Groundfish Sector	2005	2006	2007	2008	2009	2010	2011
Catcher-Processors	6	9	9	8	6	7	9
Mothership whiting CVs	17	20	20	19	19	22	18
Shoreside whiting trawl CVs	29	37	39	37	34	36	26
Nonwhiting trawl CVs	123	122	121	120	117	105	129
Limited Entry fixed gear	126	132	136	135	139	140	166
Open Access fixed gear	670	764	696	650	660	578	682
Incidental Open Access	537	462	449	274	280	294	284
Total Groundfish Vessels	1,232	1,219	1,178	1,011	1,025	965	1,041
Vessels participating in both shoreside whiting and nonwhiting fisheries	20	27	27	28	26	24	14
Vessels participating in both shoreside and at-sea whiting fisheries	7	12	15	13	13	15	13

Figure 3-6 shows trends in average ex-vessel prices for groundfish species in inflation-adjusted dollars over 2004-2011. The figure shows that, with the exception of sablefish, average ex-vessel prices during the period for most groundfish species categories have been fairly flat or slightly declining. However, preliminary results for 2011 show ex-vessel prices may be trending higher for several species categories. Noteworthy is the upward trend in the average ex-vessel price for Pacific whiting, which has more than doubled since 2004, driven by strong export demand for headed-and-gutted product. Relatively high ex-vessel prices for groundfish, driven primarily by demand from overseas, has somewhat offset the effect of flat or reduced harvests of major groundfish species over the period.

3.3.3 Number of Active Permits and Ex-vessel Revenues

The following table, figures, and notes describe current and historic permit activity and average exvessel revenues per permit.

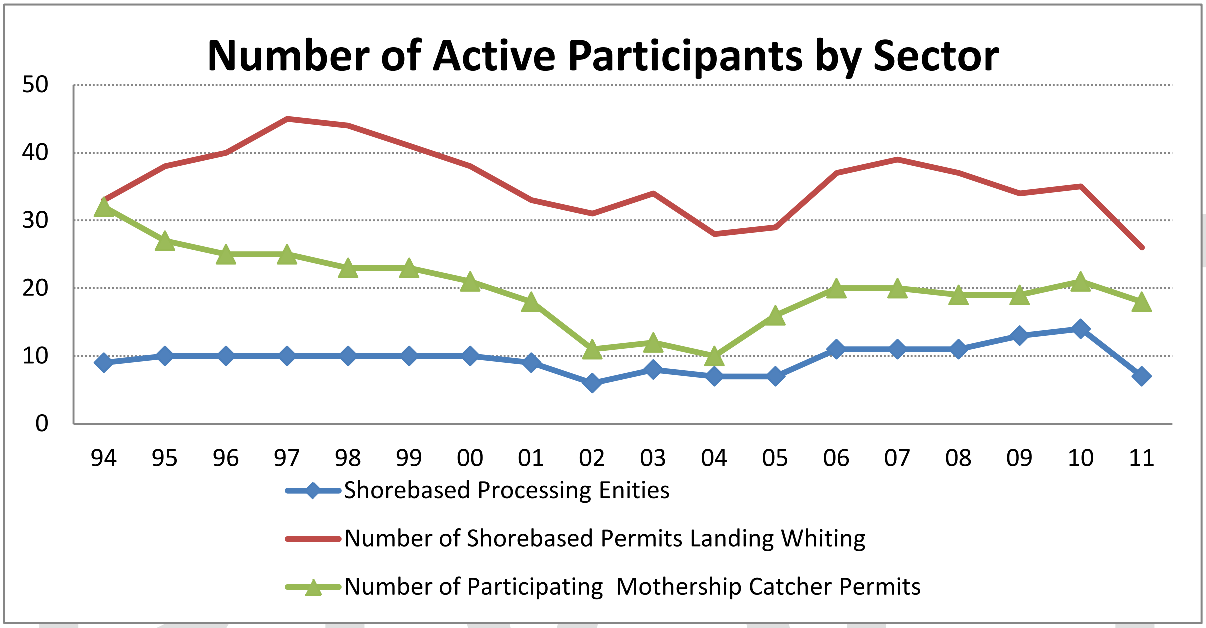


Figure 3-8. Trends in participation: shorebased processing, shorebased permits, mothership catcher permits.

Notes and Observations on Participation

- “Active” means that that the permit fished or entity received fish that year.
- Whiting is landed either at buying stations or directly at processing sites. Analysts have 0related landings to processors based on buying station linkages, where known. For companies that process whiting at multiple sites, landings have been summed to reflect a single processing entity.
- The number of permits fished includes buyback permits in years prior to 2004 (Buyback occurred in December 2003). Twenty two buyback permits were involved in the Pacific whiting fishery (See Entry and Exit Analysis below).
- The number of active shorebased processing entities increased from 7 in 2005 to 14 in 2010.
- All sectors had lower numbers of active participants in 2011 than in 2010.

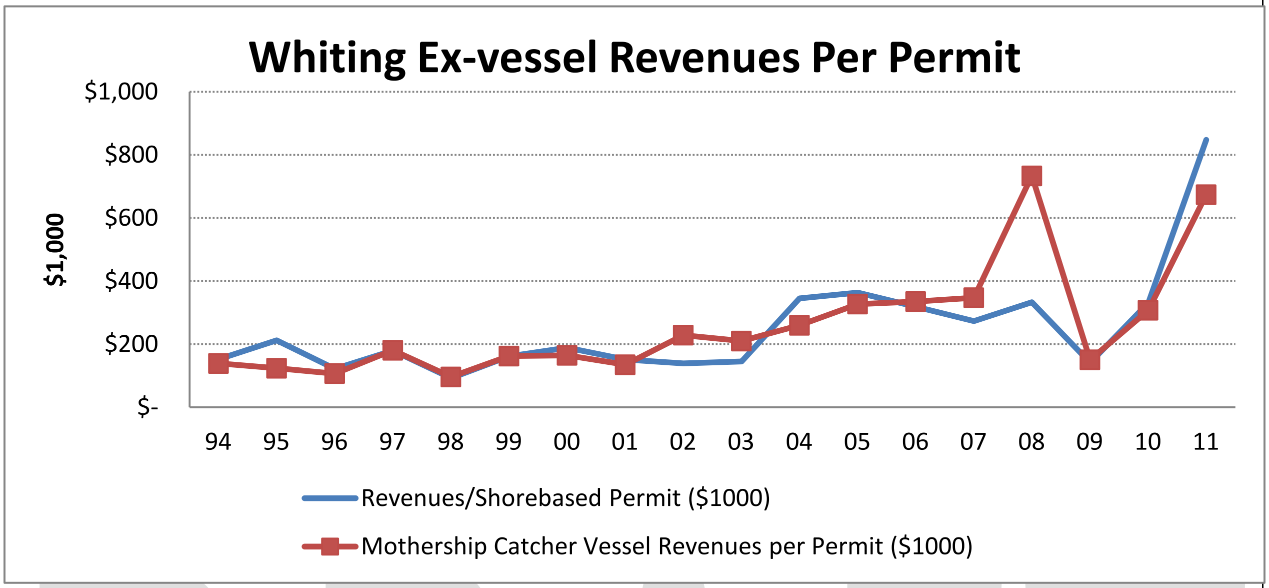


Figure 3-9. Trends in ex-vessel revenues per permit.

Notes and Observations on Ex-Vessel Revenues per Permit

- Revenues per mothership catcher-vessel permit generally increasing after 2003 and in line with sector allocation.
- Revenues per shorebased permit were similar to the mothership trend except for 2008.
- In 2008, the whiting fishery was closed early because the best available information on August 18, 2008 indicated that the 4.7 metric tons (mt) bycatch limit of canary rockfish for the non-tribal whiting fisheries was projected to be reached. The shorebased fishery was not re-opened, but unused shorebased allocations were distributed to the mothership and catcher processor sectors during the fall and winter.
- Relatively high revenues per permit in 2011 reflect increases in OY/ACL, high ex-vessel prices, and decreases in the number of active permits. Permit revenue were also likely high due to the Trawl Rationalization Program. Shorebased permits were able to fish quota pounds of other vessels, and mothership catcher-vessel permits were able to fish the catch history assignments of other permits.

Whiting Fishery Tow Size Data

Studies of high volume trawl fisheries have shown that sorting effect in the codend of large tows can be reduced because of blinding of meshes by impinged fish (Pikitch 1994). In a Bearing sea pollock mesh selectivity study by Erickson (1994) he found that codend sorting effect was nil for tows in excess of 40 mt. He found that the average size of pollock decreased as tow size increased because small fish were being retained in the larger catches. Two sources of data were examined for this EA to display tow size data for the West Coast whiting fishery: At sea fishery records for 2006-2011 and trawler logbook data for 2007. The at-sea data are shown in tables 3-8 and 3-9).

Catcher/processor data for 2006-2011 show an average tow size ranging from 45 to 59 mt with maximum tow size per year ranging from 123 mt to 168 mt. The mothership delivery data show average tow size per year during 2006-2011 ranging from 38 mt to 43 mt with maximum tow size during the same period ranging from 87 mt to 101 mt (Table 3-8)

Table 3-8. Minimum, maximum and average tow weights (mt) in the at-sea whiting fishery by sector and year, 2006-2011.

Sector	YEAR	Min	Max	Avg
Catcher/proc.	2006	0.37	139.22	53.65
Catcher/proc.	2007	0.13	167.72	47.33
Catcher/proc.	2008	0.16	153.01	58.99
Catcher/proc.	2009	0.42	122.82	44.61
Catcher/proc.	2010	0.09	123.66	46.69
Catcher/proc.	2011	0.25	133.45	46.21
Mothership	2006	1.64	99.42	42.56
Mothership	2007	3.71	90.24	40.91
Mothership	2008	3.18	96.05	42.56
Mothership	2009	3.24	87.46	38.25
Mothership	2010	1.66	101.46	38.51
Mothership	2011	0.45	92.83	39.17

Catcher/ processor tow frequency data show most hauls in all years were >40mt, up to 70% >40 mt in 2006. Tows delivered to motherships showed a substantial proportion were >40mt, ranging from 47% in 2010 to 63% in 2006 and 2008.

Table 3-9 At-sea whiting tow size frequency data for hauls >40 mt and ≤40 mt by sector, 2006-2011

Sector	YEAR	Proportion 40 mt or less	Proportion more than 40 mt	Number tows
Catcher/proc.	2006	30%	70%	1,492
Catcher/proc.	2007	40%	60%	1,571
Catcher/proc.	2008	22%	78%	1,885
Catcher/proc.	2009	43%	57%	867
Catcher/proc.	2010	47%	53%	1,401
Catcher/proc.	2011	41%	59%	1,654
Mothership	2006	37%	63%	1,454
Mothership	2007	42%	58%	1,305
Mothership	2008	37%	63%	1,732
Mothership	2009	46%	54%	1,007
Mothership	2010	53%	47%	1,096
Mothership	2011	52%	48%	1,363

Logbook data for 2007 show that about 43% of hailed tows caught greater than 40 mt of whiting (Table 3-10). The remainder of tows had ≤ 40 mt of whiting.

Table 3-10. Summary of 2007 whiting trip logbook data showing hail weight data for tows > 40mt and ≤ 40 mt

	Other species	Whiting	Grand Total	No. records	Tow prop.
≤40 mt	0.84%	99.16%	100.00%	5119	57.15%
>40 mt	0.46%	99.54%	100.00%	3838	42.85%
Total	0.56%	99.44%	100.00%	8957	100.00%

3.3.4 Catch, Revenue and Participation Trends in the Rockfish Midwater Trawl Fishery

The main species harvested with midwater trawl nets historically have included Pacific whiting and the following rockfish species: widow rockfish, yellowtail rockfish and chilipepper rockfish. The midwater trawl fishery in the Council area has primarily taken place in the management area north of 40˚ 10' N. lat (Northern management area). During 1994-2011 the northern fishery landed an average of 73,674 mt of midwater fish, which represented over 99% of the northern and southern management area (south of 40˚ 10' N. lat) catches combined (Table 3-11). Only chilipepper rockfish showed a higher average catch in the southern area during 1994-2011 (12 mt) compared to the northern area (7 mt).

Pacific whiting has been the major species harvested using midwater trawl gear in the Council area. During 1994-2011 whiting averaged 98% of the total catch of all midwater species followed by widow rockfish (1%), yellowtail rockfish (1%) and chilipepper rockfish (negligible) (Table 3-11). The midwater rockfish fishery fell off steeply starting with the 2003 season corresponding to implementation of the RCA and reduced trip limits for widow rockfish, which had been declared overfished (Table 3-10; Figure 3-10). Catches of yellowtail rockfish rebounded somewhat in 2011 the first year of the IFQ program.

Rockfish in midwater trawl landings have been relatively small in comparison to whiting based on weight of fish landed, but have been significant in terms of ex-vessel revenues. Prior to the 2003 season the combined midwater rockfish landings for the period 1994-2002 averaged 24% of total midwater revenues and ranged on an annual basis from 14% to 45% of total annual midwater revenues (Table 3-11; Figure 3-11).

Table 3-11. Midwater trawl landings in metric tons of specified species by managment area and year, 1994-2011

	Species	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
North 1/	PWHT	68,640	70,751	73,371	79,590	77,133	74,296	85,824	73,372	45,679	51,220	89,634	97,587	97,266	73,280	50,787	40,293	62,320	91,406	72,358
	WDOW	1,768	1,597	1,599	1,756	849	1,845	3,464	1,663	242	13	28	77	50	82	101	109	62	113	856
	YTRK	272	292	470	231	411	436	2,583	1,560	439	45	118	173	156	186	43	75	198	446	452
	CLPR	0	0	2	0	0	0	28	1	1	10	21	26	13	6	4	2	21	0	7
	Subtotal	70,681	72,640	75,441	81,577	78,393	76,577	91,900	76,595	46,361	51,287	89,801	97,863	97,484	73,554	50,936	40,479	62,601	91,966	73,674
South	PWHT	0	0	0	0	0	0	0	0	0	0	0	40	2	0	0	0	0	0	2
	WDOW	0	8	0	19	0	18	274	55	0	0	0	0	0	0	0	0	0	0	21
	YTRK	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	1
	CLPR	0	0	0	0	0	0	82	106	32	0	0	0	2	0	0	0	0	0	12
	Subtotal	0	8	0	19	0	18	376	162	32	0	0	40	4	0	0	0	0	0	37
Both	PWHT	68,640	70,751	73,371	79,590	77,133	74,296	85,825	73,372	45,679	51,220	89,634	97,627	97,268	73,280	50,787	40,293	62,320	91,406	72,361
	WDOW	1,768	1,604	1,599	1,774	849	1,863	3,738	1,718	242	13	28	77	50	82	101	109	62	113	877
	YTRK	272	292	470	231	411	436	2,603	1,560	439	45	118	173	156	186	43	75	198	446	453
	CLPR	0	0	2	0	0	0	110	107	32	10	21	26	15	6	4	2	21	0	20
	Total	70,681	72,648	75,441	81,595	78,393	76,595	92,276	76,757	46,392	51,287	89,801	97,903	97,488	73,554	50,936	40,479	62,601	91,966	73,711

1/ North and South mean north and south of of 40° 10' N. lat., respectively

Table 3-12. Midwater trawl landings in ex-vessel $$ of specified species by managment area and year, 1994-2011

	Species	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
North 1/	PWHT	4,637,616	7,432,009	4,371,075	7,343,657	4,129,336	6,029,838	7,613,620	5,206,908	4,361,007	4,870,809	6,936,658	10,760,442	12,540,808	11,328,551	11,584,919	5,306,434	9,691,290	22,032,378
	WDOW	1,201,053	1,120,664	1,025,334	1,219,443	609,287	1,548,590	3,309,339	1,612,376	233,256	10,987	23,112	61,560	37,017	68,113	69,426	79,551	44,370	106,736
	YTRK	189,133	215,946	311,585	175,351	238,892	314,510	2,506,085	1,536,468	431,994	37,018	102,198	148,091	132,760	133,217	30,498	57,202	155,292	449,898
	CLPR	3	100	917	151	29	34	23,774	1,030	398	6,716	14,715	19,750	9,045	3,616	1,955	1,585	4,466	0
	Subtotal	6,027,805	8,768,719	5,708,911	8,738,602	4,977,544	7,892,972	13,452,818	8,356,782	5,026,655	4,925,530	7,076,683	10,989,843	12,719,630	11,533,497	11,686,798	5,444,772	9,895,418	22,589,012
South	PWHT	0	0	0	0	0	0	25	9	0	0	0	4,423	167	0	0	0	0	0
	WDOW	0	5,819	0	13,610	0	15,872	302,872	60,020	8	0	0	2	4	0	0	0	0	0
	YTRK	0	0	0	23	0	0	24,168	34	2	0	0	0	0	0	0	0	0	0
	CLPR	0	0	0	34	0	0	91,982	124,073	32,740	0	0	161	2,594	471	0	0	0	0
	Subtotal	0	5,819	0	13,667	0	15,872	419,047	184,136	32,750	0	0	4,586	2,765	471	0	0	0	0
Both	PWHT	4,637,616	7,432,009	4,371,075	7,343,657	4,129,336	6,029,838	7,613,645	5,206,917	4,361,007	4,870,809	6,936,658	10,764,865	12,540,975	11,328,551	11,584,919	5,306,434	9,691,290	22,032,378
	WDOW	1,201,053	1,126,483	1,025,334	1,233,053	609,287	1,564,462	3,612,211	1,672,396	233,264	10,987	23,112	61,562	37,021	68,113	69,426	79,551	44,370	106,736
	YTRK	189,133	215,946	311,585	175,374	238,892	314,510	2,530,253	1,536,502	431,996	37,018	102,198	148,091	132,760	133,217	30,498	57,202	155,292	449,898
	CLPR	0	100	917	185	0	34	115,756	125,103	33,138	6,716	14,715	19,911	11,639	4,087	1,955	1,585	4,466	0
	Total	6,027,802	8,774,538	5,708,911	8,752,269	4,977,515	7,908,844	13,871,865	8,540,918	5,059,405	4,925,530	7,076,683	10,994,429	12,722,395	11,533,968	11,686,798	5,444,772	9,895,418	22,589,012

1/ North and South mean north and south of of 40° 10' N. lat., respectively

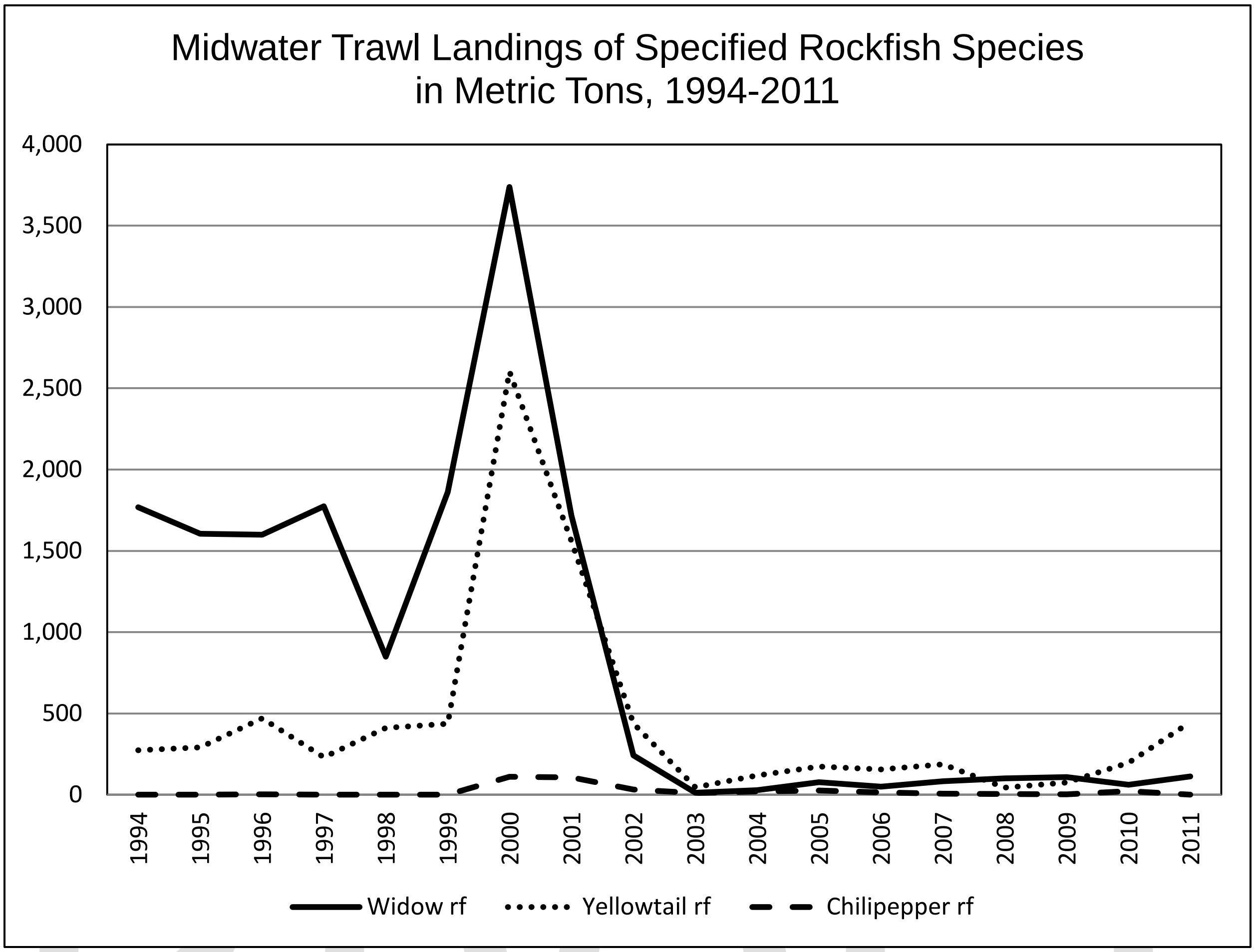


Figure 3-10. Midwater trawl landings of specified rockfish species in metric tons, 1994-2011

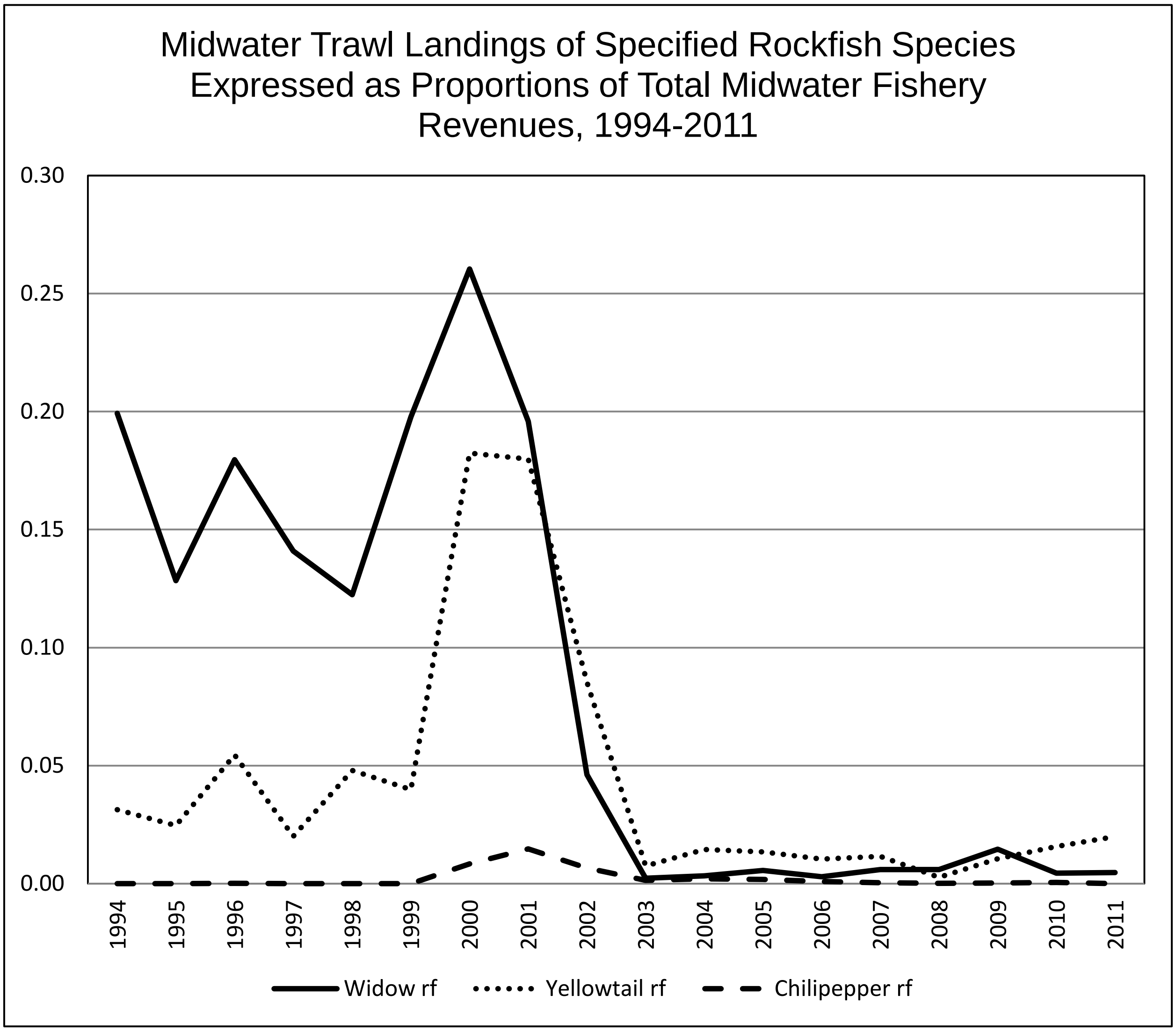


Figure 3-11. Midwater trawl landings of specified rockfish species expressed as proportions of total midwater fishery revenues, 1994-2011.

The number of vessels landing rockfish dropped off starting in 2002 and reached a low of 28 in 2004. The average number of vessels landing rockfish during 1994-2002 averaged 74.1 coastwide, ranging from 51-130. The 2003-2011 average for rockfish vessels was 33.8 with a range of 28-41 (Table 3-13; Figure 3-12). The whiting fleet was relatively stable throughout the period 1994-2011 ranging from 27-46 per year with an average of about 34 vessels per year (Table 3-13; Figure 3-12). Prior to 2003 there were consistently more rockfish vessels than whiting vessels; since and including 2003 the number of rockfish and whiting vessels was usually the same each year. This is because whiting vessel consistently landed rockfish but not all rockfish vessels landed whiting. The difference in rockfish and whiting vessel numbers represents the number of vessels that only landed rockfish. Prior to 2003 the rockfish fleet ranged from 15 to 84 vessels with an average of 38.7 vessels per year. Since and including 2003 the rockfish fleet average has dropped to 0.2 vessels per year (Table 3-13).

Table 3-13. Number of vessels using midwater trawl gear to land whiting, rockfish and all species combined north and south of 40 10 N. lat

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Avg 94-02	Avg 03-11
North	Whiting	33	36	35	37	35	35	45	30	31	33	27	30	37	39	37	34	36	27	35.2	33.3
	Rockfish	53	56	51	63	50	66	123	102	72	33	28	30	37	39	37	35	36	27	70.7	33.6
	All species	53	56	51	63	50	66	123	102	72	33	28	30	37	39	37	35	36	27	70.7	33.6
South	Whiting	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0.2	0.2
	Rockfish	0	1	0	1	0	1	16	18	8	0	0	1	1	2	0	0	0	0	5.0	0.4
	All species	0	1	0	1	0	1	16	18	8	0	0	1	1	2	0	0	0	0	5.0	0.4
N+S	Whiting	33	36	35	37	35	35	46	31	31	33	27	30	37	41	37	34	36	27	35.4	33.6
	Rockfish	53	57	51	64	50	67	130	115	80	33	28	30	37	41	37	35	36	27	74.1	33.8
	All species	53	57	51	64	50	67	130	115	80	33	28	30	37	41	37	35	36	27	74.1	33.8
N+S	Rockfish only	20	21	16	27	15	32	84	84	49	0	1	0	0	0	0	1	0	0	38.7	0.2

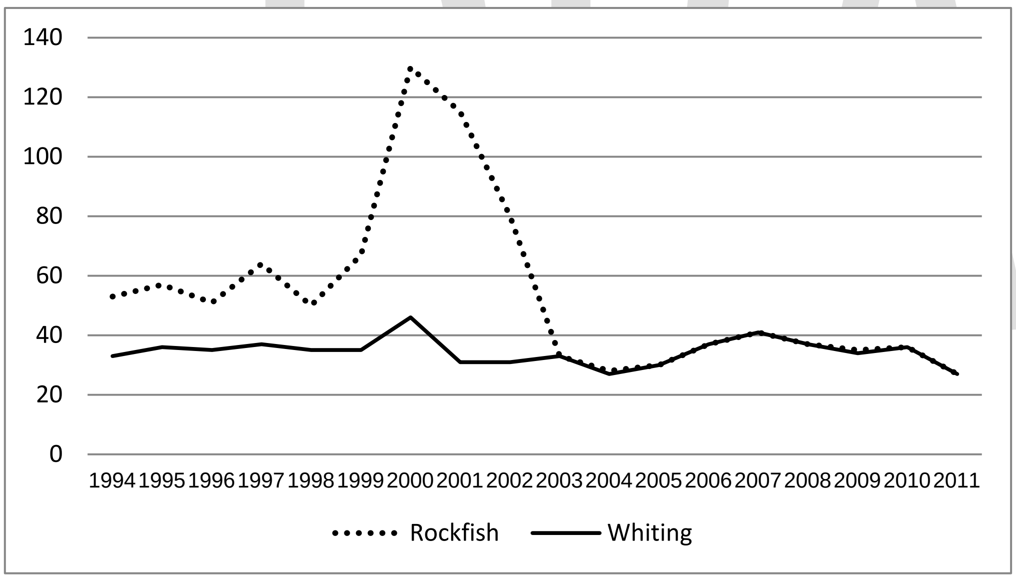


Figure 3-12: Number of vessels landing rockfish and whiting using midwater trawl gear, 1994-2011.

Vessel Revenues

A total of 127 vessels participated in the shoreside trawl sector in 2008 and averaged $19,474 in accounting net revenues (Table 3-14). Similarly, participation in nonwhiting trawl fisheries produced average accounting net revenues of $32,360. Note that these estimates spread total revenues and total costs across all 127 vessels engaged in the shoreside trawl fishery that year and so are intended for comparison purposes only. Table 3-14 shows that in 2008 about 37 vessels actually participated in the shoreside whiting fishery while about 120 vessels made landings in the nonwhiting trawl fishery. (Note: 13 shoreside whiting vessels also participated in the at-sea mothership whiting sector and 28 participated in shoreside nonwhiting trawl fisheries.) Therefore the actual distribution of revenues, costs and accounting net revenues for vessels participating in the shoreside whiting sector is probably considerably more skewed than the averages. Preliminary estimates for 2011 show 26 vessels participated in the shoreside whiting fishery, and 129 vessels were counted in the nonwhiting trawl sector.

Table 3-14. Estimated average accounting net revenue per vessel for vessel types participating in West Coast shoreside groundfish fisheries in 2008.*

Vessel Type	Vessel Count	Average Revenue from Groundfish	Average Reported Costs	Average Accounting Net Revenue
Shoreside Whiting	127	78,896	59,422	19,474
Shoreside Nonwhiting Trawl	127	264,885	232,525	32,360
Shoreside LE Fixed Gear	128	87,050	77,423	9,627
Shoreside Open Access	231	35,370	30,920	4,450

Table 3-15. Counts of vessels participating in groundfish fishery sectors: 2005-2011.*

Groundfish Sector	2005	2006	2007	2008	2009	2010	2011
Catcher-Processors	6	9	9	8	6	7	9
Mothership whiting CVs	17	20	20	19	19	22	18
Shoreside whiting trawl CVs	29	37	39	37	34	36	26
Vessels participating in both shoreside whiting and nonwhiting fisheries	20	27	27	28	26	24	14
Vessels participating in both shoreside and at-sea whiting fisheries	7	12	15	13	13	15	13

* Source: PacFIN. Vessel counts for 2011 are preliminary.

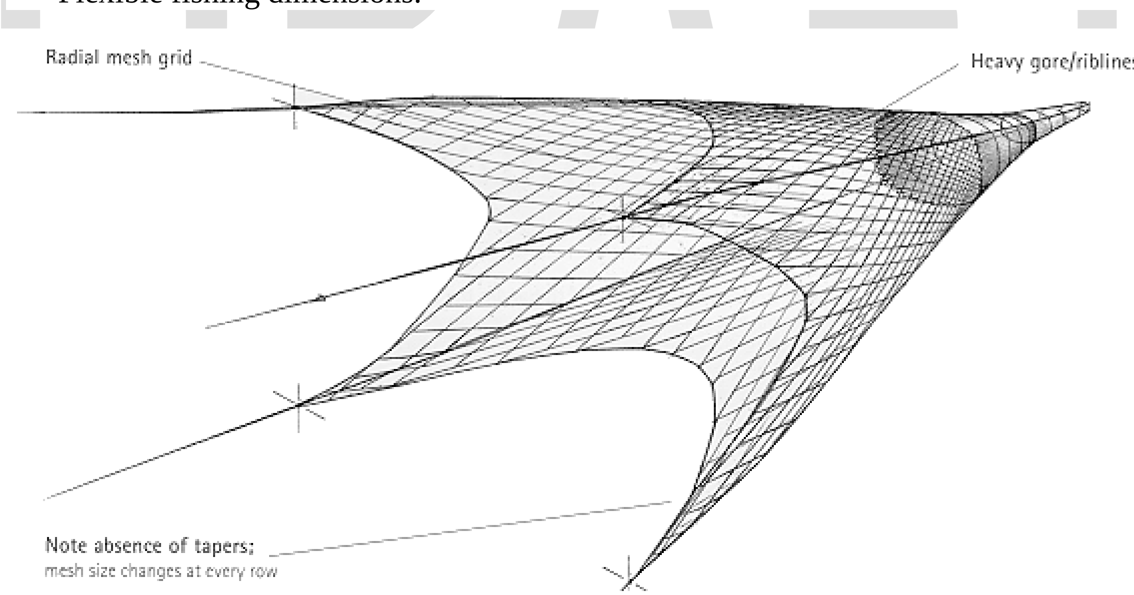
3.3.5 Midwater Trawl Gear Used to Target Pacific Whiting with Comments about Rockfish Targeting Implications

General Description of Trawl Net

There are several midwater net designs used in the Alaska pollock and West Coast whiting fisheries. The following describes the Radial Net design built by Net Systems, Bainbridge Island, Washington. Other designs by this particular builder can be viewed at the Net Systems web site: http://www.net-sys.com/radial-trawl.php.

The Radial net, according to the builder, is designed to achieve a large herding area with a towing resistance lower than that of conventional midwater trawls, thus allowing the vessel to achieve a greater scope. The net features include:

- Graduated mesh size in the front end, which allows for the greatest herding area per horsepower to be achieved.
- Most effective in shallow and mid-range depths.
- Constructed of high-grade nylon and polyethylene netting which allows for greater durability and strength.
- Flexible fishing dimensions.



Horsepower	Circumference (m)	Maximum Design Dimensions			
		@wingtips (fm)	@ transducer (fm)	@ wingtips (m)	@ transducer (m)
500	650	38 x 30	24 x 19	69 x 55	44 x 35
700	750	42 x 34	30 x 25	77 x 62	55 x 46
900	950	45 x 33	38 x 29	82 x 60	69 x 53
1,200	1,200	53 x 46	44 x 38	97 x 84	80 x 69
1,800	1,300	63 x 55	51 x 47	115 x 100	93 x 86
2,000	1,400	71 x 61	58 x 47	130 x 112	106 x 86
2,400	1,500	71 x 71	58 x 58	130 x 130	106 x 106
5,000	1,650	100 x 73	80 x 60	183 x 134	146 x 110
6,000	2,000	136 x 114	95 x 80	249 x 208	174 x 146
6,000	2,400	164 x 137	114 x 95	300 x 250	208 x 174
Note: Numbers are approximate and based on the use of the appropriate doors, buoyancy, weight, and rigging.					

Codend Description

The following codend construction information was supplied by Steve Patterson of Net Systems, Bainbridge Island, Washington.

The Codend or "money bag" is an integral part of the trawl system. The codend is tailored and hung to achieve a desired shape so that fish easily pass into it and are held there until it is hauled. Materials are chosen to produce these desired results and give long lasting service.

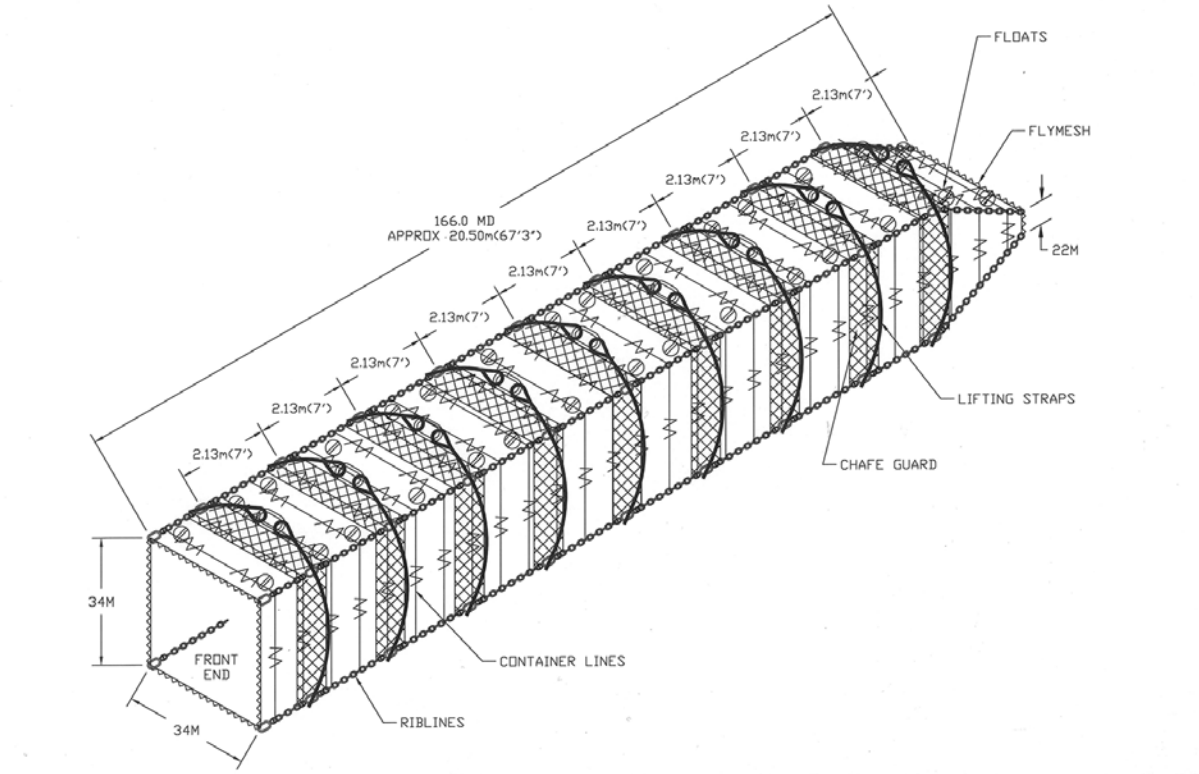
Important features include:

• Low- Stretch synthetic riblines help support the mesh and result in better codend openings and longer material life.

• Chain riblines provide a stable length and a positive means of attachment that does not slip even with the large, 150 ton codends.

• High strength fibers such as Dyneema® are used effectively for braided riblines on codends. Dyneema® ropes such as Amsteel and Amsteel Blue are excellent as riblines for large codends Dyneema is a registered trademark owned by Royal DSM N.V.
http://www.dyneema.com/americas/

• Stretched and heat set webbing material made from high quality twines prolongs codend life.



Codend Capacity Chart

To approximate codend volume or capacity, refer to the following table. This table should be used for an approximation only. For example: If a codend has a circumference of 24 feet (7.32 meters) and a length of 65.6 feet (20 meters), the codend capacity would be 72 metric tons (metric tons).

Circumference (ft/m)	Length (ft/m)							
	16/5	33/10	49/15	66/20	82/25	98/30	115/35	131/40
30/9.1	28	56	85	113	141	169	197	226
28/8.5	25	49	74	98	123	147	172	197

26/7.9	21	42	64	85	106	127	148	169
24/7.3	18	36	54	72	90	108	126	144
22/6.7	15	30	45	61	76	91	106	121
20/6.1	13	25	38	50	63	75	88	100
18/5.5	10	20	30	41	51	61	71	81
16/4.9	8	16	24	32	40	48	56	64
14/4.3	6	12	18	25	31	37	43	49
12/3.7	5	9	14	18	23	27	32	36
10/3.1	3	6	9	13	16	19	22	25

Protection from Abrasion

Various materials are available to protect the codend from abrasion resulting from the seabed, stern ramp and fish. Typically codends are partially enclosed in a protective netting layer being of a larger mesh size than the primary fish holding layer which enables juvenile or non-marketable species to escape. This sacrificial layer may also be covered with an additional protective layer of stranded polyethylene material commonly known as “hula skirt” or “horse hair.”

Other areas which may require protection include:

• Portions of the codend beneath chokers and straps.
• Hangings and lashings which may contact the seabed.
• Portions of the codend susceptible to repeated abrasion during handling.

Additional information on codend (and intermediate) construction considerations are available at the Net Systems web site: http://www.net-sys.com/index.php

An image of a codend being built is shown below.

Image of pollock/whiting codend being built. The protective material (chafer) is shown covering the bottom half of the net and beneath the larger constraining ropes. Each chafer panel, which spans each section between the larger constraining ropes, is open at the terminal end for small fish to escape. Image is courtesy of David Jincks.

3.3.6 How Pacific Whiting Nets differ from Bottom Trawl Nets

The following two sections were provided by Steven Patterson of Net Systems, Bainbridge Island, WA (pers. comm., Sept 20, 2012).

A trawl in its most basic form is a funnel towed through the water to catch fish. The funnel is made of a frame of ropes (riblines, headrope, and breast lines), with the spaces between the ropes filled in with netting. It is attached to a boat and towed by means of two wire rope “main wires” which are wound on “main winches” on either side of the vessel. The trawl opens vertically because of floats on top and /or weight on the bottom. It opens horizontally by means of large, heavy metal “doors” which are attached to the main wires in front of the trawl. These doors function in much the same way as airplane wings or sailboat sails, using the flow of water past them to a pressure differential which causes them to move outward, away from the centerline of the boat and trawl.

Trawls are used to target high volume species such as whiting, pollock and cod. Most fish are able to out swim the trawl, at least for short periods of time, so the trick is to herd the fish into the path of the net and keep them there, where they will swim with the net until they tire and eventually fall back into the funnel. In many cases they are not actually physically contained by the meshes until they are in the very last part of the net.

Trawls are used to catch a wide variety of fish in many different conditions. Because of variation in fish behavior, fishing conditions, ocean bottom, etc., many different types of trawl nets have been designed. Each is specialized to maximize performance in specific situations.

Trawls are generally categorized as either bottom trawls or midwater (pelagic) trawls. The difference in design has to do with the behavior of the species of fish being targeted.

Midwater Nets

Midwater nets are four-seam nets designed to catch schooling fish such as pollock and whiting. With these species, the entire school may behave as one organism. The trick of catching these fish is to encircle the entire school, or a large portion if and herd it back into the net by gradually compressing the school into a smaller and smaller mass.

Midwater nets have much larger openings than bottom nets, an average Bering Seas Trawler’s net may be 60 fathoms wide by 20 fathoms high. To achieve these large openings without having tremendous drag, the mesh sizes are very large and the twine sizes relatively small. A large midwater net may have up to 512 inch mesh in the front end (compared to 8 inch in bottom nets). Individual fish could easily swim out of these big meshes, but the school behaves as an organism and stays together in the net. Mesh sizes are gradually decreased as the net tapers back, compressing the school but keeping in intact. The back end of the net has small mesh (4 inch), where the fish are actually contained even if the school breaks up.

In midwater systems the doors are always above the net. The upward pull of the top bridle keeps the top of the net up, while heavy weights attached to the bottom pull the bottom of the net down. Floats are generally not used because they could tangle in the large meshes.

Traditional midwater designs had four riblines running the length of the net which held the meshes open to maintain the funnel shape. Modern designs do not have riblines; the meshes are allowed to collapse, which streamlines the net and create less drat (which in turn allows for a larger opening. Riblines are incorporated in the back end of the net in order to maintain the net opening where the fish are crowded.

For fishing in shallow water, vessels will often use “unbridled” midwater nets. In an unbridled configuration, the doors are attached directly to the top wing of the trawl, and the bottom door leg becomes the breastline of the net. This style of rigging allows more wire to be let out, so the doors can achieve adequate spread without touching the bottom.
Most vessels carry several different types of nets to allow them flexibility in selecting fishing area, depth and target species. All nets may be tuned by adjusting the rigging, weights, flotation and towing speed to emphasize certain characteristics and minimize others. Familiarity with the specific gear and with the possible adjustments is essential for any vessel to maximize productivity.

Bottom Nets

Bottom trawls are designed to fish on the bottom, in contact with the seabed. The nets are used to catch bottom-dwelling species like cod, sole, and Atka mackerel (and pollock during some times of the year). These types of fish do not school strongly, and behave as individuals rather than as a group; this means that the trawl must herd and contain individual fish. The meshes are small (8-16 inch maximum), which results in relatively high drag and means that the nets must be relatively small. Since the species targeted live on the bottom, a high opening is not needed; generally, the vertical opening on a bottom net will be between 1 and 7 fathoms.

Bottom nets are traditionally made with polyethylene netting throughout. They open vertically by means of floats attached to the headrope. The doors may be fished on or off the bottom, and there is generally a length of “mudgear” (wire rope strung with rubber discs) between the net and doors which herds fish into the path of the net. Typically the headrope extends father forward than the footrope, to provide an overhang, which ensures the fish spooked upward by the footrope do not go entirely over the net. The footrope is generally constructed with large rubber bottoms or discs, which protect the front end of the net from contact with the seabed.
The simplest bottom trawls are 2-seam nets. As the name implies, 2-seam nets are composed of 2 panels joined by a seam at either side, much like 2 sheets of paper laid one on top of the other and taped at the edges. These types of nets, because of their design, tend to have low vertical openings. They also have low drag, which means that they may be towed more quickly than other bottom nets. This type of low-opening, fast net is very good for such species as cod and

sole. When a higher opening is required, 4-seam nets are used. A 4 seam net has four sides (top, bottom and two side panels) and consequently four riblines.

Box trawls are four-seam nets which have large side wings and small or no bottom and top wings. The bridles come directly off the side panels. These nets have small bellied and are good for hard bottom where damage to the net is a concern. They tend to take a square shape when viewed from the front, which keeps the belly tight and restricts the vertical opening of the net. They are sensitive to changes in speed and can be easily overspread.

The tight belly on box trawls prevents the footrope from following bottom contours, or "tending bottom", which is a good feature to protect the net when the bottom is rough. In situations where bottom tending is desired (on softer bottom, to prevent fish escaping under the footrope) combination trawls may be used. Like a box trawl, a combination trawl has four panels. Unlike box trawls, combination trawls have top and bottom wings as well a side wings, and bridles are attached to either side of the seam, which causes the net to "fold" in the top panel above the seam and in the bottom panel below the seam. Viewed from the front, these nets take on an oblong rather than a square shape.

The additional curvature induced in the top and bottom panels by this folding action allows the net to achieve greater vertical opening and to tend bottom better than a box trawl. Combination trawls are frequently used for such species as yellowfin sole, Atka mackerel and pollock.

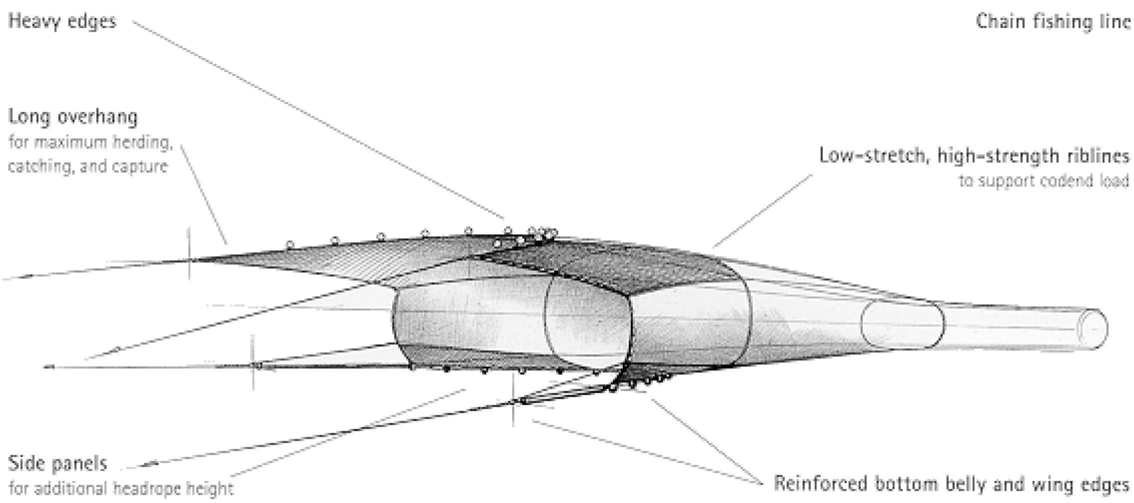
All of the trawls described so far have two bridles (top and bottom) per side. The vertical opening on these nets is restricted by the height of the side panel; beyond a certain point, the side panel will begin to collapse. Adding a third bridle to the front of the side panel supports it and allow the net to achieve a higher opening. Three bridle or high rise nets area used to catch species which are not tight against the bottom. The bottom belly is cut somewhat smaller than the top to assure that it remains tight, which protects it from damage on hard bottom.

The advantages of the third bridle may be taken one step further by adding a fourth bridle to the side pane, allowing for even greater vertical height. Four bridle nets, such as the American Jumbo trawl, have very large openings and consequently very high drag. They are generally used only on vessels with high horsepower.

Below are the description and size specifications for a 4-panel Aleutian Cod Trawl. This is one of several bottom trawl nets offered by Net System, Bainbridge Island, WA (see: http://www.net-sys.com/bottom-trawls.php

Features

- Four seam design increases headrope height.
- Low-stretch, high-strength riblines support codend loads.
- Small bottom wings for low maintenance.
- Net may be fitted with varying footrope styles to "fine-tune" it to particular fish species and grounds.



Horsepower	Headrope/Footrope Length (ft)	Maximum Design Dimensions	
		(fm)	(m)
300-400	66/87	6 x 1.5	10.9 x 2.7
500-800	74/103	7 x 1.9	12.8 x 3.5
1,200	83/119	7.5 x 2.1	13.7 x 3.8
1,800-2,400	91/140	8 x 2.5	14.6 x 4.6
2,500-3,000	108/164	11 x 3	20.1 x 5.5
3,500-4,000	156/296	14 x 4	25.6 x 7.3
Note: Numbers are approximate and based on the use of the appropriate doors, buoyancy, weight, and rigging.			

3.3.7 Trawl Net Construction and Modification Costs

The following Table 3-16 show the input received from three trawl net builders with regard to various trawl net construction and modification costs. The estimated minimum cost to remove and reapply chafer panels to the codend ranged from $5,000 to $10,000. Two builders estimated the cost to build a midwater net with codend to be as high as $400,000.

Table 3-16: Trawl net builder responses to various questions regarding trawl gear construction and modification costs				
	Builder No.			
Question	1	2	3	4
Cost to build a midwater trawl net for use in the Alaska pollock and West Coast whiting fisheries	$40,000-$80,000	$20,000-$200,000	$40,000-$200,000	NR
Cost to build a midwater trawl codend for use in the Alaska pollock and West Coast whiting fisheries	$30,000-$100,000	$10,000-$200,000	$40,000-$200,000	NR
Cost to remove and replace chafing gear on the codend of a net used in the Alaska pollock and West Coast whiting fisheries	$5,000-$10,000	$5,000-$50,000	$10,000-$15,000	NR

NR= No response

These same net builders were asked a series of questions about the nets used in the Alaska pollock and West Coast whiting fishery. Their responses are shown in Table 3-17. It shows there are no guidelines for building Alaska nets; the codend can be covered in many ways depending on what the fisher wants; the intermediate and codend sections are cylindrical while the net is tapered; codends are 60-160 ft long and 16-27 ft round and hold 100,000 to 400,000 lbs of fish; Mouth sizes range from 15 fm high X 30 fms wide to 50 fm high X 100 fm wide. Net lengths are 700-2400 ft. A question was also asked about the size of nets that will be used for widow rockfish should that fishery resume. The response was that the whiting vessels might target them with their whiting nets but a smaller net would be preferable. This is because a smaller net would be more maneuverable and less costly if damaged in areas where rockfish are most abundant.

Table 3-17. Net builder responses to various questions about construction and use of midwater trawl nets use by West Coast and Alaska fishing vessels.

Any guidelines for building Alaska nets?	None	None (except for sweeplines which may be coming into effect)	None	NR
Do you commonly cover the sides and bottom of codends with chafer?	They are built to meet the fishers need	All manner of designs are used.	Yes	NR
How would you define the codend?	The net panels are angled while the tube and codend are in a straight line	It is where the net taper ends and the cylinder begins	The point where the intermediate ends; the intermediate connects to the aft end of the net.	NR
What are the dimensions of a codend that would hold 200,000 lbs (91 mt) of fish	A 100 ton net would be 130 ft long and 19 ft round.	See table in text	Nets are 60-160 ft long and 16-27 ft around. They hold 100,000 to 400,000 lbs; hake nets tend to be smaller because of fish decomposition	NR
Can you describe the size of net used in the pollock and whiting fisheries	Every builder has its own designs	Every builder has its own designs	They are made of poly or nylon material. Mouth sizes range from 15 fm high to 30 fms wide to 50 fm high X 100 fm wide. Net lengths are 700-2400 ft.	NR
Are the nets used for widow rockfish the same as the ones used for pollock/whiting	Whiting boats would target them with their whiting nets, but smaller non-whiting vessels would order smaller nets but still much larger than they used in the past.	Rockfish are in areas that are difficult to maneuver in with a large net, which could damage the net; a fisher may use a smaller or backup net	Rockfish nets are usually much smaller because they need to be maneuverable; rockfish areas are usually rough and abrupt with many surprising pinnacles.	NR

3.3.7.1 Community Harvest Trends

The 2013-2014 proposed harvest specifications and management measures DEIS contains extensive community impact data for status quo whiting fishery regulations, which is hereby incorporated by reference (http://www.pcouncil.org/wp-content/uploads/May_2012_Main_Document_13-14_DEIS_SPEX.pdf
The following figure and notes describe current and historic whiting harvest trends by community.

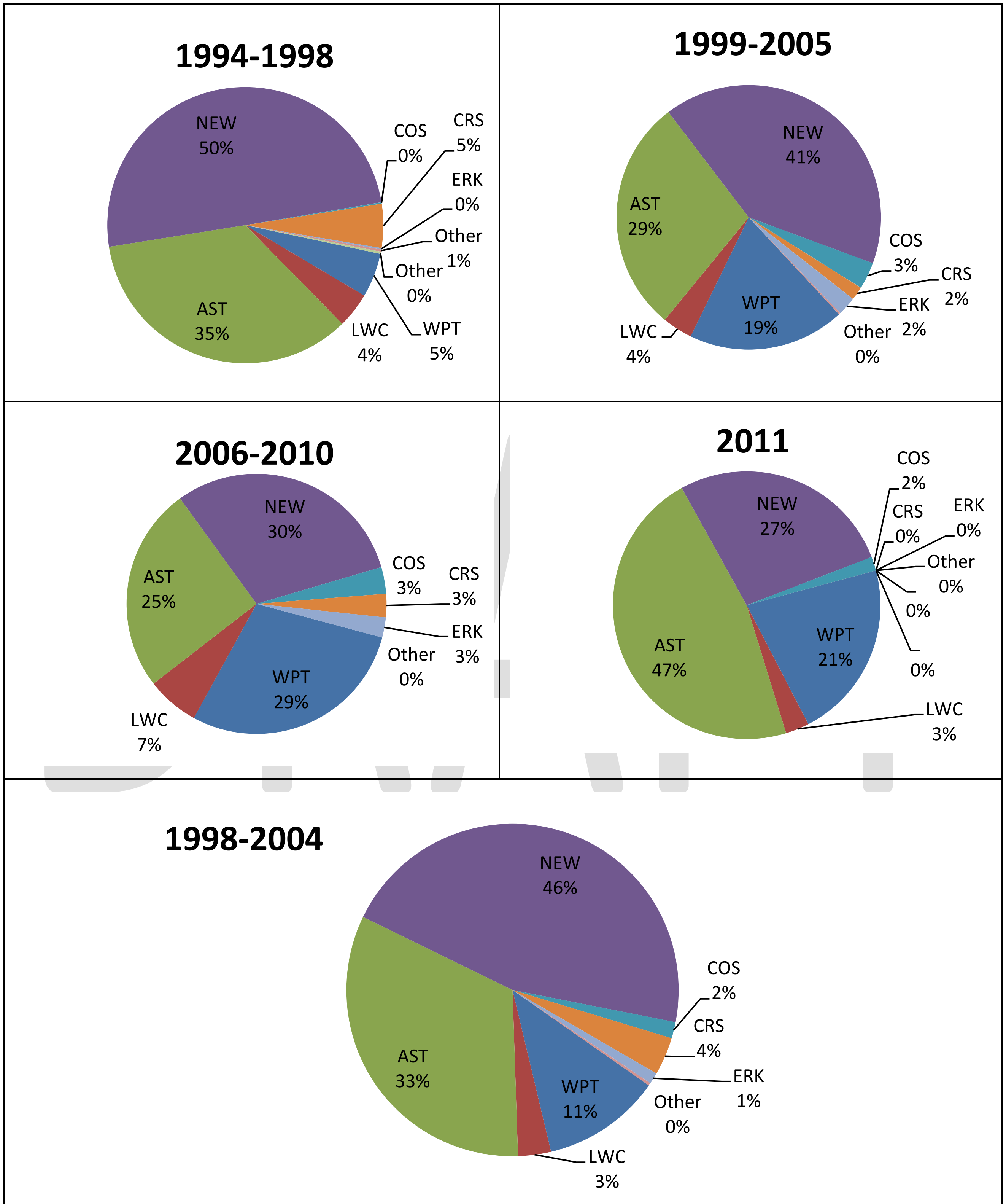


Figure 3-13. Trends in Whiting Harvest and Landings by Community (PacFIN PCID).

Notes and Observations on Community Whiting Harvest Trends

- Over the years the following ports have been the major communities receiving whiting:, Westport (WPT), Ilwaco (LWC), Astoria (AST), Newport (NEW), Coos Bay (COS), Crescent City (CRS) and Eureka (ERK). “Other” includes Blaine, and Brookings.
- Newport, Astoria and Westport are the major centers of shorebased whiting processing.
- The share of whiting landed in communities has varied over several periods: 1994-1998; 1999-2005; 2006-2010 and 2011 (Note that these estimates do not include tribal whiting).
- In the early years Newport was the lead port, but Westport has been steadily increasing. In 2011 Astoria was the lead port.
- The 1998-2004 chart covers the years used to allocate whiting to processors.
- None of the California ports received whiting landings in 2011.

3.3.8 Participation in West Coast and Alaska Fisheries

Table 3-18 shows participation by catcher vessels in West Coast and Alaskan fisheries. This table shows that of the 16 permits that were inactive in West Coast fisheries after 2003, one permit was associated with vessels that continued to be active in Alaska, one was associated with a vessel that also left Alaskan fisheries after 2003 and 14 were associated with vessels that did not have any activity in West Coast or Alaskan fisheries after 2003 (i.e. a total of 15 show not activity after 2003). The table also shows that of 43 vessels that were active in the West Coast fishery after 2003, 27 (63%) fished in the Alaska fishery and 17 (37%) fished the West Coast fishery only.

Enforcement and Management

EFPand RCA Management by gear

CURRENT REGULATIONS - JULY 2012

EFH Category	Pelagic			Bottom Trawl									
Groundfish Regulations	Midwater		a/	Bottom Trawl					Non-Groundfish Trawl b/				
	Midwater (unprotected footrope)			Small footrope			Large footrope						
	Above seabed	Occassional contact with seabed	Frequent contact with seabed	Selective flatfish	Footrope <8 inches	Demersal	Footrope 8-19 inches	Footrope >19 inches	Pink Shrimp	Sea Cucumber (S of 38º57.50')	Ridgeback Prawn	CA Halibut (S of 38º57.50')	Footrope >19 inches
North of 40º10'													
Shorward of Trawl RCA			Yes	Yes	No	No	No	No	Yes	No	No	No	No
Within Trawl RCA	Yes - Primary whiting only		No	No	No	No	No	No	Yes	No	No	No	No
Seaward of Trawl RCA			Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Non-groundfish trawl RCA									Yes	No	No	No	No
EFH - No bottom trawl, other than demersal seine			No	No	No	Yes	No	No	No	No	No	No	No
EFH - No bottom trawl	Yes - Primary whiting only		No	No	No	No	No	No	No	No	No	No	No
EFH - No bottom contact			No	No	No	No	No	No	No	No	No	No	No
EFH- Shoreward of 100 fm			No	No	No	No	No	No	No	No	No	No	No
EFH -Seaward of 700-fm	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
EFH-Davidson seamount >500 fm	No	No	No	No	No	No	No	No	No	No	No	No	No
South of 40º10'													
Shorward of Trawl RCA	No	No	Yes	Yes	Yes	Yes	No	No	Yes		Yes		No
Within Trawl RCA	Yes - Primary whiting only		No	No	No	Yes c/	No	No	Yes		Yes - if south of 38º57.50' and only to 100 fm if RCA shoreward boundary is shallower than 100 fm		No
Seaward of Trawl RCA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes				No
Within Non-groundfish trawl RCA									Yes	No	No	No	No
EFH - No bottom trawl, other than demersal seine	Yes	No	No	No	No	Yes	No	No	No	No	No	No	No
EFH - No bottom trawl	Yes	No	No	No	No	No	No	No	No	No	No	No	No
EFH - No bottom contact	Yes	No	No	No	No	No	No	No	No	No	No	No	No
EFH-Shoreward of 100 fm	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No
EFH-Seaward of 700-fm	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Farallon Islands <10fm	No	No	No	No	No	No	No	No	No	No	No	No	No
Cordell Banks <100fm	No	No	No	No	No	No	No	No	No	No	No	No	No

a/ The regulations do not specifically speak to midwater trawl gear used in a semi-pelagic manner where there is more than occasional contact with the bottom.

b/ State imposed gear restrictions are not shown in this table and may be more restrictive than federal restrictions.

c/ Demersal seine gear allowd between 38° N. lat. and 36° N. lat. shoreward of a boundary line approximating the 100 fm

Table 3-18. Participation in the **shoreside** whiting fishery for two periods (1994-2003 and 2004-2010) for catcher vessel permits based, also showing participation patterns for all other West Coast fisheries (combined) and Alaska (shaded cells are counts of permits showing no activity after 2003).

		Activity in All Other West Coast Fisheries (combined, including mothership whiting)				
		Active in Both Periods	Entering After 2003 (Not Active in Earlier Period)	Exiting After 2003 (Active Only in Earlier Period)	Not Active	Total
		Number of Catcher Vessel Permits				
Shoreside Whiting Participation	**Alaska Participation**					
Active in Both Periods ('94-'03 & '04-'10)						
	Active in Both Periods	25	-	-	-	25
	Entering After 2003	-	-	-	-	-
	Exiting After 2003	-	-	-	-	-
	Not Active	13	-	-	-	13
Entering After 2003						
	Active in Both Periods	1	-	-	-	1
	Entering After 2003	-	1	-	-	1
	Exiting After 2003	-	-	-	-	-
	Not Active	-	4	-	-	4
Exiting After 2003						
	Active in Both Periods	5	-	1	-	6
	Entering After 2003	-	-	-	-	-
	Exiting After 2003	-	-	1	-	1
	Not Active	-	-	14	-	14
Total Shoreside Whiting Participants		44	5	16	0	65
Those that also participated in Alaska		31	-	2	-	33

Notes: Based on annual PacFIN summary file data and participation records from AKFIN. Alaska participation was evaluated for the vessel associated with the permit in each year.

CHAPTER 4 IMPACTS ON THE AFFECTED ENVIRONMENT

The direct and indirect impacts of the actions being considered are addressed for each target species or species group in Sections 4.1 and 4.2. Impacts on agencies and the public decision process are covered in Sections 4.3 and 4.4. Cumulative impacts are discussed in Section 4.5. Although CEQ regulations reference the need for a cumulative impact analysis to consider "past, present, and reasonably foreseeable future actions," from an analytical standpoint what is of interest is the net effect of the proposed action and any ongoing effects of these actions because they continue to exist programmatically.

The alternatives analyzed in this EA differ with regard to the amount of chafer coverage allowed on the length and breadth of the codend and the maximum length of chafer panels allowed (Table 4-1).

Table 4-1. Relative amounts of chafing gear coverage allowed under no action and action alternatives

	Codend coverage	Maximum chafer panel length
SQ	50% of terminal 50 meshes	50 meshes of codend (1 panel could cover a 50 mesh codend)
A-1	75% of entire codend, which can be >500 meshes long	Entire length of coded may be covered with a single panel or multiple panels
A1a	50% of entire codend, which can be >500 meshes long	Entire length of coded may be covered with a single panel or multiple panels
A1b	50% of entire codend, which can be >500 meshes long	50 meshes of codend (10 panels required for 500 mesh codend)

4.1 Physical Environment

4.1.1 Direct and Indirect Impacts to the Physical Environment, Including Essential Fish Habitat and: Pacific Whiting Fishery

West Coast Marine Ecostystem

No or very small change in impacts to the physical environment is expected under any of the action alternatives compared to the no action alternative (Table 4-2). The alternatives covered by this EA pertain to the amount, location of placement and panel size of chafing gear on the codends of the nets used in the midwater trawl fishery, which in recent years has been primarily directed at Pacific whiting in recent years. North of 40^{o} 10’ north latitude, midwater trawl gear usage during the whiting season is allowed to harvest the expanded widow rockfish allowable harvest levels. Midwater trawl gear is also allowed seaward of the RCA south of 40°10’ north latitude and is not projected to be expanded to new target fisheries under this action. There is no measurable difference in impacts to the physical environment over No Action. All groundfish stocks in the Council area are managed to meet optimum yield specifications which are determined based on scientific assessment data that use historic fishery catch and fish abundance sampling data to project spawning stock size and level of allowable catch to maintain a healthy spawning stock. Impacts on the EFH for groundfish and non-groundfish are primarily a function of the areas fished, gear types used, and level of effort. The amount of effort expended in the fishery is related to availability of fish for harvest and allowable catch, which has been allocated between the various fishery sectors. The areas fished are more a function of the location of efficiently harvestable populations of this migratory stock (see Section 3.2.1.1 for a description of whiting biology) and the shoreside receiving and processing locations than it is on the amount, location of placement and panel size of chafing gear on their nets. The fleet is highly mobile, particularly the mothership sector, in which the processors can follow the catcher vessels to the areas of best fishing opportunity. There is only one gear type used in the fishery (midwater trawl), therefore changes in the chafing gear restrictions will not change the gear type used to harvest Pacific whiting.

One possible exception to the above would be with regard to the potential for increased bottom contact with the net if more chafer coverage under the action alternatives is allowed. This would because the vessel operators would be less reluctant to fish near the bottom with chafing gear providing protection to the net from pinnacles, rocks and other such formations (Table 4-2). The bottom contact information provided in Table 3-1 shows only 0.4% of midwater tows resulting in capture of sponges and corals on average during 2000-2010. Not all contact with the sea floor will produce sponges and corals in the tow as shown in the bottom trawl data in Table 3-2. Those data show sponge and coral in 8.4% of bottom tows (range 5.7% to 10.5%, depending on period used). More likely the frequency of bottom contact with midwater gear targeting whiting has been closer to 5% of tows, computed as 100/8.4 * 0.4%.

Table 4-2. Potential impacts of action alternatives compared to status quo restrictions in the directed whiting fishery: Physical Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
West Coast Marine Ecosystem	nc	nc	nc	nc
Physical and Biological Oceanography	nc	nc	nc	nc
Interannual and Interdecadal Climate Forcing	nc	nc	nc	nc
Biogeography	nc	nc	nc	nc
Essential Fish Habitat	nc	nc	nc	nc
Distribution of Midwater Fishery and Habitat Interactions	nc	N 1/	N /1	N 1/

nc=no change N=negative impact

1/ Potential for increased bottom contact due to greater chafer coverage and less vessel operator attention to staying off bottom.

4.1.2 Direct and Indirect Impacts to the Biological Environment: Pacific Whiting

The changes in chafing gear restrictions being considered in this EA have the potential to have negative impacts on the biological environment, including but not limited to the following categories of potentially impacted resources.

- Groundfish, Including Overfished Species
- ESA Listed Salmon
- Other Protected Species
- Other Fish Resources, Including forage fish

The action alternatives considered in this EA provide for greater chafing gear coverage compared to status quo restrictions on the codend of midwater nets in the whiting fishery (Table 4-1). Chafing gear coverage of the coded has the potential to reduce net sorting effect, thus reduce the escape of small fish through the net meshes. Whether any action alternative will affect the biological environment will depend on

- The degree to which undersized fish are able to escape through net meshes, and

- The degree to which fish that escape through the net meshes are able to escape through the terminal end of each chafer panel

Escape of undersized fish is important to reduce waste of non-marketable size fish, smaller forage fish species and eulachon, a threatened species under the ESA. The question can be asked whether fish are escaping the nets under conditions that currently exist in the whiting fishery. This is a relevant question because studies of high volume fisheries, such as the whiting fishery, have shown that high volume catches tend to retain all sizes of fish due to plugging (impingement) of net meshes by dead or injured fish thus reducing escape routes for small fish (Pickich et al 1995). In a study by Erickson (1995) of mesh selectively for Bering Sea pollock, he found that average fish size in the catch decreased as catch size increased indicating the smaller fish were not escaping from large catch tows, most notable for catches over 40 mt. He noted that this inverse selectivity relationship had been observed in other high volume fisheries. The inverse relationship of fish size to catch size did not exist for tows of 15 mt or less. He concluded saying that using mesh size restriction to reduce small fish catches is questionable unless tow catch size can be managed.

The escape of small fish[6] from chafer panels is only relevant if fish are escaping through the net meshes. For large volume fisheries the placement of chafing gear on the net may have no biological effect, but for small volume fisheries or small volume catches chafer panel size and attachment procedure may be relevant. Data are produced in tables 3-8, 3-9 and 3-10 showing that a substantial proportion of whiting tows caught or delivered at-sea and shoreside result in whiting catches > 40 mt, with some tows in the at-sea fishery reaching 168 mt.

Complicating the analysis of biological impacts of the action alternatives and the status quo alternative is the mixed conformance of the whiting fleet with regard to current chafing gear regulations. The regulation change restricting chafing gear application to the terminal 50 meshes of the codend starting with the 2007 season was not expected; prior to that year, there was no limit on the placement of chafing gear on the codend provided the gear did not cover more than 50% of the codend circle and single chafer panels were limited to 50 meshes of the codend with no limit on number of chafer panels. As a result there has been unknown compliance with the requirement to limit chafer coverage to the terminal 50 meshes. For the biological analysis, comparison of the alternatives assume 1) small fish are able to escape through codend meshes, but are impeded by chafer panel coverage and 2) once inside the chafer panel their chances of exiting the panel terminal opening is related to panel length.

For target species and non-target species excluding protected and ecologically sensitive species there would be no difference in projected impacts among the alternatives because placement of chafing gear on the codend primarily affects escape of small fish not the retention of fish overall in the codend (Table 4-3). In that regard there could be increased catch of small fish with the action alternatives, but the catch of target species and non-target species would be expected to remain the same. For Protected species there could be negative impacts of the action alternatives because of potential for reduced escapement through codend meshes of eulachon, a small threatened species under the ESA (see Appendix B). The impact assessment is not different among the action alternatives because whiting fishery impacts are already very small with one pound of eulachon captured in the at-sea fishery for every 5.1 million pounds of whiting on average during 2006-2011 (Table 3-4). Chafing gear coverage provisions primarily affect escape of small fish through codend meshes. Impacts to small forage fish (ecological sensitive species) would likely increase under all of the action alternatives. A-1 would likely have the greatest negative impact because up to 75% of the entire codend could be covered in a single chafer panel, which would have only one escape opening. A-2a would be similar in impact to A-1 except the chafer coverage would be limited to 50% of the codend circle. A-2b would have the least impact among the action alternatives when compared No Action. It would allow for 50% coverage of the entire codend but chafer panel lengths would be limited to 50 codend meshes.

Providing midwater fishing does not increase substantially, impacts to marine mammals and seabirds would not be expected to change over No Action as a result of the adoption of any of the alternatives. Increased catch of small fish which may be prey species for marine mammals and sea turtles is expected to be small and not result in a measurable difference between the alternatives.

Table 4-3. Potential impacts of action alternatives compared to status quo restrictions in the directed whiting fishery: Biological Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Target Species	nc	nc	nc	nc
Nontarget Species (excluding protected and ecological species)	nc	nc	nc	nc
Protected Species (ESA, MMPA, MBTA)	nc	N 2/	N 2/	N 2/
Marine Mammals and Seabirds	nc	nc	nc	nc
Ecosystem considerations	nc	NN 3/	NN 4/	N 5/

nc=no change N=negative impact (NN means more impact than N)

1/ All assessments assume small fish are able to escape codend meshes and that chafing gear impedes small fish escape and survival once inside the chafer panel; studies of high volume fisheries have shown nets become impinged with fish and small fish have few escape routes.
2/ Increased impacts to eulachon due to increased chafer coverage. There is no difference between the action alternatives because fishery impacts on eulachon have been very small (about 5.1 million pounds of whiting caught for every pound of eulachon caught on average in at-sea fisheries during 2006-2011. Table 3-4).
3/ Increased impacts on small forage fish due to 75% codend chafer coverage; only one escape opening once inside the chafer panel. Table 3-4 shows that, excluding Humboldt squid, an average of 1,239 pounds of whiting was caught in at-sea fisheries for every pound of forage fish caught on average in the at-sea whiting fishery during 2006-2011.
4/ Increased impacts to small forage fish due to 50% codend chafer coverage; only one escape opening once inside the chafer panel.

5/ Increased impacts to small forage fish due to 50% codend chafer coverage.

Eulachon

The Southern DPS of Eulachon (*Thaleichthys pacificus*), or Columbia River smelt, was listed as threatened under the ESA in 2010 (75 FR 13012). A status review (NMFS 2010b) describes the most likely threats to eulachon recovery, allowing for a qualitative assessment of the potential significance of impacts to eulachon from the US West Coast commercial groundfish fishery. The status review identified many potential threats, including climate change, bycatch, dredging, shoreline construction, and others. NMFS initiated consultation for eulachon in early 2012, and issued a Biological Opinion in February. The biological opinion concluded that the fishery is not likely to jeopardize the continued existence of the species (NMFS 2012). Although the biological opinion does not apply to the 2013-14 fishery, we can infer relatively similar conclusions, given the lack of alternative biological information on which to base conclusions regarding impacts to protected species.

4.1.3 Direct and Indirect Impacts to the Socioeconomic Environment: Pacific Whiting Fishery

Harvesting Sector Impacts

The assessment of harvest sector impacts for the status quo (no action) alternative shows a negative impact to approximately 62% of the vessel owners who are participate in the Alaksa fisheries and may currently be using codend that do not meet the West Coast requirements and do not have other legal codends available. This is because owners will have to remove chafing gear from the nets they use in Alaska for pollock to fish in the West Coast whiting fishery (Table 4-4). Data for the Alaska and West Coast fisheries show that 62% of West Coast whiting vessels also fished off Alaska during 2004-2010 (Table 3-18). The minimum one time cost estimate to remove chafer from a pollock/whiting fishery codend to meet based on net builder interviews was $5,000 (Table 3-16), which is about a 5% of a single years net revenue impact for a fishery that showed average net revenues per shoreside whiting vessel in 2008 of $100,103 (Carl Lian, NMFS, pers. comm.). This cost would be spread over the year the codend were in use. The 48% of the vessels that do not participate in Alaska are assumed to already have gear that meets the West Coast requirements, so they would incure no added cost.

The projected impacts of the action alternatives ranged from very positive (PPP) under A-1 to very good (PP) under A-2a and A 2b (Table 4-4). A-1 had a more positive impact because it is less prescriptive than the other action alternatives; the regulation only says chafer panels may be attached to the side and bottom panel and does not specify a specific maximum amount of coverage (though we have used 75% coverage for analytical purposes). The other action alternatives specify that chafer may not exceed 50% of the net circle. Under the action alternatives it would be expected that the codends that they use in the Alaska pollock fishery could be used in the West Coast whiting fishery provided they do not have chafer coverage in excess of the specified coverage amounts. This would not seem to be a problem for vessel owners because the 50% net circumference (circle) restriction was in place for many years prior to the 2007 season when the chafer coverage provision was changed.

Table 4-4. Potential impacts of action alternatives compared to status quo restrictions in directed whiting fishery: Socio-economic Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Pacific whiting harvester sector	N	PPP	PP	PP
Processor sector	nc	nc	nc	nc

1/ nc=no change N=negative impact P=positive impact (PP has more impact than P); assessments are not scaled

Processing Sector Impacts

The proposed action is aimed at vessel owners and theircodends. It does not directly impact first receivers or processors including both shoreside and at-sea operations unless the adopted regulation somehow leads to fishery closure such as attainment of a fishery catch limit (e.g., overfished groundfish fishery allowance). In that case the receivers and processors would be denied access to the full whiting allocation and the opportunity to process and sell the product. The potential of that happening under the IFQ program is highly unlikely because individuals or groups of individuals have QP to cover their overfished species impacts and the at-sea sectors have allowable catch levels for overfished groundfish species that are sufficient to cover their historical catch levels. The projected impact of the alternatives on the processor sector is for no change (Table 4-4).

4.2 Rockfish Fishery

This action consideres chafing gear changes for gear that is currently being used by vessels that are participating in the whiting fishery[7] and are making separate hauls to 1) specifically target rockfish anywhere in the EEZ, and 2) vessels south of 40'10 can use midwater gear seaward of the RCAs. In addition, mMidwater trawling for certain rockfish species may be authorized in the near future to target pelagic rockfish as with the declaration that widow rockfish has been declared rebuilt and is no longer in the overfished species category. This analysis does not authorize the use of this gear nor would it make the use of the gear a routine management measure.

The most recent stock assessment for widow rockfish showed that the spawning biomass stood at about 51% of unfished population level. Quota shares can be expected to be issued to limited entry vessel owners that have a history in the harvesting of widow rockfish, which will be in addition to the shares that have already been issued for yellowtail and chilipepper rockfish, the two other rockfish species that have historically been targeted using midwater trawl gear. The fishery, when it resumes, is expected to largely take place north of 40˚ 10' N. lat. as was the situation in the past (see Table 3-11).

The chafing gear alternatives will apply to the midwater rockfish trawl fishery but the impacts can be expected to be different from those associated with the directed whiting fishery because, in addition to whiting fishery vessels, non-whiting vessels can be expected to enter the fishery using midwater gear. Exactly who will be able to prosecute the fishery will depend on their rockfish catch histories, widow rockfish in particular. The whiting vessels will primarily be catcher vessels; it is doubtful that any catcher processor vessels will enter the fishery because their nets are very large, difficult to maneuver and costly to repair if they contact a hard bottom structure where rockfish are most abundant. What few rockfish that have been taken in recent years with midwater nets have been taken by whiting vessels, either as bycatch to whiting fishing or as directed rockfish targeting. It is not possible to separate directed catches for incidental

[7] Explain what it means to "participate in the whiting fishery.

catches in the data. The additional vessels that will be using midwater gear to take rockfish will likely come from the existing bottom trawl fleet. These are generally smaller vessels with less horsepower compared to the whiting vessels. Thus the impacts--environmentally, biologically, and socio-economically--can be expected to be a blend of impacts stemming from the fishing activities of whiting and non-whiting vessels unless they are provided with less restrictive fishing opportunities (i.e fishing within the RCAs). .

During 1994-2003 a period prior to when widow rockfish was declared overfished the midwater trawl fleet consisted of from 53 to 130 vessels (Table 3-13). Of these from 15 to 84 vessels were rockfish only vessels. The future rockfish fleet can be expected to be smaller than the historical fleet because of the trawl fleet buyback program and the implementation of the IFQ program. It is difficult to project the number and size of vessels that will prosecute the fishery in future years. It is also difficult to project the sizes of nets and codends that will be used in the fishery. The gear manufacturer responses to our questions about rockfish nets indicated that smaller nets, compared to whiting nets, will be used to fish for rockfish. This is because they are more maneuverable to fish in habitats where rockfish are most abundant. These smaller nets will also have smaller codends that might not need more chafing gear coverage than current regulations allow; i.e., they are close to or ≤50 meshes long. It may be that status quo regulations may be acceptable to many future midwater rockfish fishers. In the following it is assumed there will be a mix of net sizes in the fishery: some with codends ≤50 meshes long and some with codends >50 meshes long. It is the fishers that use the longer codends that will be most affected by status quo chafing gear restrictions.

4.2.1 Direct and Indirect Impacts to the Physical Environment, Including Habitat and Ecosystem: Rockfish Fishery

As explained in the whiting section the action alternatives relate to the potential for escape and survival of small fish through the codend meshes of midwater trawl nets. In that regard there are no projected impacts from any of the alternatives on the physical environment, with one exception: the potential for bottom contact may be higher in the rockfish fishery under the three action alternative depending on codend size and length. This is because the additional nets used to prosecute rockfish which will be towed by converted non-whiting trawl vessels that will be smaller and less expensive to build than whiting nets and they will be able to use them throughout the EEZ rather than being confined to seaward or shoreward of the RCA as is the case with bottom trawl gear. In many cases these additional nets may have no need for chafing gear coverage on more than the 50 terminal meshes, so all of the alternatives--status quo and the action alternatives--are projected to have similar impacts (Table 4-5).

Table 4-5. Potential impacts of action alternatives compared to status quo restrictions for directed rockfish trawling: Physical Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size

West Coast Marine Ecosystem	nc	nc	nc	nc
Physical and Biological Oceanography	nc	nc	nc	nc
Interannual and Interdecadal Climate Forcing	nc	nc	nc	nc
Biogeography	nc	nc	nc	nc
Essential Fish Habitat	nc	nc	nc	nc
Distribution of Midwater Fishery and Habitat Interactions	nc	N 2/	nc/N 3/	nc/N 3/

1/ nc=no change N=negative impact

2/ Potential for increased bottom contact due to greater chafer coverage on codends >50 meshes long and less attention by vessel operator to staying off bottom.

3/ nc for vessels with codends ≤50 meshes long; N for vessels with codends >50 meshes long and less attention by vessel operators to staying off bottom.

4.2.2 Direct and Indirect Impacts to the Biological Environment: Rockfish Fishery

The action and no action alternatives have the potential to have negative impacts on the biological environment stemming from the resumption of midwater trawling for widow, yellowtail and chilipepper rockfish. The concerns relate to overfished species, ESA listed species and other protected or sensitive species. The action alternatives considered in this EA provide for greater chafing gear coverage compared to status quo restrictions on the codend of midwater nets in the whiting fishery (Table 4-1). Chafing gear coverage of the coded has the potential to reduce net sorting effect, thus reduce the escapement of small fish through the net meshes. Whether any of the action alternative will affect the biological environment will depend on the degree to which undersized fish are able to escape the net meshes, and the degree to which the escaped fish are able to safely escape through the terminal end of chafer panels.

Escape of small fish from codends is important to protecting non-marketable fish, forage fish and eulachon, a threatened species. The potential for escape of fish through the codends of high volume tows was discussed in the whiting fishery section. For high volume fisheries the potential for escape of small fish may be compromised by the presence of a large volume of fish blinding the codend meshes. In the case of the rockfish midwater trawl fishery, the potential for small fish escape through codend meshes is more relevant because the volume of catch per tow can be expected to be small in comparison to whiting tows, which can be over 150 mt.

The projected impacts of the action and no action alternatives are for no change with regard to target and non-target species excluding protected species and ecosystem component species. This is because the chafing gear issue relates to the escape of small fish through net meshes and the terminal ends of chafer panels. None of the alternatives is projected to affect the catch of fish that are too large to escape through net meshes or to cause a change in impacts to marine mammals or seabirds.

Fishery bycatch data are important for assessing potential impact of the regulation alternatives on non-target species including protected species and ecosystem component (EC) species which may be discarded at sea. Quirollo (1989) reported that the species most often caught with widow rockfish caught with midwater trawl in the northern California fishery circa 1980 included yellowtail rockfish and Pacific whiting. Other rockfish landed with widow rockfish included Pacific ocean perch, Boccaccio, canary rockfish and sharpchin rockfish. Fishery bycatch data do not appear to have been collected from the West Coast midwater rockfish fishery by the West Coast Groundfish Observer Program (WCGOP) before the directed fishery ended in 2002 due to widow rockfish being declared overfished. The WCGOP started in September 2001 and had very few observers on staff at the time. No midwater rockfish bycatch data appear in the program's online reports. This may be because none was drawn for sampling in the short time the program had to sample the fishery or there may be a confidentiality issue associated with releasing the data if only one or a few vessels were sampled (John McVeigh, NMFS, pers. Comm.). Bycatch data collected from other West Coast trawl fisheries by the WCGOP and the At Sea Hake Observer Program show impacts to a wide variety of species caught in the various fisheries sampled but relative impacts to the different nontarget species varied compared to the target species and fishery sampled (see . http://www.nwfsc.noaa.gov/research/divisions/fram/observer/sector_products.cfm for the available reports).

One major concern of rockfish fishery impacts is to eulachon, a threatened species under the ESA. It is a small fish weighing less than 2 oz. on average as a spawning adult based on Columbia River data (Appendix B). The escape of these fish through the meshes of trawl nets is an important consideration and any modification of the net that affects their chance of escape and survival is important to be evaluated. It is likely that the resumption of midwater trawling for rockfish will result in some eulachon being captured or escaping through the net meshes. Forage fish, such as the ones listed in Table 3- 4 will also likely be caught in the fishery or escape through the net meshes.

All of the action alternatives have the potential to reduce escapement of eulachon a threatened species through the codend meshes compared to status quo regulations (Table 4-6). However, this only applies for codends >50 meshes long. If the nets used in the fishery are ≤50 meshes long or very close to that length there should be no change in impact compared to status quo regulations which allow for chafing gear coverage on the terminal 50 meshes. The projected impact to forage fish (ecosystem component species) is negative under all of the action alternatives because of greater chafing gear coverage compared to status quo regulations. However there would be no impact under alternatives 2a and 2b if the codends used in the fishery are ≤50 meshes long or close to the length.

Table 4-6. Potential impacts of action alternatives compared to status quo restrictions for directed rockfish trawling: Biological Environment 1/				
	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Target Species	nc	nc	nc	nc
Nontarget Species (not including protected species and EC species)	nc	nc	nc	nc
Protected Species (ESA, MMPA, MBTA)	nc	N 2/	N 2/	N 2/
Marine Mammals and Seabirds	nc	nc	nc	nc
Ecosystem component species	nc	NN 3/	NN 4/	N 5/

1/ nc=no change N=negative impact (NN has greater negative impact than N); assessments are not scaled. All assessments assume chafing gear impedes small fish escape and survival once inside the chafer panel depends on chafer panel size

2/ N is for potential eulachon impacts. This is due to increased chafer coverage on codends >50 meshes long leading to reduced escape of fish.

3/ Increased impacts to small forage fish due to 75% codend chafer coverage; only one escape opening once inside the chafer panel.

4/ NN is for potential impacts to small forage fish for nets >50 meshes long; this is due to greater chafer coverage and only one escape opening once inside the chafer panel.

5/ N is for codends > 50 meshes long. This is due to increased impacts to small forage fish due to greater chafer coverage

4.2.3 Direct and Indirect Impacts to the Socioeconomic Environment: Rockfish Fishery

Harvesting Sector Impacts

The assessment of impact to the harvest sector under status quo regulations will depend on the length of codend that vessel owners use. For codends of 50 meshes or shorter, there would be no impact. For owners with substantially longer codends the impact could be substantial. The lowest cost estimate for chafer removal and reapplication based on net builder interviews was $5,000, which would be a one time cost and may be substantial to a small holder of widow, yellowtail or chilipepper rockfish quota shares that already have nets that meet the Alaska requirements, but not the West Coast requirements. . The action alternatives all show positive impacts to vessel owners ranging from very positive under Alternative 1 to very good under the other two alternatives (Table 4-7). Alternative 1 was given a higher rating than the other action alternatives because it is less prescriptive. It would also allow for greater chafing gear coverage of the codend circumference (75% if all panels are equal size) compared to status quo regulations which limit the coverage to 50% of the net circle. The other two action alternatives allow for chafing gear coverage the entire length of the codend and not limited to the terminal 50 meshes which is the requirement under status quo regulations.

Table 4-7. Potential impacts of action alternatives compared to status quo restrictions for directed rockfish trawling: Socio-economic Environment 1/

	Status quo	Alternative 1	Alternative 2a:	Alternative 2b:
	Limited to 50 end meshes	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Rockfish harvester sector	nc/N 2/	PPP	PP	PP
Rockfish processor sector	nc	nc	nc	nc

1/ nc=no change N=negative impact P=positive impact (PP has more impact than P); assessments are not scaled

2/ nc if all rockfish trawl codends are ≤50 meshes; N if all codends are >50 meshes long.

Processing Sector Impacts

The impacts to the processor sector are the same as the impacts projected for the whiting fishery processing sector; i.e., no impact is likely under any of the alternatives. This is because IFQ management makes every holder of quota pounds accountable for their overfished species impacts and the at-sea sectors have allowable catch levels that cover their overfished species needs based on their historical maximum catches.

4.3 Impacts on Communities

The proposed action items relate to the escape and survival of small fish from the nets of midwater trawl nets. There will be no expected impact to communities from the adoption of any of the alternatives.

4.4 Impacts on Agencies and Public Decision Processes

Adoption of any of the action alternatives would reconcile the regulatory change in 2007 that appears to have been the change that limited chafer gear coverage to the terminal 50 meshes. This will allow enforcement agencies to move forward with regulation enforcement of all trawl gear restrictions, including chafer coverage on the codends of midwater trawl nets, which will be a positive development for both the harvesting sector and the enforcement agencies.

Adoption of any of the alternatives is not expected to have any impact on the public decision process because this action relates to the escape of small fish from the codends of nets used in the West Coast midwater trawl fishery, which is a fishery management issue.

4.5 Cumulative Impacts

The levels of whiting harvests will be declining in the near future for the short term (see 2013-2014 biennial specifications for the groundfish fishery). This will result in reduced harvest opportunity for whiting by all fishers. Fluctutaion in the amounts of rockfish caught with midwater gear also affect the impact of these regulatory changes.

The Council is also in the process of evaluating a change in the allocation of widow rockfish QS. Like whiting, widow rockfish the directed widow rockfish fishery is conducted primarily with midwater gear. Up through recent years and in the Amendment 20 QS allocation, widow has been used primarily to cover bycatch. Because of the transferability of QS and QP, whether or not widow is reallocated is unlikely to have much effect on how the avaialble QP are taken. The QP will be used in those harvest modes in which it can be most efficiently caught. It may have a compounding economic effect with any negative effect which occurs pursuant to this action. Any change in profitability of the fishery will ultimately be passed through to the QS owners as changing QS values.

The Council is considering the adoption of a Fishery Ecosystem Plan (FEP) which would broaden its current authority to species and issues not currently addressed in existing FMPs, including the groundfish plan. The scope of the plan is still under consideration. The guidance provided to the plan development team thus far have included:

- Development of an FEP that would primarily be advisory in nature with the potential to expand in the future.
- Amend existing FMPs to include management measures for forage fish as the Council deems appropriate.
- Develop a list of species not included in any FMP and that are not being managed to define their trophic associations and ecological roles.
- Complete an analysis of unmanaged species and potential processes for their management.

Implementation of an FEP could have positive environmental and biological impacts associated with forage fish and unmanaged fish protection. Such protections could accrue benefits to managed species such as groundfish which depend on forage fish and some unmanaged fish for their survival and reproduction. It could potentially have negative short-term soci-economic impacts if actions taken to protect forage species and unmanaged species resulted in reduced harvest opportunity for managed species.

The following is very preliminary: Many limited entry trawl vessels also harvest Dungeness crab. That resource has wide swings in abundance and availability to harvest using pot gear. Efforts are underway by the coastal states to reduce pot fishing effort in the fishery, which could affect the larger vessels in the trawl fishery that are able to haul and set many more pots than the smaller vessels. Efforts to reduce effort in the fishery could benefit the fishery overall by extending the season length and enhancing exvessel price as it is currently a gold rush fishery. There will be winners and losers in such a process.

The Council has also directed the beginnings of developmental work that would revise gear and area restrictions in consideration of the individual vessel responsibliity and flexiblity created by the trawl rationalization program regulatory environment.

CHAPTER 5 WEST COAST GROUNDFISH FMP AND MSA NATIONAL STANDARDS AND REQUIREMENTS

(TO BE COMPLETED)

- MSA
- MSA National Standards
- NMFS National Standard Guidelines
- Goals and Objectives of FMP
- Goals and Objectives of Amendment 20 to the FMP (Trawl Rationalization)
- Other Council Statements of Intent.

In this chapter, impacts are summarized by the topic areas covered by these criteria. Many of the requirements of the MSA and National Standard Guidelines are already achieved by the trawl rationalization program as a whole and are not affected by the different alternatives considered here.

5.1 Conservation

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(very incomplete)

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CHAPTER 7 NEPA COMPLIANCE

List of agencies and persons consulted.

FONSI

APPENDIX A: Comparison of North Pacific Fishery Management Council Midwater (Pelagic) Trawl and Pacific Fishery Management Council Midwater Trawl Restrictions

A review of the midwater (pelagic) trawl gear restrictions between the PFMC and NPFMC areas for this analysis showed only a few areas of agreement (or absence of conflict) between the two regulation sets (e.g., allowable number of chafing gear sections; bareness of footropes; provision for protective net meshes under transfer, lifting or splitting straps; and provisions for addition of weights to net wing tips) (See Figure 1 for midwater trawl net illustration) (Table 1) The PFMC regulations were more restrictive in several areas [codend mesh construction; chafing gear placement (several areas); footrope construction and bareness of net lines running parallel to the footrope, sweep lines and bridle lines]. The NPFMC regulations were more restrictive in other areas (minimum mesh size; chafing gear placement on the footrope and headrope; attachment mechanism between the main fishing net and the headrope and footrope; configurations that would possibly negate the intent of minimum mesh size regulations; presence of flotation devices; limitation on number footropes and fishing lines; and presence of metallic components other than for fishing instrumentation). The alternatives contained in this section were developed by staff based on conversations with members of industry.

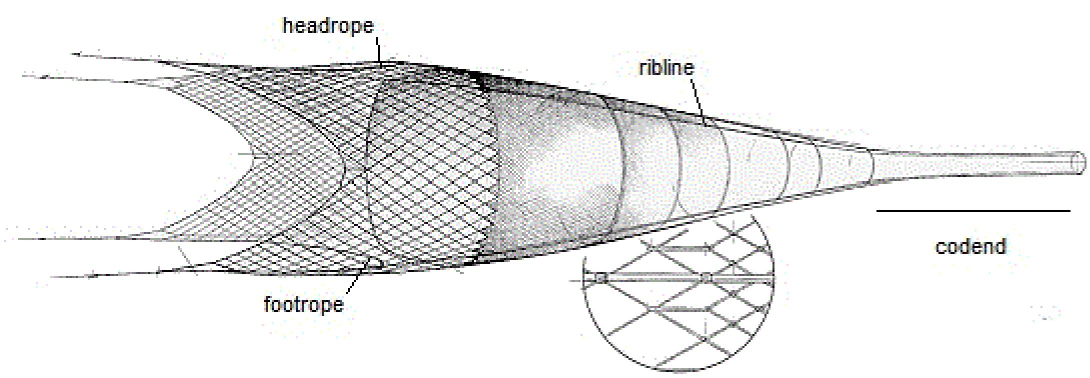

Figure 1: Side view illustration of a typical midwater trawl net used in the NPFMC and PFMC management areas (modified from NET systems web page: http://www.net-sys.com/index.php)

Table 1: Comparison of PFMC and NPFMC midwater (pelagic) trawl gear restrictions

	PFMC	NPFMC	More restrictive area
Codend: 1/	Single-walled webbing only (§660.130(b)(1))	No comparative restriction	PFMC
Mesh size:	3 inch minimum mesh size (§660.130(b)(2)) except for additional midwater trawl gear mesh size restrictions, explained below.	§679.2(14): (iii) Except for the small mesh allowed under paragraph (ix) of this definition (see below): (A) Has no mesh tied to the fishing line, headrope, and breast lines with less than 20 inches (50.8 cm) between knots and has no stretched mesh size of less than 60 inches (152.4 cm) aft from all points on the fishing line, headrope, and breast lines and extending passed the fishing circle for a distance equal to or greater than one half the vessel's length overall (LOA); or (B) Has no parallel lines spaced closer than 64 inches (162.6 cm) from all points on the fishing line, headrope, and breast lines and extending aft to a section of mesh, with no stretched mesh size of less than 60 inches (152.4 cm) extending aft for a distance equal to or greater than one-half the vessel's LOA;	NPFMC

		(iv) Has no stretched mesh size less than 15 inches (38.1 cm) aft of the mesh described in paragraph (14)(iii) of this definition for a distance equal to or greater than one-half the vessel's LOA; (ix) May have small mesh within 32 ft (9.8 m) of the center of the headrope as needed for attaching instrumentation (e.g., net-sounder device).	
Chafing (chafe) gear:2/	(1) Chafing gear may encircle no more than 50 percent of the net's circumference (§660.130(b)(3))	No comparative restriction	PFMC
	(2) No section of chafing gear may be longer than 50 meshes of the net to which it is attached (§660.130(b)(3)).	No comparative restriction	PFMC
	(3) Chafing gear (when used on the codend) may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend (§660.130(b)(3)).	No comparative restriction	PFMC
	(4) Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net (the terminal end is the end farthest from the mouth of the net). Chafing gear must be attached outside any riblines and restraining straps (§660.130(b)(3)).	No comparative restriction	PFMC
	(5) There is no limit on the number of sections of chafing gear on a net (§660.130(b)(3)).	No comparative restriction	No
	No comparative restriction	Has no chafe protection gear attached to the footrope or fishing line (§679.2(14)(ii)).	NPFMC
General provisions	(1) Footrope 3/ must be bare (unprotected)(§660.130(b)(6)).	(1) Has no discs, bobbins or rollers (§679.2(14)(i)).	Neither
	(2) Footrope must not be enlarged with the use of chains or any other means (§660.130(b)(6)).	No comparative restriction	PFMC

	(3) Ropes or lines running parallel to the footrope must be bare and not suspended with chains or any other materials (§660.130(b)(6))	No comparative restriction	PFMC
	(4) Sweep lines and the bottom leg of the bridle must be bare (§660.130(b)(6)).	No comparative restriction	PFMC
	(5) For at least 20 ft behind the footrope or headrope, bare ropes or 16 inch minimum stretch mesh must encircle the net (§660.130(b)(6)).	See 679.2 (14) (A and B), above.	NPFMC
	(6) A band of mesh may encircle the net under transfer cables, lifting or splitting straps, but must be: over riblines and restraining straps and of the same mesh size and coincide knot-to-knot with the net to which it is attached (§660.130(b)(6)).	No comparative restriction	Optional
	No comparative restriction	(2) Contains no configuration intended to reduce the minimum mesh sizes described above (§679.2(14)(v)).	NPFMC
	No comparative restriction	(3) Has no flotation other than for a net sounder device. (§679.2(14)(vi)).	NPFMC
	No comparative restriction	(4) Has no more than one fishing line and one footrope (§679.2(14)(vii)).	NPFMC
	No comparative restriction	(5) Has no metallic components except for connectors or net sounder (§679.2(14)(viii)).	NPFMC
	No comparative restriction	(6) May have weights on the wing tips. (§679.2(14)(x)).	Optional

1/ Codend is defined as the terminal, closed end of a trawl net (50 cfr 600.10 Definitions)

2/ Chafing gear is defined in PFMC area regulations as webbing or other material attached to the codend of a trawl net to protect the codend from wear (§660.130 (11)(iii)(C). Chafe protection is referred to in NPFMC regulations (see above restrictions), but is not defined.

3/ Footrope is defined in PFMC area regulations as a chain, rope or wire attached to the bottom front end of the trawl webbing forming the leading edge of the bottom panel of the trawl net, and attached to the fishing line.

Appendix B: Summary of Biological Review Team Report on Eulachon

BRT. 2008. Summary of Scientific Conclusions of the Review of the Status of Eulachon (*Thaleichthys pacificus*) in Washington, Oregon, and California. Northwest Fisheries Science Center, National Marine Fisheries Service, 2725 Montlake Blvd. E., Seattle, WA 98112-2097

Thaleichthys pacificus (Richardson, 1836) is an anadromous smelt in the Family Osmeridae. Eulachon are a short-lived, high-fecundity, high-mortality forage fish, and such species typically have extremely large population sizes.

Eulachon spawn in the lower portions of certain rivers draining into the northeastern Pacific Ocean ranging from northern California to the southeastern Bering Sea in Bristol Bay, Alaska (McAllister 1963, Scott and Crossman 1973, Willson et al. 1986). Allen et al. (2006) indicated that eulachon usually spawn no further south than the lower Klamath River and Humboldt Bay tributaries. The Columbia River and its tributaries support the largest eulachon run in the world.

Coastwide, there appears to be an increase in both mean length and weight of eulachon at maturity with an increase in latitude (Tables A-5, A-6, Fig. 7). Mean eulachon fork length and weight at maturity range from upwards of 215 mm (8.46 in) and 70 g (2.47 oz) in the Twentymile River in Alaska to 175 mm (6.89 in) and 37 g (1.31 oz) in the Columbia River.

The BRT has determined that eulachon spawning in Washington, Oregon, and California rivers are part of a DPS (southern) that extends beyond the conterminous United States and that the northern boundary of the DPS most likely occurs in northern British Columbia south of the Nass River. The BRT also concluded that the eulachon spawning in the Nass River and further north consist of at least one additional (northern) DPS.

There are few direct estimates of spawning biomass of eulachon from rivers within the DPS, although all of these data sets began to be collected after the perceived decline in run sizes occurred in the early 1990s. Columbia River commercial catch records are not a good indicator of total run size (but do give indication of minimum run size). As recent as 2003 the fishery took over 11 million eulachon weighing over 1 million pounds (see below table).

Table. Eulachon landings (pounds) from the Columbia River and tributary commercial fishery and total numbers of fish in the catch, assuming a range of 10.8 to 12.3 eulachon to the pound, based on the mean reported weight of eulachon in the Columbia River of 37 to 42 g, 1990-2008

Year	Total landings (pounds)	Number of fish at 10.8 per pound	Number of fish at 12.3 per pound
1990	2,784,200	30,069,360	34,245,660
1991	2,950,400	31,864,320	36,289,920
1992	3,673,800	39,677,040	45,187,740
1993	513,900	5,550,120	6,320,970
1994	43,400	468,720	533,820
1995	440,000	4,752,000	5,412,000
1996	9,100	98,280	111,930
1997	58,600	632,880	720,780
1998	12,100	130,680	148,830
1999	20,900	225,720	257,070
2000	31,000	334,800	381,300
2001	313,100	3,381,480	3,851,130
2002	721,200	7,788,960	8,870,760
2003	1,083,400	11,700,720	13,325,820
2004	231,600	2,501,280	2,848,680
2005	200	2,160	2,460
2006	13,100	141,480	161,130
2007	8,310	89,748	102,213
2008	16,941	182,963	208,374

The BRT ranked climate change impacts on ocean conditions as the most serious threat to persistence of eulachon. Climate change impacts on freshwater habitat and eulachon by-catch were scored as moderate to high risk in all sub-areas of the DPS, and dams and water diversions in the Klamath and Columbia rivers and predation in the Fraser and British Columbia coastal rivers were also ranked within the top four threats in their respective regions.

The weight of the available information indicates that the Southern Eulachon DPS has experienced an abrupt decline in abundance throughout its range. The BRT determined that the Southern Eulachon DPS is at “moderate risk” of extinction throughout all of its range.

Trawl Gear Regulation Change Proposals Developed at Trawl Fishery Gear Workshop

The trawl gear regulation workshop was held August 29-30, 2012 in Portland, Oregon. The primary purpose of the workshop was to review the gear restrictions (including area of use) that apply under the Trawl Fishery Rationalization program and discuss the need for such restrictions in the context of that program. The workshop included scoping of various gear restriction alternatives that were recommended by the Trawl Rationalization Regulatory Evaluation Committee (TRREC) at the November 2011 meeting of the Pacific Council. The following recommendations are offered for Council consideration for regulation implementation; they basically condense and refine the TRREC recommendations as they relate to current trawl fishery gear restrictions. A listing of the recommended regulation alternatives contained in the report follows (they are numbered based on the issue that they are intended to address; the issues are explained in the text):

The alternatives within each issue are not mutually exclusive.

Issue 1: Use of Multiple Gears and Expended Area for Midwater Gear

> **Alternative 1a:** Allow expanded use of multiple trawl gear types and midwater trawl on the same trip.
>
> > **Option:** Allow year-round use of mid-water gear within and outside the RCA north of 40^{o} 10' north latitude.
>
> **Alternative 1b:** Allow use of multiple gear types, midwater trawl and fixed gear types on the same trip.

Issue 2: Trawl Gear Modifications

> **Alternative 2a:** Reduce minimum mesh size for bottom trawl ½ inch to 4 inches.
>
> **Alternative 2b**: Eliminate the selective flatfish trawl requirement.

Issue 3: Gear movement across management lines

> **Alternative 3a:** Allow individual fishing quota (IFQ) program vessels to move fixed gear across management lines.

Issue 1: Allow Multiple Trawl Gear Types to be Onboard Simultaneously and Used on the Same Trip (Derived from TRREC recommendations 2 and 3): There are two Alternatives under this recommendation: Alternative (1a) :Allows expanded use of multiple trawl gear types and midwater trawl on the same trip. Alternative (1b) : Allows expanded use of trawl gear types, midwater trawl and fixed gear types on the same trip. These alternatives are explained below.

Alternative 1a: Allow expanded use of multiple trawl gear types and midwater trawl on the same trip.

This option would allow vessels greater flexibility or expanded opportunity to use the various trawl gear types on the same trip [large footrope trawl, small footrope trawl (including selective flatfish trawl), and midwater trawl]. Under this alternative, vessels would be allowed to possess onboard and use all bottom trawl gear types on the same trip, depending on area fished. On midwater trawl trips declared for the RCA, bottom trawl gear onboard possession would be prohibited. Catches made with different bottom trawl types on the same trip would not need to be separated in holding bins or during offload, but existing Federal sorting requirements will still apply. This is because net selectivity differences between the different bottom trawl gear types, with the same minimum mesh size restriction (4 ½ inch between the knots, BK), are believed to be negligible. However trips on which bottom trawl and midwater trawl was used on the same trip, catches by the two gear classes would need to be kept separate in the vessel hold and at time of offloading so separate landing receipts could be made for the respective gear classes. New declarations would be required for the following: possessing bottom trawl and midwater gear onboard on the same trip.

Current trawl regulations define the following trawl gear types: large footrope trawl, small footrope trawl, selective flatfish trawl, and midwater trawl. Selective flatfish trawl is a specific type of small footrope trawl. Restrictions on the use and simultaneous possession for each gear type varies whether fishing north or south of Cape Mendocino (40˚10'N. lat.) or shoreward, seaward or within the RCA. The specific gear restrictions can be found at Section 660.130 (c)(4). The onboard gear type restrictions are shown in Table 1.

> **Option:** Allow year-round use of mid-water gear within and outside the RCA north of 40^{o} 10' north latitude.

Bottom trawl gear specific fishing area restrictions would continue in effect but midwater trawl gear for any species would be allowed year round in the entire EEZ (currently only allowed during the primary whiting season and for chilipepper south seaward of the RCA); the proposal here would not affect preseason trip limits and whiting season opening dates.

A new declaration would be required for the following: possessing bottom trawl and midwater gear onboard on the same trip; and midwater fishing in the RCA outside the whiting season.

Table 1. Summary of allowable (yes) and non-allowable (no) onboard gear type combinations for limited entry groundfish trawl vessels

	Groundfish Trawl/Other Gear Combinations		Groundfish Trawl Combinations	Bottom Trawl Combinations	
	Groundfish Trawl[a/]		Bottom Trawl[c/]	Small Footrope[d/]	Small Footrope (Other than Selective Flatfish)
	Combined With				
Area/Season	Groundfish Fixed Gear	Non-Groundfish Trawl[b/]	Midwater Trawl	Large Footrope Trawl	Selective Flatfish Trawl
S. 40˚ 10’	No	No	No	No	Yes
N. 40˚ 10’ (shoreward)	No	No	No	Yes	No (SFF Only)[e/]
N. 40˚ 10’ (seaward)	No	No	No	Yes	Yes

a/ Groundfish trawl includes all of the gears listed in this table except non-groundfish trawl and groundfish fixed gear.
b/ Shrimp, California halibut, sea cucumber, etc.
c/ Bottom trawl includes small footrope trawl (which includes selective flatfish trawl) and large footrope trawl.
d/ Small footrope includes selective flatfish trawl.
e/ Vessels may not fish shore-ward and sea-ward of the RCA on the same trip with small footrope trawl on the same trip.

The above restrictions were important when vessels targeting non-whiting species were managed based on landings and fleet-wide impacts were modeled. Under trawl rationalization, individuals are accountable for their total catch of groundfish and the catches observed on every trip and on every vessel. Thus, such specific onboard gear type prohibitions, generally, no longer appear to be needed.

The use of individual trawl gear type by area allowed under current regulations is summarized in the following:

- Large footrope trawl may be used coastwide, but only seaward of the RCA.
- Small footrope trawl (including selective flatfish trawl) may be used coastwide seaward of the RCA and shoreward of the RCA south of 40º10’ N. lat.
- Only selective flatfish trawl may be used shoreward of the RCA north of 40º10’.
- Midwater trawl is only allowed seaward of the RCA south of south of 40º10’ N. lat. and throughout the EEZ north of 40º10’ N. lat during the primary whiting season.

With the exception of midwater trawl, no change is recommended to the above area-specific gear type use restrictions. Under the proposed change, mid-water trawl could be used to target groundfish throughout the Exclusive Economic Zone (EEZ) year round including within the

RCAs, except for whiting which would be subject to whiting seasons. Cumulative limits for whiting would continue to restrict whiting catch prior to the start of the whiting season. Midwater trips planned for the EEZ would not allow for onboard possession of bottom trawl gear on the same trip; midwater trips planned shoreward or seaward of the RCA could have bottom trawl gear onboard and be used as described above, so long as catch is separated by gear type.

Fishing with midwater gear is currently allowed in groundfish EFH conservation areas subject to other restrictions on the use of such gear. The recommendation is to continue the allowance for possession and use of midwater gear in the RCAs and within groundfish EFH conservation areas. For now, fishing within the RCA would continue to be restricted to mid-water (pelagic) trawl gear to avoid bottom dwelling species and bottom trawl gear would be restricted to waters shoreward of and seaward of the RCA. Restrictions might be reduced in the future based on individual vessel accountability.

The proposed changes could have negative impacts on law enforcement efforts, including the declaration program. In addition, the proposed changes could have negative impacts on observer, shoreside sampling programs, and states data management programs. It is important to note that fishery samplers both shoreside and at-sea are biologists and not are not present to enforce fishery regulations although their reports might be used after the fact to alert enforcement personnel of possible regulation violators. The impacts on fishery management programs will need to be addressed in the environmental analysis if the Council decides to move forward with this recommendation.

Alternative 1b: Allow use of multiple gear types, midwater trawl and fixed gear types on the same trip.

This alternative is the same as Alternative 1a, but, in addition, allows for the onboard possession of fixed gear types (pot and/or longline) on the same trip as trawl gear is possessed. This alternative would allow vessel owners to use trawl gear, as described under Alternative 1a, and fixed gear on the same trip. A new declaration category would likely be required for vessels using trawl and fixed gear on the same trip. For enforcement purposes, the more restrictive RCA boundaries would be required on such trips. It would also likely be required that catches be separated in the hold by gear type (bottom trawl, midwater trawl and each fixed gear type) and weighed separately at time of offloading. This is due to important gear selectivity differences and potential impacts to stock assessment models.

The rationale for the modified trawl gear type possession and use provisions under this alternative are explained under Alternative 1a. Onboard possession of fixed gear types is currently prohibited on trips in which groundfish trawl gear is onboard the vessel (Table 1). Under the IFQ program gear switching provision (§ 660.140(k)), it is now possible for trawl vessels to fish for IFQ allocations using groundfish fixed gear types (pot and/or longline) on the same trip. This alternative would allow vessel owners greater flexibility in harvesting their IFQ allocations, which would likely lead to more efficient use of vessels and gear. It might also likely lead to larger landings which could benefit fish processors by making more efficient use of offloading and processing facilities and human resources. For example, a vessel would be able to use small footrope trawl (including selective flatfish trawl) to catch their shallow water flatfish, deep water groundfish (DTS, slope rockfish), and sablefish using fixed gear on the same trip. The current gear possession and use restrictions were important when vessels were managed based on cumulative trip limits and fleet-wide impacts were modeled. Under trawl rationalization, individuals are accountable for their total groundfish catch and that catch is observed on every trip and on every vessel. Thus, there might be limited need for prohibitions on carrying multiple gear types may.

The proposal here might add more complexity to law enforcement. In addition, the proposed changes could have negative impacts on observers, shoreside sampling, and data management programs, than the previous alternative. The observer program could be affected by reduced work space due to extra gear onboard and observer safety with fixed gear sliding around during rough weather. These complexities would be reduced somewhat by requiring that the more conservative RCA limits would apply. These impacts will be addressed if the Council decides to move forward with this recommendation.

Issue 2: Trawl Gear Modifications. There are two alternative under this issue. The TRREC report recommended a broader range of regulation changes than are presented here (TRREC recommendation #6). The alternatives recommended during the workshop relate to (1) minimum mesh size restriction for bottom trawl nets, and (2) the required use of selective flatfish trawl when fishing shoreward of the RCA north of 40º10’ N. lat.

Alternative 2a: Reduce minimum mesh size for bottom trawl ½ inch to 4 inches. The recommendation here is to reduce the minimum mesh size provision for bottom trawl nets from 4 ½ inches to 4 inches. Minimum mesh size means the smallest distance allowed between the inside of one knot to the inside of the opposing knot, regardless of twine size (Between Knots, BK; § 660.11 Fishing gear (7)). The recommendation is not to remove all minimum mesh size provisions, as recommended by the TRREC, but rather to lower it for bottom trawl nets by ½ inch. The current mesh size restriction (4 ½ BK) was based on a study by Pikitch et. al. (1990 [1]) who examined gross revenue per trawl hour in the West Coast trawl fishery targeting rockfish and flatfish using various codend mesh sizes . They determined that the small size mesh tested (3 inch BK) increased time spent sorting the catch while the larger mesh size (5 inch) resulted in increased loss of marketable fish.

The reason for the change is to accommodate the inconsistency, reported in the workshop, of available netting in meeting the minimum mesh size requirement of 4 ½ inches in all net sections. As part of this recommendation fishermen should be urged to continue to order or make bottom trawl nets with webbing spacing nominally specified as 4 ½ inches. If the fishermen continue to order the larger mesh-size net there will be less concern with violation of minimum mesh size regulations. However, if fishermen start ordering the smaller mesh size, then the problem with minimum mesh size violations will resurface. Use of the smaller mesh size could also result in increased catch of non-marketable size fish that individuals would be held accountable for in their total catch of groundfish. The impact to law enforcement and other

[1] Pikitch, E., Bergh, M., Erickson, D., and J. Wallace. (1990). Final report on the results of the 1988 West Coast groundfish mesh size study. Fish. Res. Inst., WH-10., Univ. Wash. 98195. Saltonstall-Kennedy Grant #NA88-ABH-00017.
https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/4141/9019.pdf?sequence=1

fishery management efforts would likely be neutral. These will be addressed if the Council decides to move forward with this proposal.

Alternative 2b: Eliminate the selective flatfish trawl requirement. Selective flatfish trawl is a type of small footrope trawl that is required shoreward of the RCA north of 40º10' N. lat. The regulation was implemented in 2005 (http://www.pcouncil.org/bb/2007/1107/D6c_ODFW-NWFSC.pdf). The net construction specifics for this regulation are as follows:

> The selective flatfish trawl is a two-seamed net with no more than two riblines (lines that the run the full length of the net), excluding the codend. The breastline (a line that connects the headrope to the footrope) may not be longer than 3 ft (0.92 m) in length. There may be no floats along the center third of the headrope (a line across the top end of the net) or attached to the top panel except on the riblines. The footrope (the main line across the bottom front end of the net) must be less than 105 ft (32.26 m) in length. The headrope must be not less than 30 percent longer than the footrope (§660.130(b)(5)(i)).

As part of this recommendation, the above wording defining the gear and any linking regulations requiring its use would be removed from regulation. In its place, the small footrope trawl language would apply when fishing shoreward of the RCA north of 40º10' N. lat. (like it is to the south of that area). The main reason for the proposed change stems from the specificity of the regulation: it does not provide for the effective placement of flexible grates to exclude non-target fish species nor does it allow for experimentation with new net designs or net configurations.

The trawl fishery is faced with reduced harvest allowance for Pacific halibut under the IFQ program. Work in Alaska has shown that Pacific halibut bycatch can be reduced by the use of flexible grates in bottom trawl nets. A four seam net is required for proper grate installation but the selective flatfish trawl regulation (above) requires a two-seam trawl. The GMT has reviewed the situation and reported their findings, including four alternatives to addressing the issue (GMT 2011). One of the alternatives is to replace the selective flatfish trawl regulation with a four-seam small footrope trawl regulation requirement (for the area north of 40º10' N. lat). The proposal here is the same as the GMT alternative but without the four-seam element.

This proposal has potential negative biological impacts if catch of canary rockfish, an overfished species, should increase. Ultimately canary rockfish catch is limited by the available QP, however, there could be negative impacts for the fleet as a whole if the gear change resulted in disaster tows (tows with amounts of canary equal to a significant portion of the total shorebased fishery canary allocation). The selective flatfish trawl requirement was aimed at maintaining a nearshore flatfish trawl opportunity while reducing impacts to canary rockfish in the bottom trawl fishery rather than moving the shoreward boundary of the RCAs shoreward. An even greater concern now may be impacts to Pacific halibut, which could impede access to IFQ species allocations if vessel individual bycatch quota (IBQ) for halibut are reached. The potential impacts of the proposed change will be addressed if the Council decides to move forward with this recommendation.

Issue 3: Fishing Across Management Lines. This issue was not a high priority action item in the TRREC report, but the Council directed the workshop to scope the issue and see if something can be done about the situation. The situation is that under IFQ program regulations, vessels must land catches in the management area where they were caught before fishing in another management area. Some vessel owners report that the regulation is expensive to their operations, particularly those that fish out of ports in close proximity to a management line. The four IFQ management areas are (660.140 (c)(2)):

1. Between the US/Canada border and 40°10′N. lat.,
2. Between 40°10′ N. lat. and 36° N. lat.,
3. Between 36° N. lat. and 34°27′ N. lat., and
4. Between 34°27′ N. lat. and the US/Mexico border

The species management lines that correspond to the above areas are shown in Table 2. It shows that 12 of the 25 IFQ species or species groups are managed relative to on one of the above management lines.

Table 2: Management lines used for IFQ Species (50 CFR 660.140) 1/	
Roundfish	**Rockfish**
Lingcod.	Pacific ocean perch S. of 40°10′
Pacific cod.	Widow rockfish.
Pacific whiting.	Canary rockfish.
Sablefish north of 36° N. lat.	Chilipepper rockfish S. of 40°10′
Sablefish south of 36° N. lat.	Bocaccio S. of of 40°10′
	Splitnose rockfish S. of 40°10′
Flatfish	Yellowtail rockfish N. of 40°10′
	Shortspine thornyhead N of 34°27′ N. lat.
Dover sole.	Shortspine thornyhead S of 34°27′ N. lat.
English sole.	Longspine thornyhead N of 34°27′ N. lat.
Petrale sole.	Cowcod S. of 40°10′
Arrowtooth flounder.	Darkblotched rockfish
Starry flounder.	Yelloweye rockfish
Other Flatfish stock complex.	Minor Rockfish slope complex N. of 40°10′
Pacific halibut (IBQ) N of 40°10′	Minor Rockfish shelf complex S. of 40°10′
	Minor Rockfish slope complex N. of 40°10′
	Minor Rockfish shelf complex S. of 40°10′
1/ Species or species groups without north/south latitude designation are managed coastwide)	

Alternative 3a: Allow IFQ program vessels to move fixed gear across management lines. This alternative would allow vessel owners to move fixed gear across management lines with groundfish on board the vessel after making an appropriate fishery declaration. Vessels that participate in the shorebased IFQ program may fish in only one management area during a trip (660.140 (c)(2)).

This means that vessel operators must offload their catches before fishing, or resetting their gear when fishing with fixed gear, in a different management area. IFQ program trawl vessels are allowed to fish fixed gear for IFQ species as per § 660.112 (b)(3) and declaring their intent before leaving port. Under current regulations if a fisher makes a fixed gear set in area A, they must land their fish before re-setting their gear in area B. Under the proposal here, they would be allowed to pull their gear in area A, reset it in area B and then land the fish caught in area A. The fisher would report the area where the fish were caught at time of landing. To fish across a management line as describe here, the fisher would first have to declare their intent before leaving port to check and move their gear. Thus a new declaration category will be required.

This recommendation does not allow for setting fixed gear in two (or more) management areas at the same time and delivery of the combined catches to a single port. This prohibition is mentioned because the location of catch from each management area cannot be determined when the catches are mixed. Such separation is important for species that are allocated based on management areas such as minor slope rockfish. Also, this recommendation does not address the issue of fishing across management lines using trawl gear. The workshop did not receive sufficient input on this latter issue to make a recommendation.

Other Recommendations

- Logbooks are not required for fixed gear fishing under the IFQ gear switching program. A federal action or actions by the coastal states would be required to implement such a program. This is an important action that needs to be moved forward.
- Electronic fishing monitoring technology could enhance enforcement monitoring of fishing activities especially when fixed and trawl gear are used on the same trip. This is another important action item that needs to be moved forward.
- The trawl permit length endorsement and associated permit transfer provisions are no longer needed as vessel capacity is no longer an issue under the IFQ program. However, there may be impacts to non-target species and to target species taken with fixed gear under gear switching that will need to be taken into account.

References

GMT. 2011. Groundfish Management Team report on preliminary management measures for 2013-14. Agenda Item E.9.b GMT report 2 November 2011. PFMC, Portland OR 97220. 17p. (http://www.pcouncil.org/wp-content/uploads/E9b_GMT_RPT2_NOV2011BB.pdf)

APPENDIX A: Excerpt from November 2011 Groundfish Management Team Report: Allowance for Four-Seam Trawls Shoreward of the RCA

(http://www.pcouncil.org/wp-content/uploads/E9b_GMT_RPT2_NOV2011BB.pdf)

Issue: Allow the use of four-seam trawls shoreward of the RCA to facilitate the use of flexible grates for excluding Pacific halibut from trawl catches. A primary benefit of such a management is reduced catches of Pacific halibut and increase access to shelf flatfishes for the IFQ Program.

Background: Prior to 2005, small footrope trawls (and midwater trawls) were allowed shoreward of the RCA. There were no requirements regarding the number of panels (or seams), the breastline height (which approximates the maximum height of the headrope above the footrope), or the length of the headrope for bottom trawls fished shoreward of the RCA (Figure 1). The selective flatfish trawl became a requirement in 2005 north of 40o 10' N latitude when trawling shoreward of the RCA. Modifications to the "typical" small footrope trawl were required for the development of the selective flatfish trawl (see Figure 1) and are described in Federal Pacific Coast Groundfish Regulations (Page 375; September 2, 2011):

(i) Selective flatfish trawl gear. Selective flatfish trawl gear is a type of small footrope trawl gear. The selective flatfish trawl net must be a two-seamed net with no more than two riblines, excluding the codend. The breastline may not be longer than 3 ft (0.92 m) in length. There may be no floats along the center third of the headrope or attached to the top panel except on the riblines. The footrope must be less than 105 ft (32.26 m) in length. The headrope must be not less than 30 percent longer than the footrope. An explanatory diagram of a selective flatfish trawl net is provided as Figure 1 of part 660, subpart D."

The purpose of this design was to reduce the catch of overfished rockfish species (e.g., canary rockfish), while providing access to a portion of the traditional shelf flatfish fishery (see 2005-2006 FEIS). The restricted breastline length ensured that the headrope height was approximately no more than 1 m above the footrope, and the required ratio of headrope length to footrope length provided a "cutback" headrope. Research in Oregon demonstrated that this low-rise trawl with a "cutback" headrope would maintain or increase flatfish catches while reducing catches of certain larger rockfish and roundfish species (including canary rockfish) and Pacific halibut relative to the most common four-seam trawls that were used by the U.S. west coast groundfish fleet at the time (King et al. 2004; Hannah et al. 2005). The reduced catches of rockfishes, other roundfishes, and Pacific halibut was thought to be facilitated by the low and "cutback" headrope because: (a) some fishes may move up and away from the bottom as they encounter the trawl footrope (e.g., Bublitz 1996; Rose 1996), and, (b) some fraction of certain "schooling" species may exceed 1 meter above the bottom as the trawl passes by (e.g., Pacific whiting and canary rockfish).

Concern and Potential Solution: Under the current IFQ program, many fishermen are concerned of exceeding their Pacific halibut IBQ before accessing their quota pounds (QP) for target species (see the presentation by Dr. John Gauvin, PFMC, Agenda Item I.7.c, Public Comment, Power Point Presentation, April, 2011). Since the inception of the IFQ Program, fishermen have been experimenting with sorting grates (rigid and flexible) that have been successfully used in Alaska trawl fisheries to reduce the catch of Pacific halibut (e.g., Rose and Gauvin 2000). These grates guide certain species (such as Pacific halibut) out of the trawl at fishing depth (through top or bottom escape panels) while allowing for the retention of species that are smaller and/or that exhibit different behaviors within trawls. Flexible grates are preferable to rigid grates because of ease of handling

(e.g., see PFMC, Agenda Item I.7.c, Supplemental Public Comment Power Point, April 2011), and potentially safety concerns.
Although rigid grates may be effectively applied to both four- and two-seam trawls, flexible grates may be ineffective or problematic in two-seam trawls, which are required shoreward of the RCA. The water flow in the back end of a two-seam trawl (e.g., in the areas of the intermediate and codend) may be low, and consequently, these areas of the two-seam net may collapse on occasion during a tow. The result may be reduced halibut escapement or high loss of target species. The water flow throughout four-seam trawls may be higher than two-seam trawls which may result in higher success of flexible sorting grates for excluding Pacific halibut from the catch. Hence, two-seam trawls that are required shoreward of the RCA may not be suitable for the installation of flexible grates.

Considerations for Further Analysis: The GMT acknowledges that the limited Pacific halibut IBQ may be a significant constraint for individuals achieving their target species QP, and consequently, the commercial fishery reaching the ACL for many of the trawl-dominant species. Under Amendment 21, the maximum halibut IBQ allowed for the IFQ Program will be 279,570 lbs (round wt, legal + sublegal) until 2014, and 215,054 lbs (round wt, legal + sublegal) thereafter. These values for Pacific halibut IBQ represent a significant reduction to the annual halibut mortality demonstrated by the limited entry trawl fishery prior to the IFQ Program (e.g., approximately 459,000 to 633,000 lbs round weight for the years 2005 to 2009; Heery et al., 2010). Hence, measures may be required to reduce Pacific halibut catch and increase access to target species.

Further analysis of this potential management measure may be possible with low or moderate effort, depending on alternatives. Some considerations for analysis of this potential management measure will include: (a) potential for increased (or decreased) catch of overfished species, (b) improved access to target species, and (c) impact to the habitat (e.g., substrate). With these considerations in mind, potential alternatives that could be analyzed with low to moderate effort include:

- *No Action (Status Quo; Selective Flatfish Trawl)*

- *Alternative 1 (Four-Seam Selective Flatfish Trawl):* Allow four-seam trawls shoreward of the RCA, with all regulated specifications equal to the selective flatfish trawl except the number of seams (four instead of two).

- *Alternative 2 (Four-Seam Cutback Small Footrope Trawl):* Allow four-seam trawls shoreward of the RCA, with **cutback headrope** similar to the selective flatfish trawl. All other gear regulations currently in effect for small footrope trawls remain the same (e.g., small footrope, mesh size, chafing gear, etc). Headrope height is unrestricted.

- *Alternative 3 (Four-Seam Small Footrope Trawl):* Allow four-seam, small footrope trawls shoreward of the RCA. All current gear regulations shown for small footrope trawls would remain in place (e.g., headrope height and the headrope length:footrope length ratio are unrestricted).

- *Alternative 4 (Two-Seam Selective Flatfish Trawl Modified with Four-Seam Intermediate & Codend):* Allow existing two-seam selective flatfish trawl nets to be modified to include a four-seam intermediate and cod-end section.

Alternatives 1 – 3 progressively deviate from the selective flatfish trawl while maintaining all features of the small footrope trawl. Alternative 4 is a combination selective flatfish trawl (2-seam) that is modified to allow four-panel (seam) intermediate and codend that may better facilitate the installation of a flexible grate. Some potential impacts of these alternatives include:

• The alternatives may not significantly impact the habitat (e.g., substrate) relative to status quo because only small footrope trawls are included. The analysis would become more complex if alternatives included large footrope trawls due to their potential impact to the substrate shoreward of the RCA.

• Alternatives 1 – 4 allow four-seam trawls shoreward of the RCA, which will facilitate the use of flexible grates. This action may increase escapement of Pacific halibut from trawls at fishing depth relative to status quo, and subsequently increase access to target species QP.

• Although Alternative 1 may show similar catch rates for overfished species as Status Quo, this alternative would require the most significant modifications to four-seam small footrope trawls that fishermen currently own, and would therefore be most expensive for the fleet to implement. Cost to the fleet decreases with each alternative.
• Catch rates for target species may be significantly higher for alternatives 2 and 3 relative to status quo under equal conditions (i.e., fishing in the same area at the same time).

• Even though catch rates of overfished species may be relatively higher for alternatives 2 and 3 relative to status quo (under equal conditions), the IFQ Program requires 100% observer coverage, and fishermen are individually accountable for constraining catches within their Quota Pounds. This feature of the IFQ Program will likely result in fishermen adjusting their fishing methods to ensure that they remain within their Quota Pounds for overfished species (e.g., tow location and tow duration)

• Alternative 4 may show similar catch rates for overfished species as Status Quo, but would require fewer modifications to develop relative to Alternative 1. Alternative 4 might be a cost-effective solution that would enable fishermen to modify their two-seam selective flatfish trawl nets in a manner that is more compatible with flexible grate halibut excluder designs. This type of modification is common in Bering Sea flatfish trawl fisheries and has achieved successful results.

GMT Recommendation: The range of alternatives that provide for the use of Pacific halibut excluders (grates) could result in increased access to target species while minimizing catch of Pacific halibut, a significant benefit to the IFQ Program. The potential analysis described above could be completed with low to moderate effort since the overall impacts to groundfish would remain within the trawl allocation. That is, any changes to the harvest levels of the IFQ species will be accounted for by existing QPs. For non-IFQ species, changes to trip limits could be accommodated inseason if landings are projected to be greater than the trawl allocation. Further, as noted above, no changes to habitat are anticipated as a result of the proposed alternatives.

References:

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Agenda Item I.5.a
Attachment 5 – Lender Issues
November 2012

TRAWL RATIONALIZATION TRAILING ACTIONS

ISSUE: LENDERS

Draft Council Decision Analysis Document

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

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CHAPTER 1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This document provides background information about, and analyses for, modifications affecting the ability of the groundfish industry to acquire loans from lenders. The proposed action would require an amendment to the regulations implementing the Pacific Coast Groundfish Fishery Management Plan (FMP). If the regulatory amendment is implemented, the description of the trawl rationalization program contained in Appendix E to the groundfish FMP would automatically be revised to reflect the regulatory modification. The proposed action must conform to 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. NMFS has determined that this action would be classified as a Categorical Exclusion under NEPA.

1.2 Description of the Proposed Action

1.2.1 Issue: QS Control Limit Safe Harbor for Lenders

The action considered under this issue would amend the shorebased trawl rationalization regulations as they apply to lenders with respect to QS control limits.

1.2.2 Issue: Public Record Of Lender Interest in QS *(CONSIDERTAION POSTPONED TO FURTHER VET PROBLEM AND POTENTIAL SOLUTIONS)*

The action considered under this issue is to amend the shorebased trawl rationalization regulations to provide a means by which lender collateral interest in QS could be included in the information kept on QS accounts, with the concurrence of the QS account holder and the lender.

1.3 Purpose and Need for the Proposed Action

1.3.1 Issue: QS Control Limit Safe Harbor for Lenders

When the control limits policy was established there was substantial concern about opportunity for circumvention of the limits. When it approved the initial issuance rule implementing the IFQ program, NMFS inserted into the QS control rule an exception for banks and financial institutions. There is concern about both whether the entities qualifying for this exemption are sufficiently defined and the scope of the activities for which the exemption was provided. An overly broad class of entities receiving the exception or an overly broad scope of exempted activities could undermine effectiveness of the control limits.

The following is the regulatory text into which NMFS inserted an exception for banks and financial institutions (the insertions are underlined).

660.140(d)(4) *Accumulation limits*—(i) *QS and IBQ control limits.* QS and IBQ control limits are accumulation limits and are the amount of QS and IBQ that a person, individually or collectively, may own or control. QS and IBQ control limits are expressed as a percentage of the Shorebased IFQ Program's allocation. (A) *Control limits for individual species.* No person may own or control, or have a controlling influence over, by any means whatsoever an amount of QS or IBQ for any individual species that exceeds the Shorebased IFQ Program accumulation limits. (B) *Control limit for aggregate . . .* (C) The Shorebased IFQ Program accumulation limits are as follows: [see Table of QS Control Limits] (ii) Ownership—individual and collective *rule.* The QS or IBQ that counts toward a person's accumulation limit will include: (A) The QS or IBQ owned by that person, and (B) That portion of the QS or IBQ owned by an entity in which that person has an economic or financial interest, where the person's share of interest in that entity will determine the portion of that entity's QS or IBQ that counts toward the person's limit.	(iii) *Control.* Control means, but is not limited to, the following: (A) The person has the right to direct, or does direct, in whole or in part, the business of the entity to which the QS or IBQ are registered; (B) The person has the right to limit the actions of or replace, or does limit the actions of or replace, the chief executive officer, a majority of the board of directors, any general partner, or any person serving in a management capacity of the entity to which the QS or IBQ are registered; (C) The person has the right to direct, or does direct, and/or the right to prevent or delay, or does prevent or delay, the transfer of QS or IBQ, or the resulting QP or IBQ pounds; (D) The person, through loan covenants or any other means, has the right to restrict, or does restrict, and/or has a controlling influence over the day to day business activities or management policies of the entity to which the QS or IBQ are registered;	(E) The person, excluding banks and other financial institutions that rely on QS or IBQ as collateral for loans, through loan covenants or any other means, has the right to restrict, or does restrict, any activity related to QS or IBQ or QP or IBQ pounds, including, but not limited to, use of QS or IBQ, or the resulting QP or IBQ pounds, or disposition of fish harvested under the resulting QP or IBQ pounds; (F) The person, excluding banks and other financial institutions that rely on QS or IBQ as collateral for loans, has the right to control, or does control, the management of, or to be a controlling factor in, the entity to which the QS or IBQ, or the resulting QP or IBQ pounds, are registered; (G) The person, excluding banks and other financial institutions that rely on QS or IBQ as collateral for loans, has the right to cause or prevent, or does cause or prevent, the sale, lease or other disposition of QS or IBQ, or the resulting QP or IBQ pounds; and (H) The person has the ability through any means whatsoever to control or have a controlling influence over the entity to which QS or IBQ is registered.

In the preamble to the final rule, NMFS explained that this change was adopted in response to public comment:

> [Comment:] Proposed § 660.140(d)(4)(iii)(D) and (E) ''could eliminate the ability of a quota share/quota pound owner to obtain necessary financing for fishing operations. Under these sub-clauses, a bank or other financial institution would be unable to provide loans using quota shares/pounds as collateral, a common practice in limited access fisheries. A quota share

> brokerage would be unable to take title or otherwise encumber quota shares/pounds beyond the accumulation limits, even if a fisherman requested the broker do so.''
>
> [Response:] NMFS does not intend that these sections apply to banks or financial institutions, unless the financial documents specify control beyond normal business agreements. NMFS has modified the regulations accordingly. As for quota share brokerages, each transaction must comply with the accumulation or control limits; however, compliance does not prevent brokerage transactions. Compliance would be based on the facts of the transactions.
> [. . .]
> NMFS acknowledges that participants in the fishery may be concerned about whether potential actions would comply with the accumulation limits. It is the responsibility of the participants to comply with the regulations; if participants have questions about potential actions, NMFS encourages those participants to provide the agency with specific facts and questions prior to entering into agreements or taking action in order to understand NMFS's interpretation of the potential facts in relation to the regulation.

Subsequent to the modifications described above, the public has expressed uncertainty about the types of institutions to which the exception is expected to apply. What types of entities might qualify as a "bank or other financial institution?" For example, it is traditional in the fishery for processors to lend harvesters money for capital acquisitions. Do the exceptions for lenders apply to such activities? Adopting language in the control limit regulations with more specificity could provide more clarity as to whether the exclusions applicable to "banks and other financial institutions" should be construed more broadly or more narrowly.

Other concerns with exempting certain activities of lending institutions from the control rule have to do with the scope of the activity for which an exception is provided and with overlaps and conflicts in the various paragraphs of the current regulatory language. The public has requested clarification regarding how the paragraphs might be applied. For example, banks and financial institutions are provided an exception with respect to the use of loan covenants to "restrict, any activity related to QS or IBQ or QP or IBQ pounds" (paragraph E) but are not provided an exception with respect to directing, delaying or preventing the transfer of QS or individual bycatch quota (IBQ) or having the right to do so (paragraph C) (see page 4 for the regulations and Table 2-1 for a summary). This concern could be addressed in a number of ways. One would be by adding the lender exemption to paragraph (C). However, there are also other conflicting overlaps between the paragraphs, for example between paragraphs (E) and (D). Again, paragraph (E) provides an exception for certain lenders pertaining to the direction of "any activity related to QS or IBQ or QP or IBQ pounds" while paragraph (D) does not provide those lenders an exception for "day to day business activities or management policies of the entities to which the QS of QP are registered." Paragraphs (G) and (C) also overlap and conflict in a similar fashion. There is also concern as to whether the paragraphs provide a greater exception than banks require in order to achieve the interests necessary to secure their loans. For example, paragraph (E) appears to go beyond what is needed to establish security interest, covering "any activity related to QS or IBQ or QP or IBQ pounds."

Thus, there are two sub-issues to address with respect to the safe harbor provided to lenders. The first is determination of the entities eligible for the safe harbor and the second is the scope of the exception provided to such entities (i.e. the activities allowed under the safe harbor).

1.3.2 Issue: Public Record of Lender Interest in QS

Lenders have expressed concern about their ability to ascertain whether or not QS they have accepted as collateral for a loan have been used as security for other obligations and about their ability to know about and/or prevent the transfer of any QS that has been pledged to them as security for a loan. Ability to secure interest in QS is important to both the lenders and members of the industry seeking loans. Limited ability to provide this security for QS pledged as collateral may make it more difficult and expensive to acquire loans (result in higher risk and hence higher interest rates). While the Section 305(h)(1) of the MSA requires the creation of a central lien registry, this section has never been implemented due to legal, cost, and workload issues.

CHAPTER 2 DESCRIPTION OF THE ALTERNATIVES

2.1 Issue: QS Control Limit Safe Harbor for Lenders

2.1.1 Lending Entities Qualifying for an Exception

This section deals with specification of the entities which would qualify for an exception for lending activities. Alternatives are as follows.

Status Quo: Retain existing language CFR 660.140(d)(4) which provides exceptions for "*banks and other financial institutions that rely on QS or IBQ as collateral for loans,*" (no action). Certain exceptions to the control limits are provided for "banks and other financial institutions that rely on QS or IBQ as collateral for loans" (see page 4).

Alternative 1 (Preliminary Preferred Alternatve): Retain existing language CFR 660.140(d)(4) which provides exceptions for "*banks and other financial institutions that rely on QS or IBQ as collateral for loans,*" but add an amplification indicating that to qualify as a bank or financial institution for purposes of this paragraph the entity must be regularly or primarily engaged in the business of lending and not engaged in or controlled by entities whose primary business is the harvest processing or distribution of fish or fish products. Additionally, require that any lender that wishes to qualify for the exception and is not state or federally chartered banks or other financial institution disclose the identity and share of interest of any entity with a 2% or more ownership interest in the lender, in a manner similar to what is required for the trawl identification of ownership interest form CFR 660.140(d)(4)(iv).

Alternative 2: In the description of control (CFR 660.140(d)(4)), replace "*banks and other financial institutions that rely on QS or IBQ as collateral for loans*" with "*a state or federally chartered bank or other state or federally chartered financial institution that relies on QS or IBQ as collateral for loans*."

Alternative 3: In the description of control (CFR 660.140(d)(4)), replace "*banks and other financial institutions that rely on QS or IBQ as collateral for loans*" with "*any person that relies on QS or IBQ as collateral for loans.*"

Alternative 1 would clarify that the entities qualifying for this exception include more than traditional banks and financial institutions, i.e. include other types of lenders, so long as those lenders are not otherwise engaged in the fishery. The intent is to ensure that the exception applies for those legitimately engaged in providing lending services to the industry but at the same time does not provide entities with other financial interests in the industry to gain an advantage through an exception to the control limit. To reduce the chance that this exception might be exploited by participants in the fishing industry, a requirement is included for the disclosure of ownership interest in any financial institution for which such disclosures are not already required, i.e. for banks or financial institutions that are not state or federally chartered. As compared to status quo, Alternative 2 would result in a narrower application of control rule safe harbor for lending institutions. While Alternative 2 alternative provides a clear test for whether the lending institution qualifies (i.e., whether it is state or federally chartered), it would also result in some lending institutions not being able to avail themselves of the exemptions from the control rule. For instance, private equity funds may not be state or federally chartered. Alternative 3 would result in a broader application of exemptions for lending institutions from the control rule, because "person" includes not only banks and other financial institutions, but other entities as well (such as processors or harvesting companies) and individuals.

2.1.2 Scope of the Exception Provided

This section deals with the scope of activities for which a lender receives an exception from the control limits. Alternatives are as follows.

Status Quo: No change. (see page 4 for current language and Table 2-1 for a summary).
Alternative 1: Add the appropriate language providing an exception for lenders to paragraph (C).
Alternative 2: Same as Alternative 1 but also remove the exceptions provided to lenders in all other paragraphs and add at the end of each of the other paragraphs language to the following effect: *"with the exception of those activities allowed under paragraph (C)"*
Alternative 3 (Preliminary Preferred Alternative): Same as Alternative 2 but further limit the exception under paragraphs C and G so that the lenders exception pertains only to control over the transfer of QS and IBQ and not the affiliated QP or IBQ-pounds. All associated QP will be distributed to the borrower unless the bank or financial institution provides evidence that the borrower is in default on the loan, in which case the related QP will be distributed to the adaptive management program until such time as any the QS/IBQ held by the bank or financial institution is sold, or the QS/IBQ holdings of the bank or financial institution are below the QS control limits.
Alternative 4: Add exceptions for lenders to all paragraphs.

Table 2-1 provides a summary of the paragraphs for which lender exceptions are and are not provided. The full regulatory text is provided on page 4.

Table 2-1. Summary of 660.140(d)(4): activities for which lender exceptions are provided and not provided.

No Lender Exception Provided	Lender Exception Provided
(A) & (B) directs the business of an entity or authority over director, board, partners etc.	(E) Any activity related to quota
(C) Prevents or delays quota transfer (shares or pounds)	(F) Controlling management of the entity or being a controlling factor
(D) Through loan covenants affects day to day business activities	(G) Cause or prevent sale, lease, or other disposition of quota
(H) Any other means of control over shares	

There appear to be possible conflicts in the exceptions granted between the following paragraphs:

- (C) and (E)
- (C) and (G)
- (D) and (E)/(F)
- (A/B) and (F).

Alternative 1 would make it clear that lenders could control the transfer of QS, IBQ, QP, and IBQ but leave other possible inconsistencies in place. Alternatives 2, 3, and 4 would eliminate any inconsistencies due to overlap among the paragraphs. Alternative 2 would achieve this end by restricting the exception for lenders to lender influence over the transfer of quota, as specified in paragraphs C (exceptions provided in other paragraphs would be eliminated). Alternative 3 would further restrict the paragraph C and G exception by limiting the exception just to QS and IBQ, not to the QP and IBQ-pounds. Alternative 4 would achieve consistency among all the paragraphs by providing lenders exceptions under all paragraphs.

2.2 Issue: Public Record of Lender Interest in QS *(CONSIDERTAION POSTPONED TO FURTHER VET PROBLEM AND POTENTIAL SOLUTIONS)*

During public comment, lenders have requested (1) third party verification of QS ownership, (2) a lien registry, and (3) individually serialized QS, in order to provide the means by which they could secure QS as collateral for loans. In the fall of 2011, NMFS made a determination that QS ownership information would be made publicly available, eliminating the need for third party verification of QS ownership. Creating unique identifiers for QS would either be very costly or require a modification to the program to reduce the degree of QS divisibility. An alternative to unique identifiers might be to add lender information to QS ownership records. Transfer of QS from the account would then require authorization from both the owner and the lender. The lender would have no other authority with respect to the disposition of the QP from the account. The position of the lender with respect to the QS in the account would be similar to the position of a lender on the title for a car loan. If only some of the QS held by a particular individual were to be pledged as collateral, then the individual would be allowed to establish a separate account for the QS obligated to a lender. The need for a lien registry and serialized identification might be largely met by the combination of providing a place on QS accounts for lien holders to be listed in the NMFS data system and the state-by-state system of Uniform Commercial Code central lien registries for secured transactions. The alternatives under consideration are as follows

Status Quo: No change.
Alternative (recommendation by the GAP endorsed by the Council, November 2011): Add a place to list lender on the QS ownership records. A lender name would only be included on the record if the QS owner agrees but removal would require agreement of both the QS owner and the lender. While a lender is listed, transfer of QS from the account would require authorization from both the owner and the lender. To facilitate commitment of only part of an owners QS to a particular lender, a single QS owner would be able to establish additional QS accounts.

There are a variety of ways this alternative might be implemented. The following is one example.

1. A QS holder wishing to pledge QS as collateral and the lender desiring to use the QS as collateral would sign a form provided by NMFS. If the QS holder was only pledging part of his/her QS as collateral a separate account would be created for those QS subject to the agreement with the lender.
2. The form would state that a separate account would be opened with one field designating the owner and a separate field designating the binding party (lender). The form would also specify the amounts of QS held by the QS owner that would be placed into this account.
3. The only difference between this account and any other account would be that QS in the account could be transferred out of the account only through the filing of a QS transfer form signed by both the QS owner and the lender. The lender's only authority with respect to the account would be the ability to prevent QS transfers from the account.
4. With respect to any disputes that might arise between the QS owner and the lender regarding the terms and conditions on which the QS owner or lender is required to authorize QS transfers, these issues would be settled privately, through the courts if necessary, but not be a matter of concern for NMFS.

While this provision might begin to address the lien registry issue it would not be a complete response in that regard.

CHAPTER 3 IMPACTS

3.1 Direct and Indirect Impacts to the Physical Environment, Including Habitat and Ecosystem, and Biological Environment

Modifications to the rules affecting a lenders ability to secure QS as collateral for loans will have no direct or indirect impacts on the physical or biological environment. The effects of this proposal would be to modify the socio-economic impacts of fishery management measures implemented under the West Coast Groundfish FMP to mitigate the physical and biological impacts arising from the activities of west coast groundfish fisheries.

3.2 Direct and Indirect Impacts to the Socioeconomic Environment

3.2.1 Fishery and Business Impacts

The control rule is designed to prevent an entity from accumulating excessive shares and exerting undo influence in the market place for shares and fish. Prevention of such accumulations related to a number of fishery management objectives (MSA National Standard 4(c), 303A(c)(5)(B)(ii) and (c)(5)(D); and FMP Amendment 20 Goals and Objectives, Constraint 6). It is to the benefit of both lenders and businesses that QS be usable as collateral to secure loans. Lenders providing financing to a number of industry participants could find themselves in violation of control limits, if the control they exert to secure collateral is limited by control limits. Therefore an exception to the control limits has been provided to allow for lenders to service the industry. The exception provided is not clear both in terms of who it applies to and the nature of the activities to which the exception applies. Uncertainty has a dampening effect on lending which in turn adversely affect the industry.

The alternatives considered would increase certainty about lender position under the control limits and thereby have a number of positive effects on the industry. Increased certainty would decrease risk, reduce the costs of borrowing, and increase net benefits to the nation. Borrowing costs would be reduced because lenders require lower compensation for placing their money at risk when the lending environment is more certain.

Reducing the costs of borrowing and increasing the acceptance of QS as collateral for loans would decrease the importance wealth for individuals acquiring assets to enter the fishery, decreasing barriers to entry (a consideration of MSA 303A(c)(5)(B)). Often the collateral used for a loan is the purchases made with the loan funds. The ability to use the purchased QS as collateral decreases the amount of wealth (alternative collateral or fiscal assets to use in the purchase of QS) an individual would have to accumulate in order to enter the fishery as a QS owner.

While all of the alternatives increase certainty about the rules that apply to lenders, the alternatives for the control rule safe harbor (Section 2.1) vary in terms of who would qualify as a lender and the scope of the activities for which an exception is provided. Through these variations the alternatives perform differently with respect to objectives related to the prevention of excess control. With respect to the issue of determining which entities qualify as lenders (Section 2.1.1) Alternative 3 would allow the broadest class of entities to qualify as a lender for purposes of the lender safe harbor. It would open the door for an exception for any lender, regardless of the lender's primary business. This would provide greater opportunities for members of the fishing industry to abuse the lender exception and gain excessive control by financing the QS purchases of others. Alternative 2 provides the most restrictive class of entities eligible for the exception: state or federally chartered financial institutions. This could rule out nonprofit and other organizations (e.g. communities) which may desire to make loans to the industry in order to pursue social policies but have no intent to control the markets and industry. Alternative 1 would leave the present language but add an amplification that banks and financial institutions include entities that are regularly or primarily engaged in lending and not engaged in the fishing industry. Additionally, to help ensure that the provisions are not used by members of the industry to circumvent limits on excessive accumulation, Alternative 1 includes a provision requiring the divulgence of ownership information by entities that are not Federal or state chartered financial institutions.

All of the alternatives on the scope of the exception (Section 2.1.2) clarify conflicts between paragraphs on the nature of the exception provided, thus contributing to a clearer and less risky regulatory environment, except Alternative 1 (Table 3-1). Alternative 1 eliminates the most important conflict, making it clear that control limits will not interfere with the lender's right to interfere with the transfer of an asset which has been pledged as collateral, but leaves other conflicts in place. Alternative 2 is the same as Alternative 1 but eliminates all other exceptions for lenders. Elimination of these exceptions could interfere with a lenders ability to take management control of a company in the event of bankruptcy or other actions that go beyond limiting the transfer of quota but are necessary to secure their interest. Alternative 3, narrows the exception for lenders even further by restricting their ability to limit transfers to the QS (the long term asset) and not the QP that are issued annually to QS holders. Alternative 4 would provide a lender exception in every paragraph of the control rule. Because of the broader scope of the activities for which an exception is provided, Alternative 4 would provide the most opportunity for abuse of the exception by an entity desiring to exert excessive control, while Alternative 3 by providing the narrowest scope of exceptions provides the least such opportunity. At the same time, Alternatives 2 and 3 could limit the ability of lenders to secure their assets in a manner similar to the way they could for other types of collateral (e.g. taking control of a bankrupt company during reorganization), thus somewhat increasing the risk to lenders as compared to Alternative 4 and potentially resulting in somewhat higher lending costs than Alternative 4.

Table 3-1. Summary of "scope of exception" options.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Potential Conflicts [a/] (C) and (E) (C) and (G)	Eliminated	Eliminated	Eliminated	Eliminated
Potential Conflicts [a/] (C) and (E) (C) and (G)	Remain	Eliminated	Eliminated	Eliminated
Activities exception applies to	Lender exception applies to any activity related to quota; controlling management of the entity or being a controlling factor; causing, preventing or delaying quota transfers, sales, leases or other dispositions.	Lender exception applies to QP and QS transfers	Lender exception applies only to QP transfers	Broadest scope of lender exception

a/ Potential conflicts between the paragraphs of 660.140(d)(4) – see page 4.

Action on the alternative to provide a public record of lender interest in QS (Section 2.2) has been postponed to provide more time to explore whether or not existing mechanisms can meet the identified needs. If existing mechanisms are not adequate, the types of changes considered here would be expected to decrease lender risk with the attendant positive affects of risk reduction, as discussed in the first paragraphs of this section. The security provided by the ability to register an interest and prevent a transfer may reduce transaction costs, also enhancing net benefits and increasing access to capital.

3.2.2 Impacts on Communities

Overall, the alternatives are expected to improve access to financing and better access to financing is expected to increase the health of the industry and hence the health of the local fishing communities. Increased access to financing could also increase the probability that local control will be maintained over the QS, particularly given that there are a number of nonprofit organizations interested in funding QS purchases for the purpose of maintaining control in local communities. Additionally, the control limit exceptions of Section 2.1 might also facilitate a lending by a community that desires to directly finance QS purchases by members of the community.

3.3 Impacts on Agencies

Clarifying the lender exceptions to the control rule may decrease agency costs by decreasing regulatory confusion and enforcement.

Consideration of a recommendation that NMFS provide a place in which lender interest can be registered has been postponed. Agency costs would be associated with the implementation and administration of the registration of lender interest in QS (Section 2.2). This registration might occur initially only with joint agreement between the QS owner and the lender, but once established would also require joint agreement prior to QS transfers and in order to end the listing of the lender on the QS account. A need to create separate accounts for those QS a holder had pledged as collateral and those which had not been pledged as collateral would add to administrative costs. Additionally, if a QS holder is to be allowed to pledge QS as collateral to more than one lender, a separate joint account might be needed for each QS/Lender combination.

TRAWL RATIONALIZATION TRAILING ACTIONS

ISSUE: WHITING SEASON AND SOUTHERN ALLOCATION

Draft Council Decision Analysis Document

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

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CHAPTER 1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This document provides background information about, and analyses for, modifications affecting regulations for the shore-based whiting fishery. The proposed action would require an amendment to the regulations implementing the Pacific Coast Groundfish Fishery Management Plan (FMP). The proposed action must conform to 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.

In addition to addressing MSA mandates, this document will provide the analytical content for an environmental assessment (EA), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. Assuming that an EA is required, the document will be organized so that it contains the analyses required under NEPA.

1.2 Description of the Proposed Action

The action considered under this issue is to amend the regulations governing the groundfish fishery by modifying the season opening date for the shore-based primary whiting season and the allocation cap on the amount of the allocation taken and retained early in the season in the area south of 42° N. lat.

1.3 Purpose and Need for the Proposed Action

The trawl rationalization program generates benefits over the previous management program to the degree that previous management constraints can be relieved and flexibility provided in the new program. The opportunity for regulatory relief is generated by the individual and collective responsibility for staying within allowed catch levels that is imposed by the rationalization program. The self responsibility of the trawl rationalization program is generated through a system of catch shares (in the form of IFQs or catch limits assigned to co-operatives). Flexibility in the new program is provided by providing the opportunity for individuals to trade catch shares among themselves. This flexibility is expected to allow the industry to optimize the value it derives from the fishery, subject to those regulations which need to remain in place to achieve conservations objectives and address socio-economic concerns which would not otherwise be expected to result from the influence of market forces.

A substantial portion of the regulatory relief provided to the shore-based trawl fishery was the near elimination of the system of 2-month trip limits which was used to control harvest of nonwhiting species under the previous management regime. However, the trawl rationalization program made no automatic adjustments to the season structure used to control harvest in the shore-based and at-sea whiting fishery. There may be an opportunity to further enhance benefits of the trawl rationalization program by relieving constraints imposed by the season regulations. The Amendment 20 trawl rationalization program specifically identified consideration of modification of the whiting seasons to be a matter for a trailing action.

CHAPTER 2 DESCRIPTION OF THE ALTERNATIVES

2.1 Alternatives

2.1.1 Background

In 1996, the northern shore-based fishery (north of 42° N. lat) and at-sea whiting fisheries (mothership and catcher-processor) all began on May 15, the central shore-based fishery (between 42° N lat. and 40° 30' N lat.) began on March 1 and the southern fishery (south of 40° 30' N lat.) began on April 15. For 1997 the Council adopted, and NMFS approved, a preferred alternative which changed the opening date for the northern shorebased fishery to June 15, and moved the start date for the central fishery to April 1. Additionally, an allocation decision was made to limit the central and southern fisheries (the California fisheries) to taking a total of 5% of the shorebased allocation prior to the start of the northern fishery. These regulations have remained in place and continue under the trawl rationalization program.[1]

In addition to modifying the season dates and establishing a California early season allocation, the Council's action for the 1997 fishery also established a framework for modifying the season opening dates on an annual basis. The framework for taking action is discussed in Section 2.3.

The alternative to status quo would return the northern shore-based season start date to May 15 and would also move the California fishery season start dates to May 15. The 5% limit on the

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[1] The Council's action implemented for the 1997 fishery:

> **Adopted alternative: establish a season framework.** Under the proposed framework, the Council may set separate season opening dates for each of the three sectors. Objectives and criteria for making these decisions are included in the discussion document. The season for northern California (40°30' N to 42° N latitude) would be modified to open April 15 in 1997 (60 days prior to the opening of the northern shorebased season) and be subject to a limit of 5% of the shore-based allocation (about 4,300 mt in 1997). The 1997 season opening date for mothership processors and catcher-processors will remain May 15, but the shore-based season north of 42°N will be June 15. Seasons may be adjusted annually to achieve the stated objectives. In addition, at-sea processors would be authorized to process whiting waste products when other at-sea whiting operations are prohibited, except for 48 hours before and after the at-sea whiting season is open.

amount of fish taken in the California fisheries prior to the start of the northern fishery becomes nonsensical if the California and northern fisheries start at the same time. Therefore, the alternative to status quo would also eliminate the early season allocation to the California shore-based whiting fishery (south of 42° N. lat).

The environmental assessment for the 1997 action is available from the Council website: http://www.pcouncil.org/wp-content/uploads/02_1997_EA_RIR_Whiting.pdf.

2.1.2 Description of Alternatives

The following are the alternatives being considered for this action.

Status quo: No Action. The current regulations for the start date and sourthern allocation are as follows.

> 660.131(B)(2) Different primary season start dates. North of 40°30' N. lat., different starting dates may be established for the catcher/processor sector, the mothership sector, and in the Pacific whiting IFQ fishery for vessels delivering to IFQ first receivers north of 42°N. lat. and vessels delivering to IFQ first receivers between 42° through 40°30' N. lat. . . .
>
> (iii) Primary whiting season start dates and duration. After the start of a primary season for a sector of the whiting fishery, the season remains open for that sector until the sector allocation of whiting or non-whiting groundfish (with allocations) is reached or projected to be reached and the fishery season for that sector is closed by NMFS. The starting dates for the primary seasons for the whiting fishery are as follows:
>
> (A) Catcher/processor sector—May 15.
> (B) Mothership sector—May 15.
> (C) Shorebased IFQ Program, Pacific whiting IFQ fishery.
> (1) North of 42°N. lat.—June 15;
> (2) Between 42°–40°30′N. lat.—April 1; and
> (3) South of 40°30′N. lat.—April 15.
>
> 660.55 (f)(2) . . . No more than 5 percent of the Shore based IFQ Program allocation may be taken and retained south of 42° N. lat. before the start of the primary Pacific whiting season north of 42° N. lat. . . . .

Alternative (PPA): Use a single May 15 start date for all whiting sectors including California fisheries and eliminate the 5 percent California early season whiting fishery cap, to the extent that a fishery management plan (FMP) amendment is not required. This change would be implemented through the two-meeting process already authorized under the framework of the Pacific Coast Groundfish FMP.

2.1.3 Rationale

A number of considerations influenced the 1996 decision to move the season opening date for the northern shore-based fishery from May 15 to June 15, including providing an opportunity for catcher vessels to participate sequentially in the mothership fishery (opening May 15) and the shorebased fishery (opening June 15), and allowing vessels to complete their May-June DTS cumulative limits before the start of the fishery (it was not permissible to land more than 60% of the DTS limit in a particular month). The shift from a May 15 to a June 15 opening (and from March 1 to April 1 for the central area) was also expected to have some effect in allowing the fish to grow to a larger size prior to harvest (decreasing the total number of individual fish taken to achieve the allocations and having some marginal effect on increasing stock productivity). On the down side was an expectation that shifting a portion of the season to later in the year might increase bycatch rates of rockfish because more of the whiting stock biomass would be in northern areas where rockfish such as yellowtail and widow are more available to midwater gear. With respect to the salmon fishery, the 1997 EA summarized:

> The salmon bycatch data do not show a consistent pattern other than to indicate that high salmon bycatch rates may occur in the at-sea fishery later in the year. The shore-based fishery has experienced low salmon bycatch rates during most summer periods. It would be diffcult to predict the impact of changing the season timing on salmon bycatch, especially on a year-to-year basis as could occur under the proposed framework" (Council 1997, p. ES-4).

The change in the shore-based season opening dates was supported by all sectors of the industry, including the shore-based processors in northern California.

The 5% limitation on early season whiting catch in the California fishery was seen as "prevent[ing] expansion and further capitalization in that area, contributing to further stability as well as minimizing cost to the nation from further capitalization" (Council 1997, p. ES-4).

For the shorebased industry in the north, returning to a May 15 opening would increase flexibility to determine the most optimal time to harvest the whiting by adding one month to the season length. The actual timing of harvest would likely take into consideration numerous factors including bycatch rates of other species (bycatch of groundfish is constrained by the quota pounds fishermen hold and bycatch of salmon above certain levels may trigger a reinitiation of consultation under the ESA[2]), opportunity costs related to other fishing opportunities (such as participation in the mothership whiting fishery or pink shrimp fishery), optimal size and condition of whiting for processing, and market prices. Moving the season start dates for California fisheries would simplify regulations and eliminate the 5% early season cap (eliminate a management measure requiring a possible inseason action that would constrain participants in the IFQ program) and may have an effect on salmon bycatch. The tradeoff for the California fisheries is a decrease in flexibility due to the shortened season. However, with implementation of the IFQ program it appears that harvest has moved out of northern California (Table 2-1. Industry members report that the historic landing in this area were primarily from catcher vessels trying to get a jump on the start of the season. With the IFQ travelling south for the early season no longer provided an advantage in terms of increased harvest opportunity.

[2] The standard for reinitiation of consultation is 0.5 Chinook per mt for any sector or a total of 11,000 Chinook for all sectors including the whiting fishery

Table 2-1. History of early season participation (1994-1996 and 2004-2011)

Shoreside Early Season Landings		1994	1995	1996	2004	2005	2006	2007	2008	2009	2010	2011
						Metric Tons						
N of 42	May 15-June 14	12,648	25,598	11,250	-	-	-	-	-	-	-	-
42°–40°30′N. lat	April 1-May 14	1,730	[redacted]	1,283	[redacted]			2,087	2,298	1,792	1,736	0
S. of 40°30′N. lat.	April 15-May 14	0	0	0	0	[redacted]	0	0	0	0	0	0
						ExVessel Value ($)						
N of 42	May 15-June 14	796,295	2,682,576	657,727	-	-	-	-	-	-	-	-
42°–40°30′N. lat	April 1-May 14	171,850	[redacted]	119,509	[redacted]			259,645	493,746	197,080	297,657	0
S. of 40°30′N. lat.	April 15-May 14	0	0	0	0	[redacted]	0	0	0	0	0	0
						Number of Vessels						
N of 42	May 15-June 14	16	25	26	-	-	-	-	-	-	-	-
42°–40°30′N. lat	April 1-May 14	4	1	4	4	4	5	6	7	6	9	0
S. of 40°30′N. lat.	April 15-May 14	0	0	0	0	1	0	0	0	0	0	0
						Number of Buyers						
N of 42	May 15-June 14	6	11	7	-	-	-	-	-	-	-	-
42°–40°30′N. lat	April 1-May 14	3	1	3	2	2	2	3	5	5	7	0
S. of 40°30′N. lat.	April 15-May 14	0	0	0	0	1	0	0	0	0	0	0

Cells are blacked out to ensure confidentiality.

2.2 Alternatives Considered But Rejected from Detailed Analysis

The scope of the current alternatives is limited to moving the whiting season opening for the shore-based fisheries to May 15, coastwide, and a complementary adjustment (elimination of the 5% cap on the early season catch in the south). Moving the whiting season opening date even earlier, or other modifications of the whiting season regulations might also be considered but would require a more extensive analysis that could not likely be completed on time to be implemented for the 2013 fishery, given current workload constraints. Therefore, the current priority is to determine whether some interim regulatory relief can be provided until more substantial adjustments to the whiting regulations can be considered.

2.3 Summary of Impacts

Table 2-2. Summary of impacts.

Category	Summary of Impacts
Impact Mechanism Shift in Timing of Whiting Harvest (Relatively Small Impact)	Based on 2011 data. perhaps about 17% to 27% of the shoreside harvest might shift up a month with the earlier fishing opportunity – depending on a variety of market, capacity, and fish availability factors as well as alternative fishing opportunities (see opening paragraph of Section 3.1). Because the shorebased fishery is allocated only 42% of the nontribal TAC, perhaps 7 to 11 percent of the nontribal TAC might be shifted one month earlier. Relative to 2010, the total whiting catcher vessel harvest for May 15-June 14 may not change that much because an increase for the shoresbased fishery would be offset by diminished early effort in the mothership fishery, assuming the 2011 pattern holds (See Figures 3-1 and 3-2). Opportunities for early season fishing off California would be eliminated.
Nonwhiting trawl	The earlier opening would also allow the earlier use of midwater gear to target on non-whiting species such as widow rockfish and yellowtail rockfish.
Physical Environment and Habitat	No impact.
Whiting Productivity	Negligible impacts A 10% increase in productivity was projected when comparing a hypothetical situation where all the commercial harvest is taken in September to one in which all is taken in April. This might shift only about 10% of the harvest by one month instead of four.
Bycatch Species	
Salmon	Salmon –it appears a Section 7 Consultation may not be needed for the extension of the whiting season. Previous analysis indicates the risk of higher salmon bycatch is in late April and early May. Impacts would continue to be capped at 11,000 Chinook for the entire midwater whiting fishery. Salmon impacts would also occur as a result of the use of midwater trawl gear to target nongroundfish. If bycatch rates in such activities are higher May 15-June 14 than later in the summer and fall, then there could be an increase in total salmon bycatch. If bycatch rates are higher with the earlier opening, segments of the fishery other than shorebased whiting could be affected.
Rockfish	Rockfish – rockfish bycatch issues should be addressed by the IFQ program.

Category	Summary of Impacts
Bycatch of other species including forage fish.	Data is not available to inform an assessment of possible impacts. An impact would occur if these rates are higher during the earlier period than after June 15. With 100% monitoring, information will be available to assess bycatch in the fishery and make adjustments if bycatch rates are problematic.
Socio-economic – Fishery	Opportunities for vessels that participate in both the shorebased and mothership segments of the fishery may shift if both fisheries open at the same time. An earlier opening will provide some additional harvesting and processing flexibility which may benefit the industry. In years when the TAC is very high, an earlier opening may facilitate more optimal harvest rates.
Socio-economic - Community Effects	Elimination of the early season openings off California may adversely effect futre opportunities and flexibility for those communities, however, there was no early season fishing in 2011.
Socio-economic - Agency	Elimination of need to monitor 5% early season cap on landings off of California.

2.4 Process for Taking Action

The Council's action for the 1997 fishery (see footnote 1) established a framework for modifying the season opening date on an annual basis. That framework was codifed in the following regulations:

> 660.131(B)(2) Different primary season start dates. North of 40°30' N. lat., different starting dates may be established for the catcher/processor sector, the mothership sector, and in the Pacific whiting IFQ fishery for vessels delivering to IFQ first receivers north of 42°N. lat. and vessels delivering to IFQ first receivers between 42° through 40°30' N. lat.
>
> (i) Procedures. The primary seasons for the whiting fishery north of 40°3′ N. lat. generally will be established according to the procedures of the PCGFMP for developing and implementing harvest specifications and apportionments. The season opening dates remain in effect unless changed, generally with the harvest specifications and management measures.
>
> (ii) Criteria. The start of a primary season may be changed based on a recommendation from the Council and consideration of the following factors, if applicable: Size of the harvest guidelines for whiting and bycatch species; age/size structure of the whiting population; expected harvest of bycatch and prohibited species; availability and stock status of prohibited species; expected participation by catchers and processors; the period between when catcher vessels make annual processor obligations and the start of the fishery; environmental conditions; timing of alternate or competing fisheries; industry agreement; fishing or processing rates; and other relevant information.

The framework does not provide for the modification of the southern allocation nor does it include modifying the season start date for the southern most area (south of 40°30' N. lat.). Additionally, NMFS as made a preliminary determination that an EA will be required for this action. Given that the Council will need to go through the process of adopting a preliminary and preferred alternative, that the framework does not appear to provide any relief in terms of the analytical requirements, and that the current scope of the alternative goes beyond that covered by the framework, it is not readily apparent that use of the framework provisions for changing the whiting season provides any advantage over use of the socio-economic framework contained in the FMP. The socioeconomic framework requires a full rule making process including two decision meetings for the Council (preliminary and final actions).

CHAPTER 3 IMPACTS

3.1 Direct and Indirect Impacts to the Physical Environment, Including Habitat and Ecosystem, and Biological Environment

Biological impacts will be driven by the degree to which an earlier season opening results in a shift of harvest earlier into the year. Under the status quo IFQ program there is no race to fish. Whether an earlier opening results in earlier fishing will likely be driven by early season market prices, the condition of fish, catch per unit effort, the occurrence of bycatch species for which there is an avoidance incentive, opportunities in other fisheries, etc. Heavy fishing at the outset of the season under status quo might indicate a higher probability of an advantage to an earlier season and a greater likelihood that more harvest will be taken earlier if the season opens earlier. Prior to the trawl rationalization program, the fishery generally reached its peak in the first full week of fishing (week 25, Figure 3-1). With implementation of the trawl rationalization program in 2011 the fishery ramped up more slowly than in previous years, not reaching a peak until week 26. The fishery took a total of 16,000 mt in the first four weeks and then about 6,200 mt per week from week 26 through week 34. If the earlier opening simply shifts this same pattern forward in time, one might expect somewhere between 16,000 mt (17% of the 2011 harvest) and 24,800 mt (4 x 6,200, 27% of the 2011 harvest) to be taken in the newly opened period (May 15 through June 14).

Another factor influencing the effect of an earlier season opening date may be cross participation between fisheries. A comparison of Figure 3-1 and Figure 3-2 show the historic offset in the peak harvests for these two fisheries. The fishery pattern changed in 2011 with the implementation of the trawl rationalization program. In 2011, the mothership fishery had a bimodal distribution (with the strongest fishing occurring early and late) which generally bracketed the shorebased fishery's high effort period. Of the 50 permits with some whiting history from 2003-2010 (shaded cells of Table 3-1), 19 (nearly 40%) particpated in both the shorebased and mothership sectors during that period (boxed cells in Table 3-1). If the overlap of the earlier season forces some vessels to choose between participation in the mothership and shorebased fishery, then either of the sector might fish at a slower rate than they otherwise would. However, it is also possible that processor capacity and demand, combined with the transferability of quota, would simply result in a redistribution of harvest among more vessels, rather than a different fleet harvest rate.

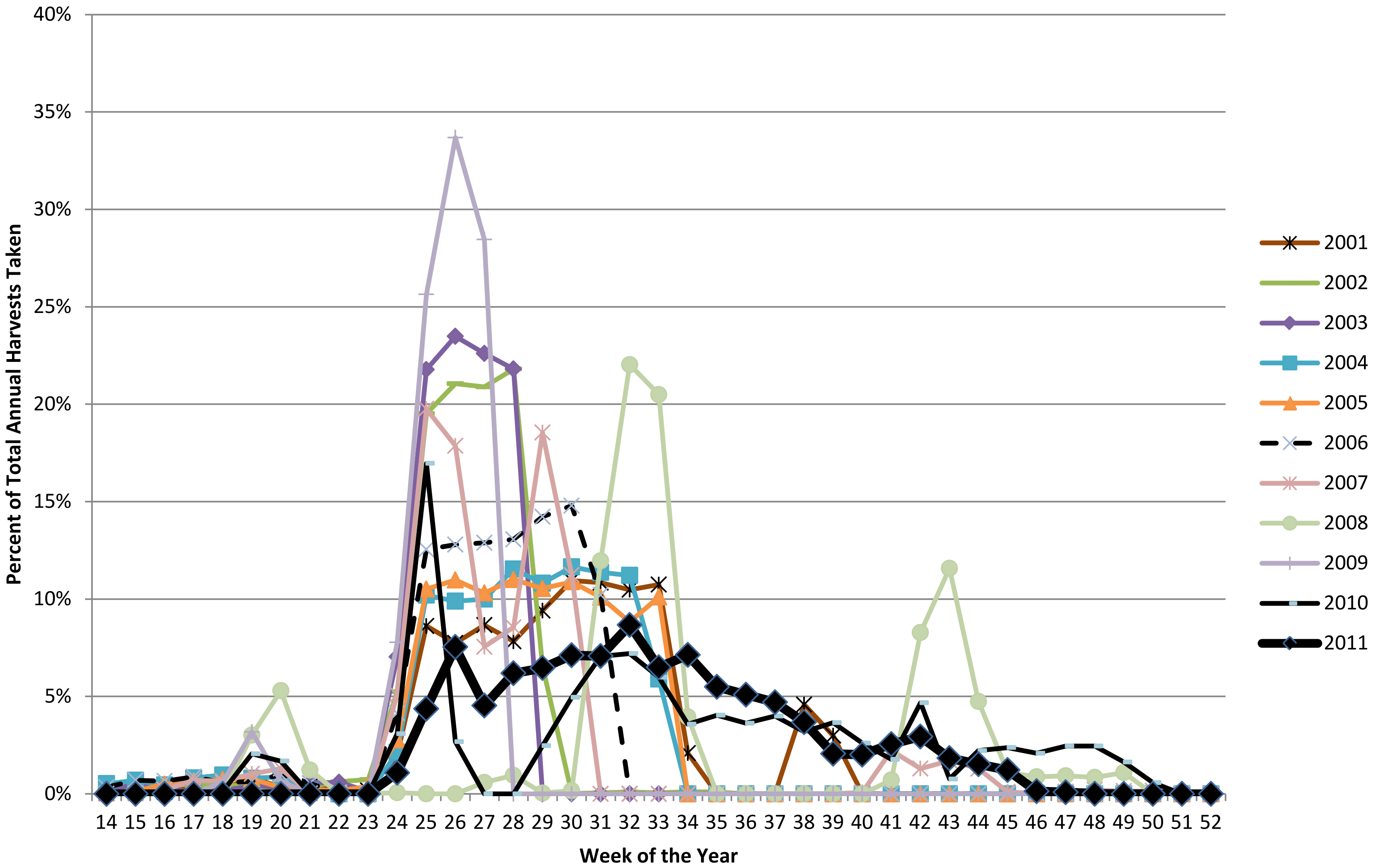

Figure 3-1. Percent of annual harvest, shorebased sector by week, 2001-2011.

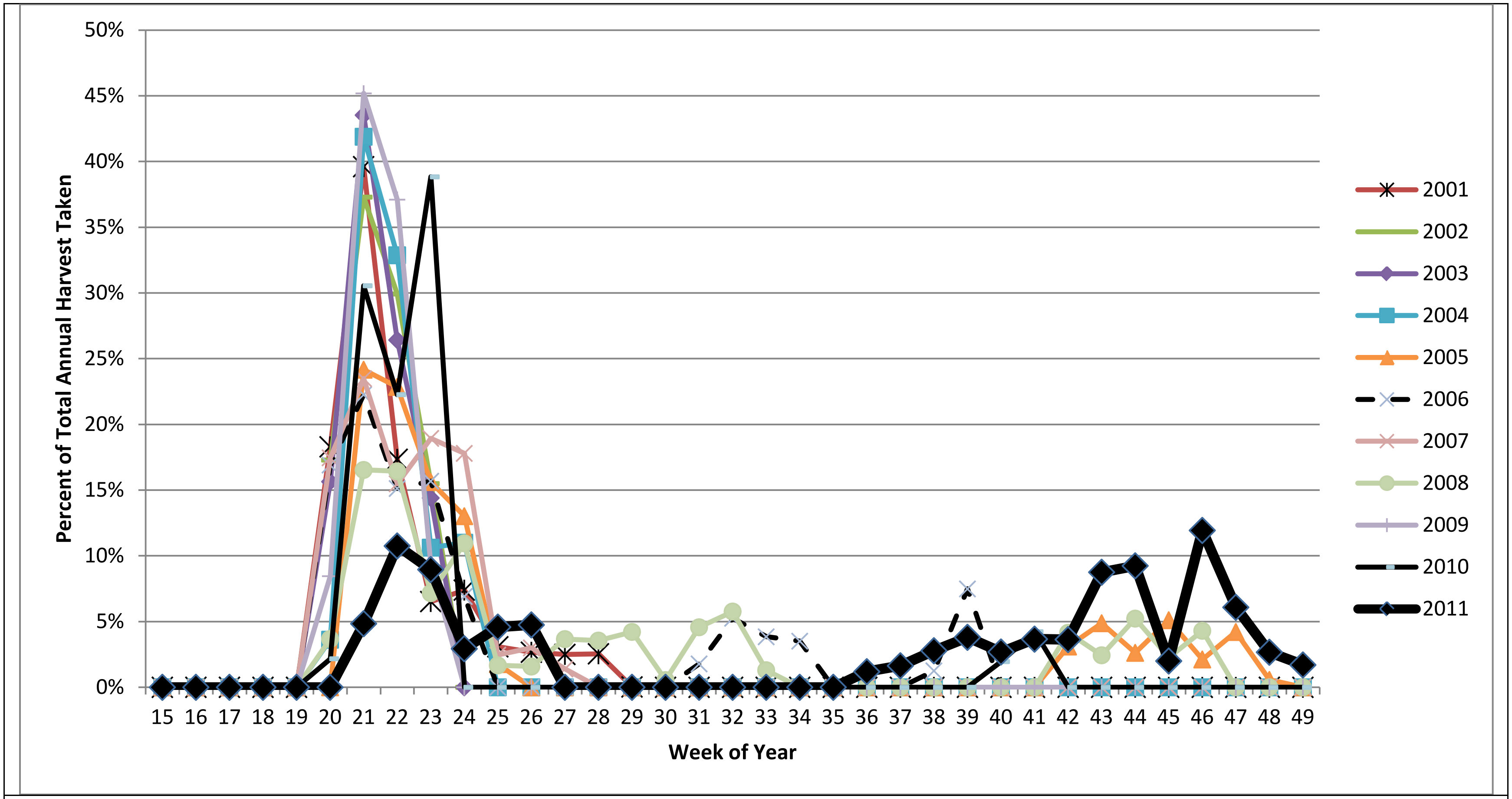

Figure 3-2. Percent of annual harvest, mothership sector by week, 2001-2011.

Table 3-1. Participation in the whiting fishery for two periods (1994-2003 and 2004-2010) for catcher vessel permits, showing participation in the **mothership** whiting fishery and **shorebased** whiting fishery.

	Shoreside Whiting Participation				
	Active in Both Periods	Not Active in Earlier Period (Entering After 2003)	Active Only in Earlier Period (Exiting After 2003)	Not Active (mothership whiting only)	Total
	Number of Catcher Vessel Permits				
Mothership Whiting Participation	-	-	-	-	
Active in Both Periods	18	1	4	2	25
Entering After 2003	-	-	-	-	-
Exiting After 2003	9	-	4	1	14
Not Active (shorebased whiting only)	11	5	13	-	29
Total	38	6	21	3	68

The 1997 EA (Council 1997) found that the likely biological and physical environment impacts from shifting the whiting season opening dates would accrue to the whiting resource, salmon (mostly chinook), and other groundfish species (primarily yellowtail and widow rockfish). A summary of the main conclusions of the EA is provided in the following sections. Some of this information may need to be updated for this EA.

3.1.1 Whiting

The 1997 EA stated

> Delaying all or part of the whiting harvest to later in the season allows the whiting to grow, and thus fewer would be caught to achieve the harvest guideline. This could equate to as much as a 10% increase in longterm yield if the entire harvest were delayed until September each year, compared to the entire harvest being taken in April.

Under consideration here is a one month move (from June 15 to May 15) of a portion of the shorebased sector's allocation of whiting (42%). The 1997 EA indicated a 10% change in the yield would result from a four month delay in the entire whiting OY, a September harvest as compared to a harvest taken entirely in April. Given that the action alternative would result in only a one month move of only a relatively small portion of the total harvest (perhaps 11%[3] of the whiting OY), the maximum impact on long term yield would likely be relatively small. Moreover, movement of the opening date to May 15 does not mean the timing of the entire shore-based harvest will be moved forward by a one month increment. The IFQ program provides an opportunity for harvest to be spread out over a longer period of time. It may that an extension of the season duration by one month encourages a steady but lower rate of harvest, spread out over a longer time, or that conditions are such that very little harvest occurs earlier in the year. Regardless, it seems unlikely that the entire allocation would be harvested during the

[3] Derived assuming that 27% of the harvest is moved forward by a month and applying that value to the 42% allocated to the shoreside sector.

earlier period (May 15-June 14) as a result of the season change and the expected effect on yield would be small.

Given that under trawl rationalization, the optimal fishery appears to be a slower paced one, an earlier season start date may provide flexibility which is useful for years in which the whiting allocation is particularly high – provide more of an opportunity to harvest the entire allocations at the more optimal slower rate.

3.1.2 Bycatch Species

3.1.2.1 Salmon

The 2010 section 7 consultation on the salmon fisheries stated the following with respect to the whiting fishery:

> Large numbers of salmon are caught in the bottom trawl and whiting components of the groundfish fishery off the coasts of Washington, Oregon, and California. A number of section 7 consultations have been conducted to determine effects of the fishery on ESA listed salmon. In each of the consultations, NMFS has determined that the incidental take of salmon in the fishery would not likely jeopardize the continued existence of the ESUs under consideration. The 1999 groundfish FMP opinion included an incidental take statement that permits the bycatch of 11,000 Chinook salmon in the whiting fishery (primarily a mid-water trawl) and 9,000 Chinook salmon in the bottom trawl component of the groundfish fishery (NMFS 1999). Consultation on the groundfish fishery was reinitiated in 2006 as a result of data that indicated that the incidental take statement for Chinook salmon had been exceeded in some fashion in 3 out of 4 years between 2002 and 2005 (NMFS 2006a). Ultimately, the supplemental biological opinion concluded that the fishery was not likely to jeopardize those ESUs and that the incidental take statement in place remained adequate for the groundfish fishery going forward. The groundfish trawl fishery operates in areas offshore most of the U.S. west coast, with the exception of southern California, but the amount of salmon bycatch associated with California Central Valley ESUs is not believed to be high. A recent study of salmon bycatch in the whiting fishery estimated about 3% of the salmon were Central Valley fall-run, and no evidence of Sacramento winter-run was detected (Moran et al. 2009), although this finding was based on data from only one year. Based on the information available from CWT recoveries, it seems likely that the bycatch of winter-run north of Point Arena would be minimal (see Effects Analysis). (NMFS 2010, p. 29).

When the shorebased season opening was moved from May 15 to June 15 NMFS found that the rule change was within the scope of the consultation in place at that time.[4] NMFS has informed Council

[4] The ESA Biological Opinion on salmon provide criteria that would require reinitiating an ESA consultation. In September 2010, NMFS issued a public notice which read, in part, as follows:

> The National Marine Fisheries Service (NMFS) is concerned that current Chinook salmon bycatch rates in the 2010 shoreside Pacific Whiting fishery have been consistently higher than 0.05 Chinook/mt of whiting. This catch ratio is the guideline outlined in the 1999 Biological Opinion addressing potential effects of incidental Chinook salmon mortality in the whiting fishery. Consultation shall be reinitiated if: the shoreside catcher/processor, mothership, or Tribal components of the fishery exceed or are expected to exceed the bycatch rate of 0.05

staff that a move from June 15 to May 15 would also likely be within the scope of the current Biological Opinion for salmon species listed under the ESA.

With respect to salmon bycatch rates in the early season, the 1997 whiting season EA observed that prediction of bycatch rates by season is difficult and the greatest risk of elevated salmon bycatch for the shorebased whiting fishery appeared to be in late April and early May.

> The dynamic nature of the marine ecosystem makes prediction of bycatch rates difficult. For example, salmon bycatch in the whiting fishery is not uniform, but rather patchy, and most tows are free of any salmon. . . . . Improved communication among participants in the fishery could help reduce this bycatch by identifying areas of local salmon abundance. . . . An early season (especially in late April and early May) has been associated with higher salmon bycatch rates, especially in the shore-based fishery. However, during the joint venture period of the 1980s, salmon bycatch generally increased after June, peaked in July, and increased again in October. A NMFS reported dated May 25, 1992 concluded there is little apparent seasonality. The late season seems especially variable. . . . . The shore-based fishery has experienced low salmon bycatch during most summer periods. It would be difficult to predict the impact of changing season timing on salmon bycatch, especially on a year-to-year basis, as could occur under the proposed framework.

3.1.2.2 Groundfish Bycatch

With respect to rockfish, the 1997 EA on moving the salmon season stated:

> Rockfish are the primary groundfish taken as bycatch in the whiting fishery, especially widow and yellowtail rockfish. Bycatch of these species could tend to increase if seasons are set late in the year when the bulk of the whiting biomass is in northern waters where rockfish are more available to midwater trawl gear. As with salmon, if areas of rockfish concentration can be identified and avoided, bycatch could be reduced.

Irrespective of the effects of a move of the season on the amount of rockfish taken as bycatch, total trawl related mortality is limited by sector allocations and the amount of fish allocated to each quota holder. Thus, no biological or distributional impacts would be expected. The allocations to each QP holder provide individual vessel incentive to avoid bycatch for IFQ species that may constrain total harvest.

With respect to species for which allowable harvests are sufficient to support targeting, under trawl rationalization it is permissible to target nonwhiting groundfish species with midwater gear. An earlier season start date would allow earlier harvest of not only whiting but also other species taken with midwater gear, such as widow rockfish and yellowtail rockfish. Differences in total bycatch for non-IFQ groundfish species would be expected only if the bycatch rates from May 15 through June 14 are higher than in the summer. Information on the earlier season bycatch rates of non-IFQ species will not be available until the fishery is open for that period, at which time adjustments can be made in the start dates for subsequent seasons if problematic bycatch rates occur.

3.1.2.3 Bycatch of Other Species, Including Eulachon and Forage Fish

Changing the whiting season date affects midwater gear targeting not only on whiting but on other groundfish species as well. Under the trawl rationalization program, once the whiting season is open, midwater gear can be used to target any species of groundfish north of 40^{o} 10’ north latitude, for which

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chinook/mt of whiting; and the expected total bycatch of chinook in the fishery is expected to exceed 11,000 fish.” (NMFS, 2010b) an individual has adequate QP. Widow rockfish and yellowtail rockfish are the most likely targets. The main effect of moving the season date is a change in the timing of harvest. Total harvest is not likely to be affected. An issue which might be concern is whether some bycatch rates of forage fish or other species might be higher during the earlier opening. Good data are not currently available to inform the assessment of possible changes in bycatch. The last time the shorebased whiting fishery was open from May 15 through June 14 was prior to 1997. While the fishery at that time was a full retention fishery the data recorded on fish tickets for many bycatch species is reported to be unreliable (e.g. data on eulachon and forage fish bycatch). Observer data is not available because the WCGOP was not in place until 2002.

Even with an earlier shorebased opening, the total whiting effort for the May 15 through June 14 period might change substantially, relative to the pre-2011 levels. Assuming that the 2011 fishing pattern holds, which showed strongly diminished May 15 through June 14 catch in the mothership fishery, the net effect of an increase in harvest in the shorebased fishery for that period might be negligible. That the total whiting catch might not increase is relevant only to the degree that the bycatch in the mothership and shorebased fisheries do not differ. Whether this is the case is uncertain. Because 100% observer coverage is now in place to document any bycatch, these rates will be reported. If the earlier rates create a biological concern the season opening date can be readjusted in the future under the season setting framework (which is not being used here because the change to the southern allocation does not fit within it).

3.2 Direct and Indirect Impacts to the Socioeconomic Environment

3.2.1 Fishery and Business Impacts

Under the trawl rationalization program businesses will time the harvest and processing of product to maximize net revenues from all fishing opportunities in aggregate. Extending the shorebased season by a month will increase the choices available for the northern fishery, providing an opportunity to improve private economic benefits if those benefits are higher in the May 15 through June 14 period than later in the year. If the benefits cannot be increased by harvesting during that period, then it is less likely that the change in harvest date will have a substantial effect on the seasonal distribution of harvest in the northern fishery. For the southern area, for up to 5% of the shorebased harvest,[5] there would be a contraction in flexibility to harvest—with the season opening moving from April 1 (in southern California) and April 15 (in northern California) to May 15. However, data for 2011 shows no harvest is occurring in this area under the IFQ program. Table 2-1 Even though those data show no harvest is currently occurring, introducing a constraint will reduce the opportunity to take advantage of any newly developing opportunities which may occur with shifts in stock distribution or shifts in other local economic factors.[6]

While it does not appear that the movement of the start date for the shorebased fishery will create a need for reconsultation under the ESA, if the salmon bycatch rates in the shorebased fishery are higher from May 15 through June 14 than they are later in the year, there could be an impact on other sectors—all of which together are under an aggregate limit of 11,000 Chinook.

[5] Under status quo, 5% is the maximum that can be taken in the early California season.

[6] In the event that extraordinarily favorable conditions occurred in the southern early season, the 5% cap combined with a much larger amount of quota pounds available for harvest, could result in a mini-derby, a race to harvest whiting QP prior the 5% cap being reached.

3.2.2 Impacts on Communities

To the degree that whiting are less available off of California after May 15, as compared to between the status quo April openers and May 15, communities in California into which whiting might be landed may be disadvantaged by the action alternative. Fish are more likely to have moved out of the area early in warmer water years than colder water years. While the opportunity to own QS ensures the right to harvest the whiting, if whiting are not available after May 15 in concentrations and conditions that allow economically competitive fishing then any potential opportunity that could arise in the California area might be dampened. As discussed above, it appears that under the IFQ program, the early season whiting fishing off California may have disappeared because of the elimination of the race for fish.

3.3 Impacts on Agencies

The alternative would eliminate the need for agencies to monitor the 5% early season cap on the California whiting fishery and create a more consistent whiting management regime for on-the-water monitoring (vessels using midwater gear north of 40^{o} 10' north latitude between May 15 and June 14 would be allowed to do so regardless of whether they were delivering to shore or at-sea). Under status quo, from May 15 to June 14 vessels are allowed to use midwater gear only if they are delivering to motherships and not if they are delivering to shorebased processors.

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TRAWL RATIONALIZATION TRAILING ACTIONS

ISSUE: WIDOW ROCKFISH ALLOCATION

Draft Council Decision Analysis Document

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

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CHAPTER 1 **PURPOSE AND NEED FOR THE PROPOSED ACTION**

1.1 Introduction

This document provides background information about, and analyses for, modifications affecting regulations for the shore-based groundfish trawl fishery. The proposed action would require an amendment to the regulations implementing the Pacific Coast Groundfish Fishery Management Plan (FMP). The proposed action must conform to 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.

In addition to addressing MSA mandates, this document may provide the analytical content for an environmental assessment (EA), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. Assuming that an EA is required, the document will be organized so that it contains the analyses required under NEPA.

1.2 Description of the Proposed Action

The action considered under this issue is to amend the regulations governing the groundfish fishery by reallocating widow rockfish QS among QS holders.

1.3 Purpose and Need for the Proposed Action

The current allocation of widow rockfish was established when widow rockfish was overfished. A primary objective for the initial allocation of widow rockfish QS was to meet the needs that target fisheries had for widow rockfish QS to cover bycatch.

Prior to the stock becoming overfished, there was a significant target fishery for widow rockfish—primarily targeted with midwater trawl gear. The stock has now been rebuilt and the allocation to the shorebased trawl fishery has increased substantially, from 343 mt in 2012 to 994 mt in 2012. At this higher allocation level, it is possible for the sector to both meet the needs for widow rockfish QP to cover bycatch in target fisheries and prosecute a strategy targeted on widow rockfish. Therefore, it is likely that harvesters will renew targeting on widow rockfish. To ensure optimum yield from the resource is achieved, there is a need for QS/QP to be transferred to vessels willing and able to participate in this targeted fishery. Transferability of widow rockfish QS/QP ensures that the quota will move to vessels able to utilize this increased harvest opportunity.

The purpose of the reallocation would be to administratively redistribute the initial allocations among initial recipients (to date, no QS trading has occurred due to the QS moratorium). With the exception of the overfished species, such as widow rockfish, the trawl rationalization program allocated QS primarily to those who targeted on a particular stock from 1994-2003 (a portion of the QS was also allocated equally among all initial recipients). Section A-2.1.6 of the trawl rationalization program has a provision on reallocation with changed in overfished status:

> **A-2.1.6. Reallocation With Change in Overfished Status**: When an overfished species is rebuilt or a species becomes overfished there may be a change in the QS allocation within a sector (allocation between sectors is addressed in the intersector allocation process). When a stock becomes rebuilt, the reallocation will be to facilitate the re-establishment of historic target fishing opportunities. When a stock becomes overfished, QS may be reallocated to maintain target fisheries to the degree possible. That change may be based on a person's holding of QS for target species associated with the rebuilt species or other approaches deemed appropriate by the Council.

This redistribution of the initial allocation would give consideration to those who historically targeted on widow rockfish, similar to the consideration that was given for non-overfished species at the time the program was initially established.

1.4 Background

The Council is considering widow rockfish quota share (QS) reallocation in response to the stock's recent recovery to rebuilt status. The Council decided to extend the moratorium on widow QS trading through the completion of consideration and implementation of widow QS reallocation or December 31, 2014, whichever comes first.

CHAPTER 2 DESCRIPTION OF THE ALTERNATIVES

2.1 Alternatives

2.1.1 Description of Alternatives

The following alternatives to consider (Note: For simplicity, examples in the following alternatives reference 100 percent of the QS. In fact, 10 percent of the QS is in the adaptive management program. Therefore the percentages referenced would need to be adjusted to take into account the 10 percent set-aside for adaptive management):

Status quo. No reallocation. Allow reallocations to occur through QS trading among QS holders.
Alternative 1: Full Reallocation. Complete reallocation QS based on catch history using the same formulas used for the original allocation of target species QS (based on permit history from 1994 through 2003).
Alternative 2: Pounds neutral reallocation. Based on rebuilt status, the trawl allocation for widow will likely increase substantially in 2012. Determine the percentage of the total QS that would result in an individual holding QS in 2013 receiving the same amount of QP they received in 2012. In the 2012 trawl allocation was 343 mt and the new allocation will be 994 mt, if everyone keeps 34.5 percent of their QS (343/994) then they will receive the same amount of nonAMP QP in 2013 that they did in 2012. This would leave 65.5 percent of the nonAMP QS for redistribution based on the allocation formula specified in Alternative 1.
Alternative 3: Split the Difference. Same as Alternative 2 but reallocate only one half the difference between full reallocation and pounds neutral reallocation (65.5 percent divided by 2 equal 32.75 percent of the QS to be reallocated).

Note: Because Alternative 1 would reduce the annual amount of QP received by some individuals, as compared to the 2011 and 2012 fisheries, Alternative 1 might entail the need for more rigorous analysis than Alternatives 2 or 3.

2.1.1.1 Issues to be addressed to develop the alternatives

Equal Allocation. Should an equal sharing component be included?

Inclusion of years when widow rockfish was overfished. Should 2003 (when widow rockfish were overfished) be included in the evaluation of permit history?

The purpose of considering this reallocation is to take into account fishery patterns during a time when there was targeting for widow rockfish (prior to the time it was declared overfished). The alternatives suggested below were developed based on the formulas used to allocate non-overfished species. These formulas evaluated catch history for 1994-2003.

Widow targeting effectively ended in 2002. In 2003 there were only 8000 total lbs of widow landed in the non-whiting fishery compared with an average of 8.8 million lbs during 1994-2002. The inclusion of year 2003 plus the use of relative pounds in the widow reallocation formula gives rise to an unintended result because only 15 non-buyback permits recorded widow landings in the nonwhiting fishery in 2003 and one of those permits landed 50% (4000 lbs) of all widow landed that year (the next largest historical landings, in terms of relative pounds, by any permit in any single year during the allocation period is less than 4%). Consequently while this permit ranks only about 95th out of 165 permits in terms of its share of widow landings during 1994-2002, under Alternatives 1 and 2 it receives a much higher allocation than any other permit, and under Alternative 3 it comes in 1st, assuming no equal sharing, and 9th with equal sharing. So the use of relative pounds and the inclusion of year 2003 in the allocation period appears to confer a large, unintended advantage on one permit over all others. For this reason, the Council may wish to exclude 2003 harvest from these allocation formulas. Also, because of this aberration, a baseline that runs from 1994 through 2002 is used rather than through 2003.

2.2 Alternatives Considered But Rejected from Detailed Analysis

2.3 Process for Taking Action

The allocation formulas are specified in Appendix E to the FMP, which is periodically updated to reflect regulations. This action would occur through a regulatory amendment.

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CHAPTER 3 IMPACTS

3.1 Direct and Indirect Impacts to the Physical Environment, Including Habitat and Ecosystem, and Biological Environment

No effect.

3.2 Direct and Indirect Impacts to the Socioeconomic Environment

3.2.1 Fishery and Business Impacts

Status Quo: Market determined effects – it is likely that reallocations will occur through the market place as necessary to ensure that harvest opportunity is not forgone.

Action Alternatives: Redistribution of wealth among initial recipients through administrative action. Widow rockfish QS is currently distributed based on a permit's catch of target species with which widow rockfish is an associated bycatch. Widow rockfish QS redistribution would be based on the same distributional criteria used for non-overfished species under status quo initial allocations (i.e. distributions of QS for a species is generally proportional to harvests of the species for the 1994-2003 allocation periods – with adjustments for equal allocations).

3.2.1.1 Preliminary Distributional Results

The following figures provide an initial view of the distributional effects of the alternatives. QS allocations are compared to 1994-2002 averages. The 2003 harvest year was omitted from the baseline comparison for the reasons described in Section 2.1.1.1 However, 2003 is still included in the action alternative allocation formulas. In these figures, the permits are arrayed along the horizontal axis in order from the least to the greatest initial allocations under status quo. Following the QS distribution figures, Figure 3-5 and Figure 3-6 shows the effect on QP comparing the application of the 2012 widow rockfish allowable harvests to status quo QS with the application of the 2013 widow rockfish allowable harvests to the action alternatives.

Notes:

- In Figure 3-1, the action alternatives pull the allocations toward the 1994-2002 averages.
- Permit P018's allocations far exceed the 1994-2002 average because of the inclusion of 2003 harvest in the allocation formula (see discussion in Section 2.1.1.1).
- Permit P165's status quo allocation of widow is extraordinarily high because of heavy targeting on other flatfish in a high bycatch area.
- An equal allocation component would provide a floor allocation level for the action alternatives (visible by comparing the lowest allocations in Figure 3-1 to the lowest allocations in Figure 3-2).
- There is one entity (QS account) that received a very strong allocation under status quo that would receive a very small allocation under Alternative 1 (point furthest to the right in Figure 3-3 and Figure 3-4).
- The accumulation limit for widow rockfish is 5.1%. Based on available information on QS account control, there may be up to one entity that receives an amount greater than the control limits depending on the alternative selected and whether or not equal sharing is included. The single entity affected is different with different options.
- In terms of QP issuance, under all action alternatives except Alternative 1 all permits would receive more QP under rebuilt conditions (applying 2013 allowable harvests) than they recieved under status quo (applying 2012 allowable harvests, Figure 3-5 and Figure 3-6).

The following table converts QS percents to an exvessel value equivalent using 2012 and 2013 widow rockfish allocations to the shorebased fishery. This information can be used to provide an initial sense of the economic effect of the changes in allocations reflected in the figures. In general, QS trades at a multiple of exvessel value.

Table 3-1. Exvessel value equivalent of hypothetical individual quota share allocations assuming $0.50 per lb exvessel price under two different trawl sector allocations

		Hypothetical Widow Rockfish Individual Quota Share Allocations			
Shorebased Sector Allocations	mt	0.10%	0.50%	1%	2%
		Exvessel value equivalent of QS Allocations ($)			
2012 Shorebased Allocation	343	378	1,890	3,781	7,562
2013 Shorebased Allocation	994	1,096	5,478	10,957	21,914

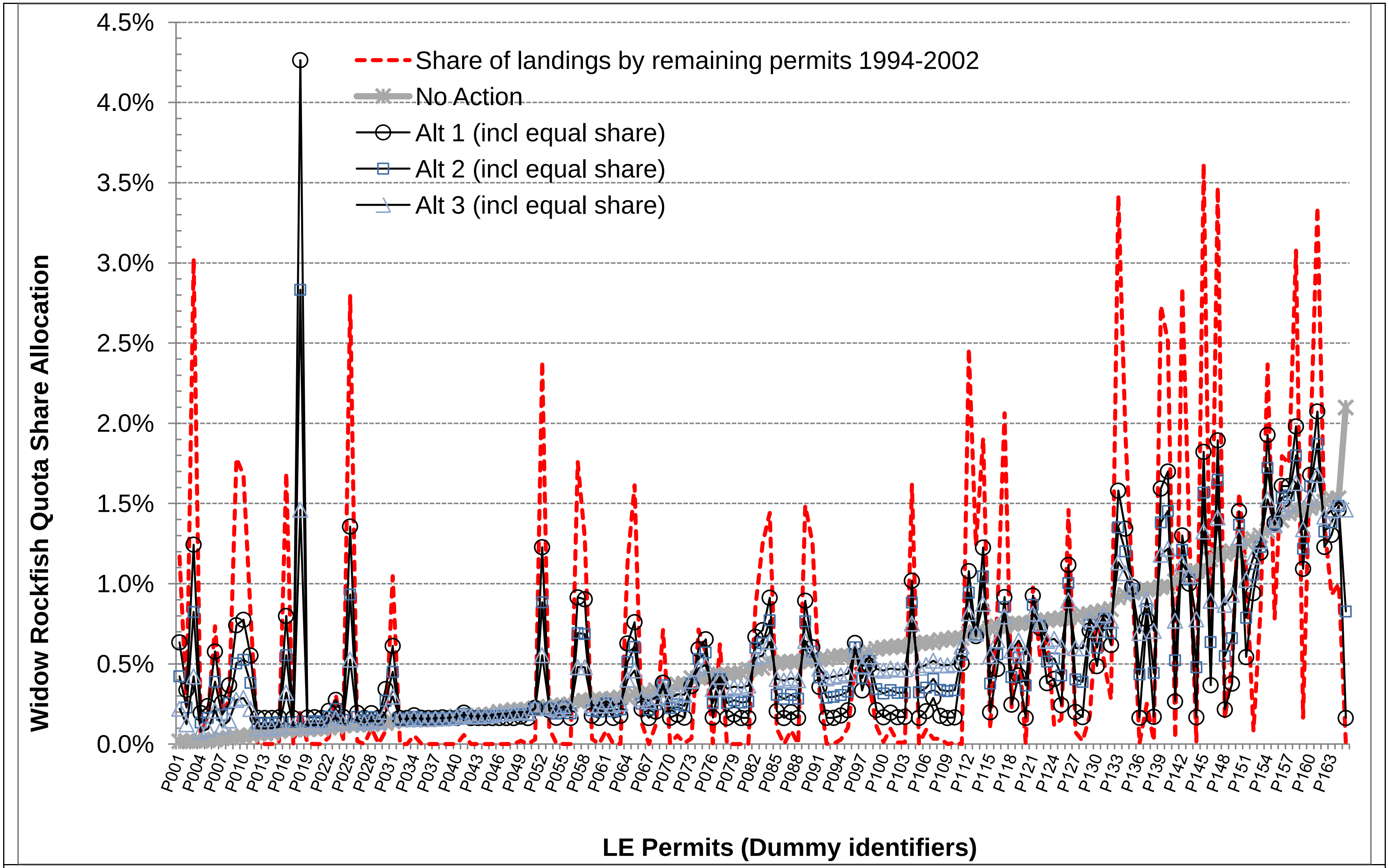


Figure 3-1. Widow rockfish **QS** distributions to **permits** under status quo (No Action) and the alternatives compared to 1994-2002 average share of harvest – alternatives **include an equal share component** (QS values sum to 90% due to 10% set aside for the Adaptive Management Program, historic shares of harvest sum to 100%).

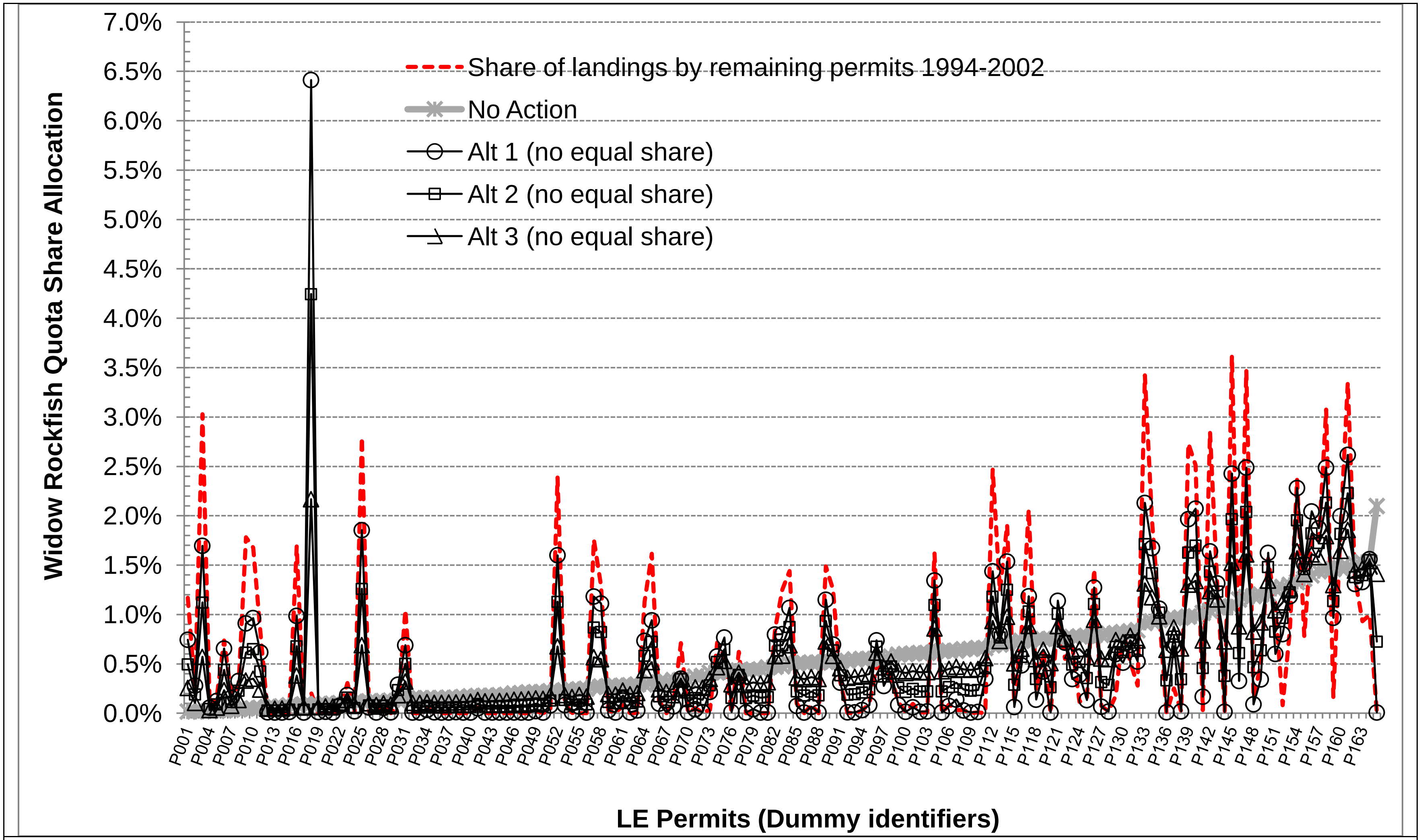


Figure 3-2. Widow rockfish **QS** distributions to **permits** under status quo (No Action) and the alternatives compared to 1994-2002 average share of harvest – alternatives **do not include an equal share component** (QS values sum to 90% due to 10% set aside for the Adaptive Management Program, historic shares of harvest sum to 100%).

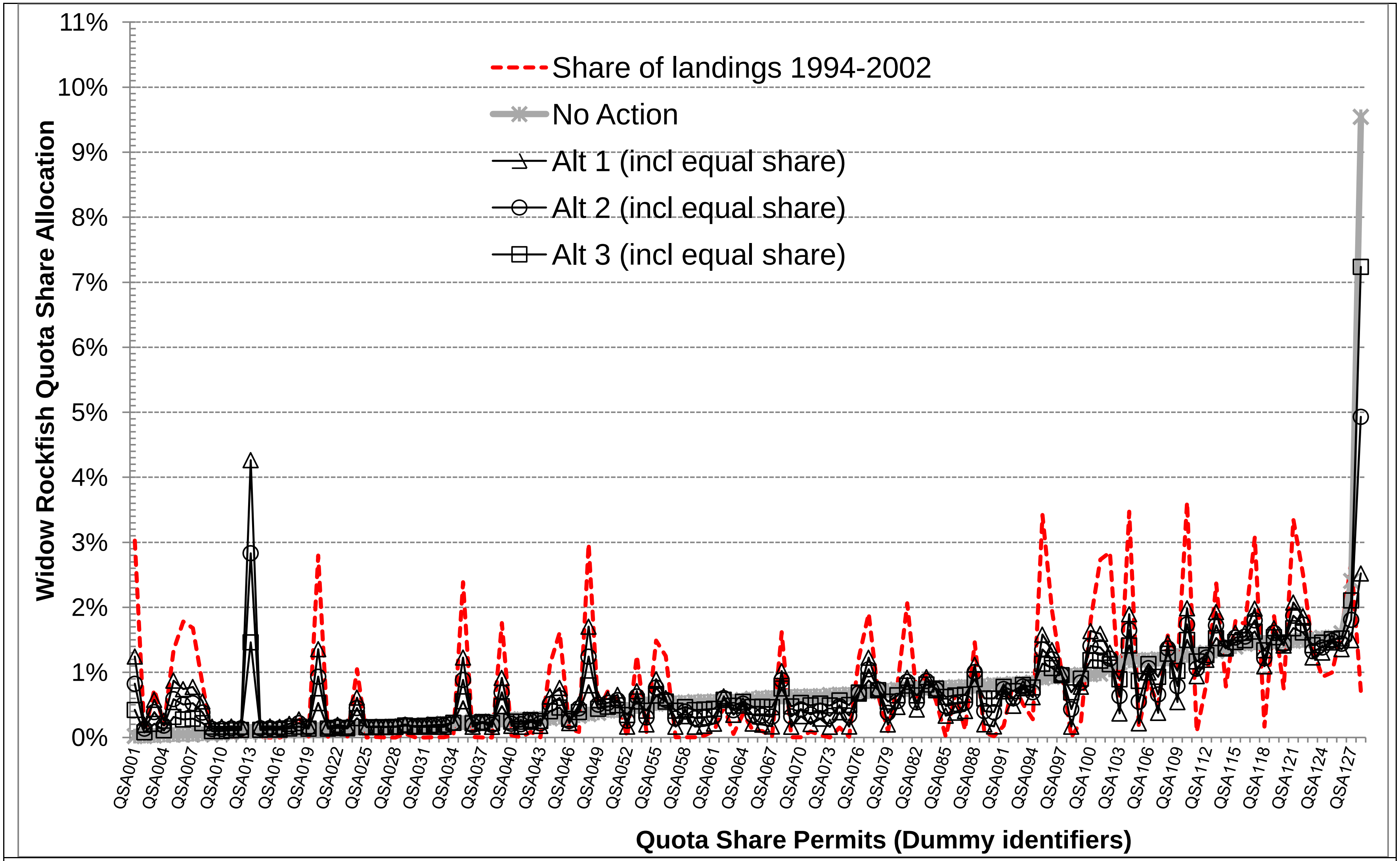


Figure 3-3. Widow rockfish **QS** distributions to **entities** under status quo (No Action) and the alternatives compared to 1994-2002 average share of harvest – alternatives **include an equal share component** (QS values sum to 90% due to 10% set aside for the Adaptive Management Program, historic shares of harvest sum to 100%).

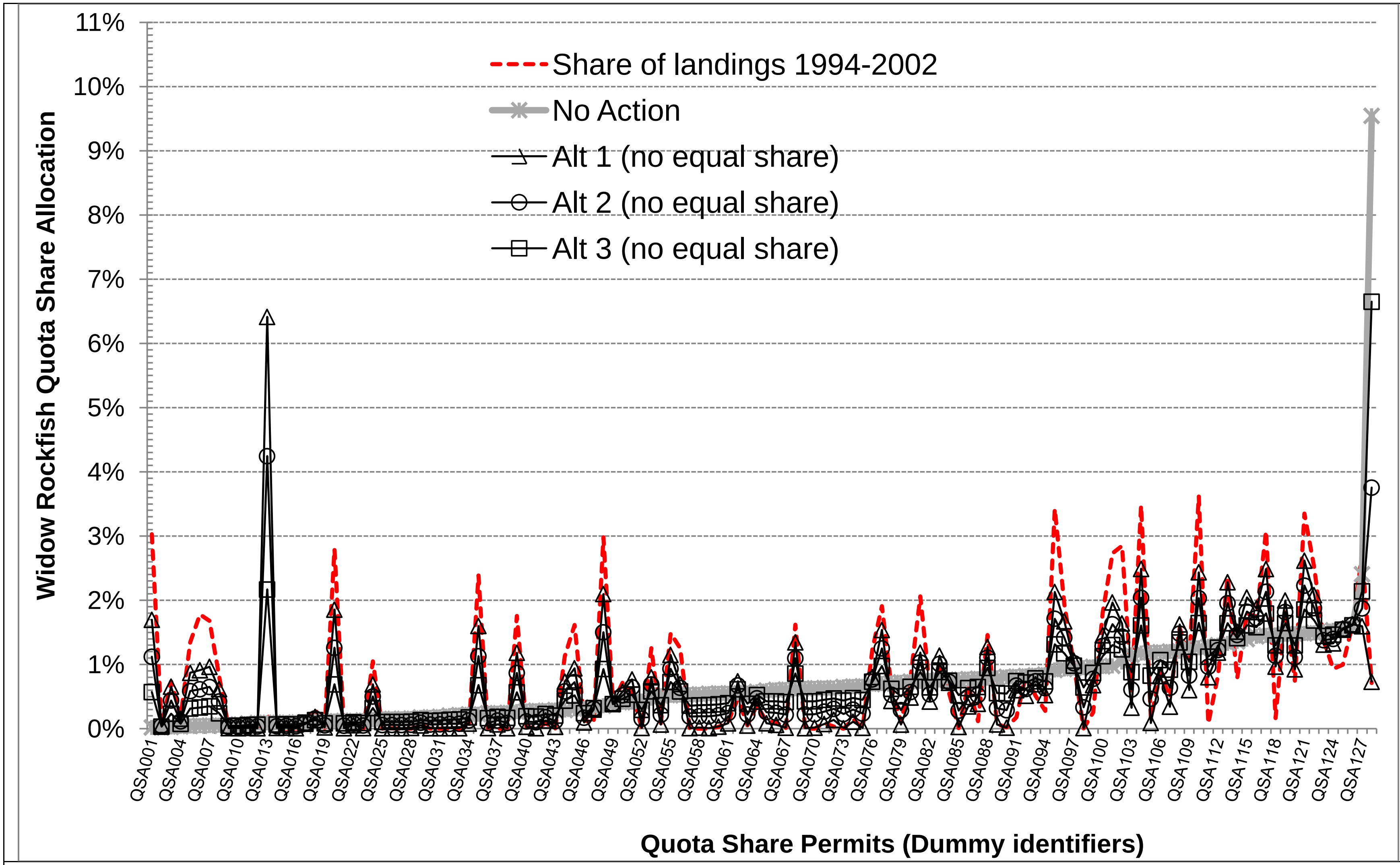


Figure 3-4. Widow rockfish **QS** distributions to **entities** under status quo (No Action) and the alternatives compared to 1994-2002 average share of harvest – alternatives **do not include an equal share component** (QS values sum to 90% due to 10% set aside for the Adaptive Management Program, historic shares of harvest sum to 100%).

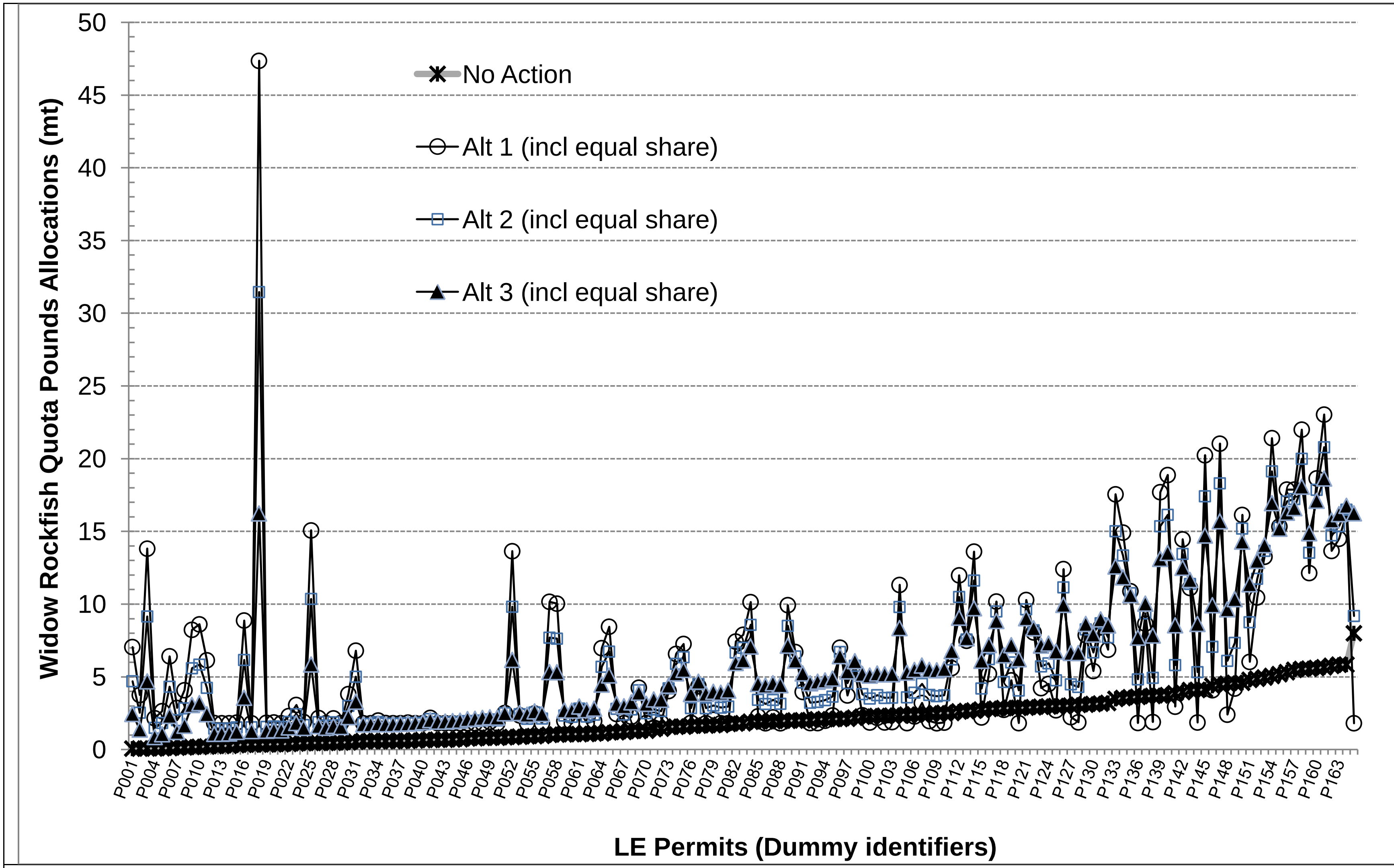


Figure 3-5. Widow rockfish **QP** distributions to **permits** under status quo (No Action using 2012 shorebased allocation) and the alternatives (using the 2013 shorebased allocations)– alternatives **include an equal share component**.

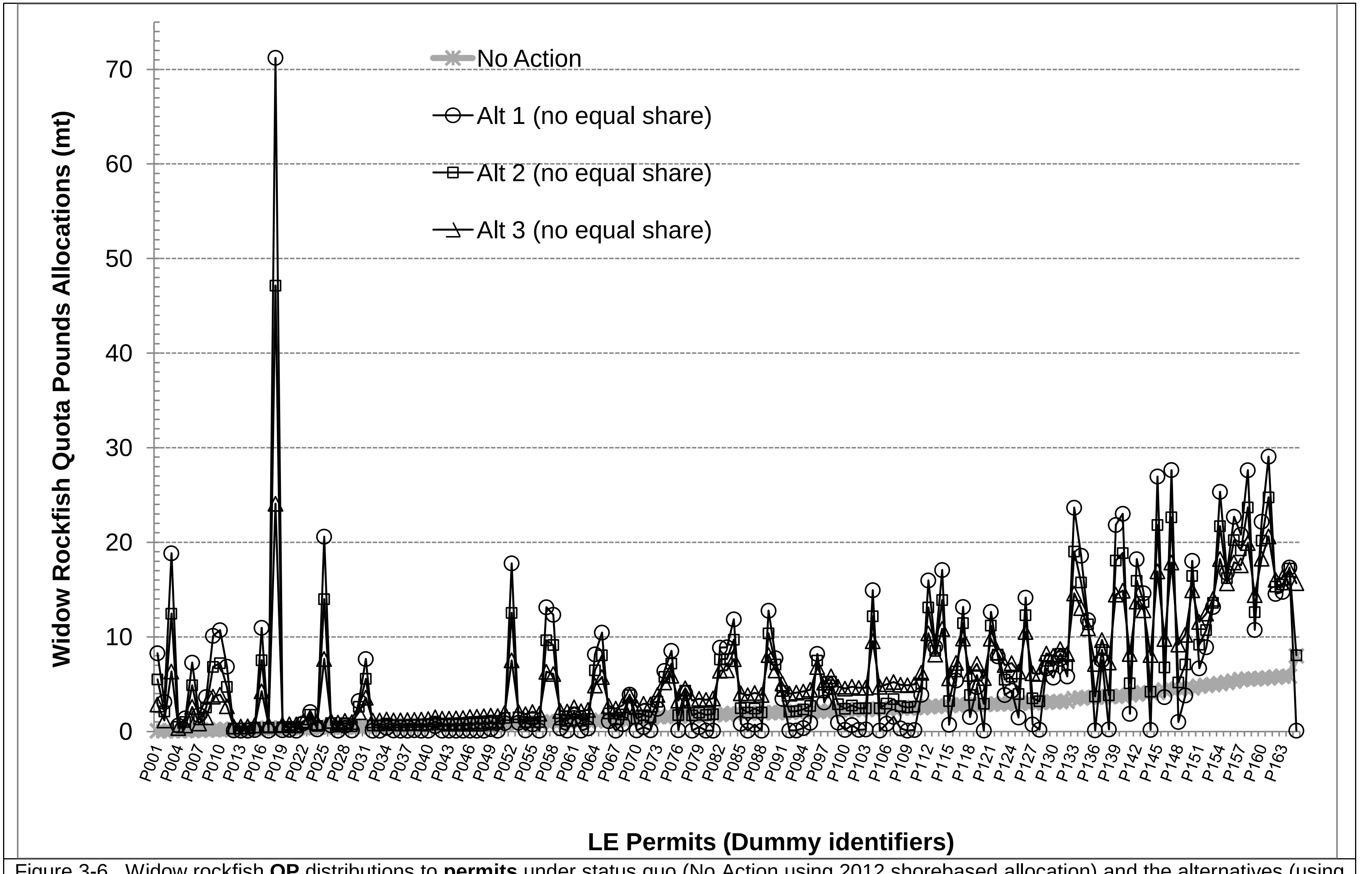


Figure 3-6. Widow rockfish **QP** distributions to **permits** under status quo (No Action using 2012 shorebased allocation) and the alternatives (using the 2013 shorebased allocations)– alternatives **do not include an equal share component**.

3.2.2 Impacts on Communities

Some geographic redistribution is also likely.

3.3 Impacts on Agencies

Outside of the Council process, the main impact on agencies will be administrative and legal costs for NMFS.

PACIFIC WHITING CARRYOVER IMPLEMENTATION

The groundfish Fishery Management Plan (FMP) and regulations for the shorebased individual fishing quota (IFQ) fishery allow up to 10 percent of the surplus quota pounds (QP) in a vessel account to be carried over from one year to the next, called surplus carryover.[1] Additionally, up to a 10 percent deficit in a vessel account for one year can be covered with QP from a subsequent year, called deficit carryover. Provisions under the Pacific whiting bilateral agreement with Canada allow up to 15 percent of a country's unused total allowable catch (TAC) from the previous year to be carried over and added to the following year TAC. [2] Further, in any year, if catch exceeds the TAC, an amount equal to the excess catch shall be deducted from the TAC in the following year. The aforementioned adjustments to the TAC are hereinafter referred to as the adjusted TAC.

The National Marine Fisheries Service (NMFS) did not issue 2011 Pacific whiting surplus QP into the 2012 fishery because NMFS determined the risk of exceeding the TAC was too high (Agenda Item D.8.b, NMFS Report, June 2012). Additionally, there were potential interactions between the carryover provision in the shorebased IFQ fishery and the TAC adjustment provisions that had not yet been fully explored.

At the September Council meeting, NMFS outlined four carryover implementation approaches to stimulate domestic discussions between the IFQ, mothership (MS), and catcher/processor (C/P) sectors:

Approach A: Apportion the adjusted U.S. TAC according to the sectors' allocations (IFQ, MS, C/P), then issue the surplus carryover in addition to the adjusted U.S. TAC. This is inconsistent with the mechanism used by Canada to issue its carryover in the first year of implementation.

Approach B: Apportion the unadjusted U.S TAC according to the sectors' allocations (IFQ, MS, C/P), then issue the surplus carryover from the adjustment amount to the IFQ fishery first, then any remaining portion of the adjustment would be issued according to the sectors' allocations (IFQ, MS, C/P).

Approach C: Apportion the adjusted U.S TAC according to the sectors' allocations (IFQ, MS, C/P), then issue the surplus carryover from just the shorebased IFQ allocation, then issue the remaining shorebased IFQ allocation to the IFQ fishery.

Approach D: If tribal whiting is reapportioned to the non-treaty sectors in the fall, then surplus carryover could be issued to IFQ prior to sector reapportionment (IFQ, MS,C/P).

[1] See Groundfish Fishery Management Plan Appendix E, A-2.2.2 and regulations at 50 CFR part 660.140(e)(5).
[2] See Article II.5 in the Agreement between the Government of the United States of America and the Government of Canada on Pacific Hake/Whiting, 2003.

Under this agenda item, the Council is scheduled to identify an implementation approach that represents past Council action, as outlined in the current FMP and regulations. To facilitate this consideration, a Pacific whiting carryover workshop is scheduled for November 2, 2012, concurrent with the Council meeting. The individual recommendations from the workshop, along with advisory body and public comment, will be provided for Council consideration. The Council recommendation under this agenda item will be forwarded to the Joint Management Committee for implementation in 2013, if possible.

Possible Regulation Amendment Process for Consideration of Electronic Monitoring as a Replacement for the 100% Observer Coverage Requirement

This document was originally presented to the Council at its June 2012 meeting.

Time	Process Considerations	Comments
Summer 2012	• NMFS/PSFMC Feasibility Project Field Season	See project description presented at the April 2012 Council meeting and initial status report at the June 2012 Council meeting
Nov 2012	• Council considers aspects of alternatives that do not depend on the outcome of the NMFS/PSMFC project ○ Initial study design for the 2013 at-sea and shoreside field season ○ Consider ▪ Need for logbooks and other sensor equipment and integration with cameras ▪ Provision for an audit system (appropriate levels and relative risks) ▪ Funding needs and distribution of program costs ▪ Consequences of failure to report discard events (e.g. paying for increased review or requirement to carry observer) ▪ Impacts on supply and costs for remaining observers	
Mar/Apr 2013	• Consider results of 2012 NMFS/PSMFC • Finalize 2013 study design • Refine regulatory process plan • Scoping of regulatory alternatives and infrastructure changes	Consider whether any regulatory changes should be pursued, if the NMFS/PSMFC field project demonstrates potential feasibility (for just Whiting catcher vessels?)
Summer 2013	• Execute at-sea and shoreside field studies	
Nov 2013	• Consider initial results of 2013 field season • Adopt regulatory alternatives for analysis	
June 2014	• Consider full analysis of alternative in the context of previous rationale for 100% observer coverage • Select preliminary preferred alternative	
Sept 2014	• Select final preferred alternative	
Sept 2014 through 2015	• Secretarial approval process and implementation, including ○ Regulation drafting and paperwork reduction act submissions ○ Securing contracts for video review ○ Commercial installation and testing ○ Observer program adjustments	

Shorebased Whiting Carryover Workshop

Reference: Agenda Item I.5.a, Attachment 8

November 2, 2012

Objectives

- Adopt an approach for issuing surplus carryover in the shorebased IFQ program that
  - is consistent with the Pacific whiting treaty procedures
  - keeps mortality from all sectors within the Pacific whiting total allowable catch (TAC)
  - is consistent with tribal treaty rights and allocation structure
  - is consistent with the existing whiting sector allocations in the groundfish Fishery Management Plan

Summary Participant Discussion on Approaches for Surplus Carryover

- If the Council is interested in maintaining surplus carryover for Pacific whiting
  - there was interest in Approaches C and E
  - None of the participants favored Approach A, B, or D
- Several supported removing the surplus carryover provision for Pacific whiting

Review of Terminology – Treaty Process

Total Allowable Catch (TAC): Harvest limit used in the Pacific whiting treaty process and Federal regulations; similar to annual catch limits

- Coastwide TAC
- Country specific TAC (US and Canada)

Review of Terminology – Treaty Process "Adjusted TAC"

- If in any one year, a country's catch exceeds its individual TAC, an amount equal to the overage shall be deducted from the country's TAC in the following year
- If in any one year, a country's catch is less than the country's TAC, an amount equal to the shortfall shall be added to its individual TAC in the following year, unless otherwise recommended by the JMC. The amount shall not exceed 15 percent of a country's unadjusted TAC

Review of Terminology – Federal Regulations

Pacific whiting allocations (660.55(f)(2))

After set-asides (research, tribal, etc.) are removed, the commercial harvest guideline is allocated as follows:

- 34% for the Catcher-Processor (CP) Coop Program
- 24% for the Mothership (MS) Coop Program
- 42% for the Shorebased IFQ Program

Review of Terminology – Federal Regulations

- At-sea Sectors (CP and MS)
  - Allocations are made to the co-ops
  - No carryover provisions exist within the MS or CP programs

Review of Terminology – Federal Regulations

- Shoreside IFQ Program
  - Allocations are made to the quota share accounts (QS)
  - Carryover of quota pounds (QP) occurs in vessel accounts

Review of Terminology – Federal Regulations

Surplus Carryover (660.140(e)(5))

- Specific to the shorebased IFQ program
- Allows up to 10% of the **eligible QPs** in a vessel account that were not used in one year to be carried over into the following year
- Surplus QPs may not be carried over for more than one year
- If there is a decline in the allowable harvest from one year to the next, the amount of QP carried over as a surplus will be reduced in proportion to the reduction in the harvest level (ACL or TAC)

Review of Terminology – Federal Regulations

Eligible surplus carryover (660.140(e)(5))

- Calculated by multiplying the carryover percentage (up to 10%) by the cumulative total of QP (used and unused) in a vessel account for the base year, less any transfers out of the vessel account or any previous carryover amounts

Review of Terminology – Federal Regulations

Deficit Carryover (660.140(e)(5))

- Specific to the shorebased IFQ program
- Allows up to a 10% deficit in a vessel account for one year to be covered with QP from a subsequent year

Review of Terminology – Federal Regulations

Tribal Whiting Reapportionment (660.131(h) and 660.60(d)(1)(iv))

- By September 15, the Regional Administrator will consult with the tribes and evaluate projections relative to the tribal allocation
- The portion of the tribal allocation that will not be used may be reapportioned to the non-tribal sectors in proportion to their initial allocations, on September 15 or as soon as possible
- No reapportionments occur after December 1
- Starting in 2011, reapportionment between the non-tribal sectors is not available

Review of Accounting Process – Tribal Reapportionment

- QP issued as a result of tribal reapportionment are not included in the calculation of eligible surplus carryover (see comment 15 in 77FR28497)
- QP from tribal reapportionment are kept in a separate column from regularly issued QP and are debited prior to the removal of non-tribal QP
  - If a vessel has already caught fish, NMFS counts the QP from reapportionment against the fish already landed and credits the vessel back for previously used regularly issued QP

2012 Approach

1. Adopt the adjusted TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Shorebased IFQ carryover is not issued

2012 Approach

1. Upward Adjusted TAC: 186,036

   a. Included approximately 43,636 mt of unharvested fish from 2011, which was largely from the tribal sector since tribal reapportionment was not available in 2011. Tribal reapportionment is now available

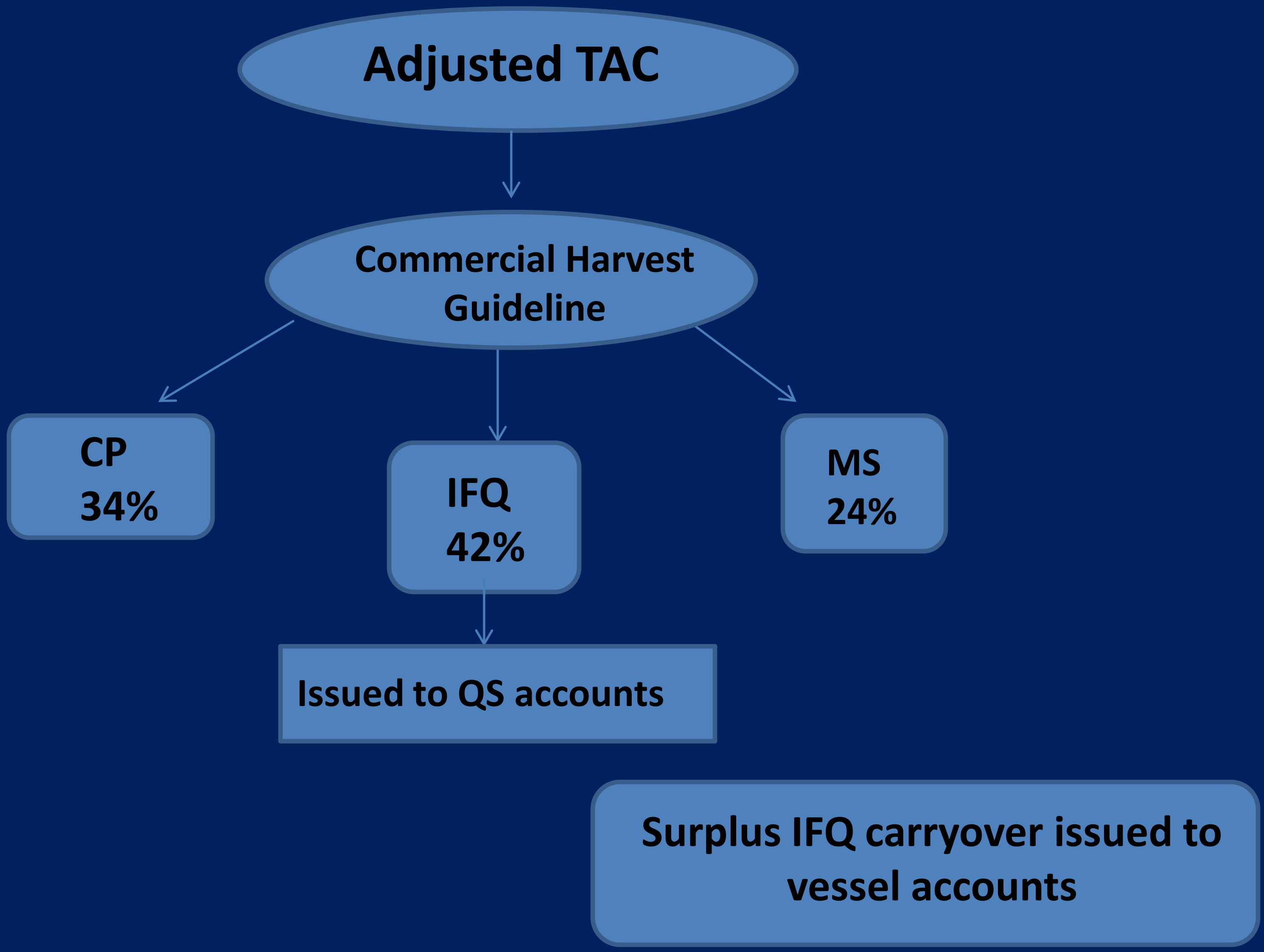
2. Approximately 725 mt (1.6 million pounds) of 2011 shorebased carryover, was not issued to vessel accounts in 2012

   - If surplus carryover is unavailable for Pacific whiting, it is anticipated that individuals may harvest all QP or could go into deficit

Approach A – TAC Plus Carryover

1. Adopt the adjusted TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.) ; resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Issue surplus IFQ carryover to vessel accounts from the previous years vessel account underage
5. This amount is in addition to the TAC, thus the total allocations are greater than the TAC

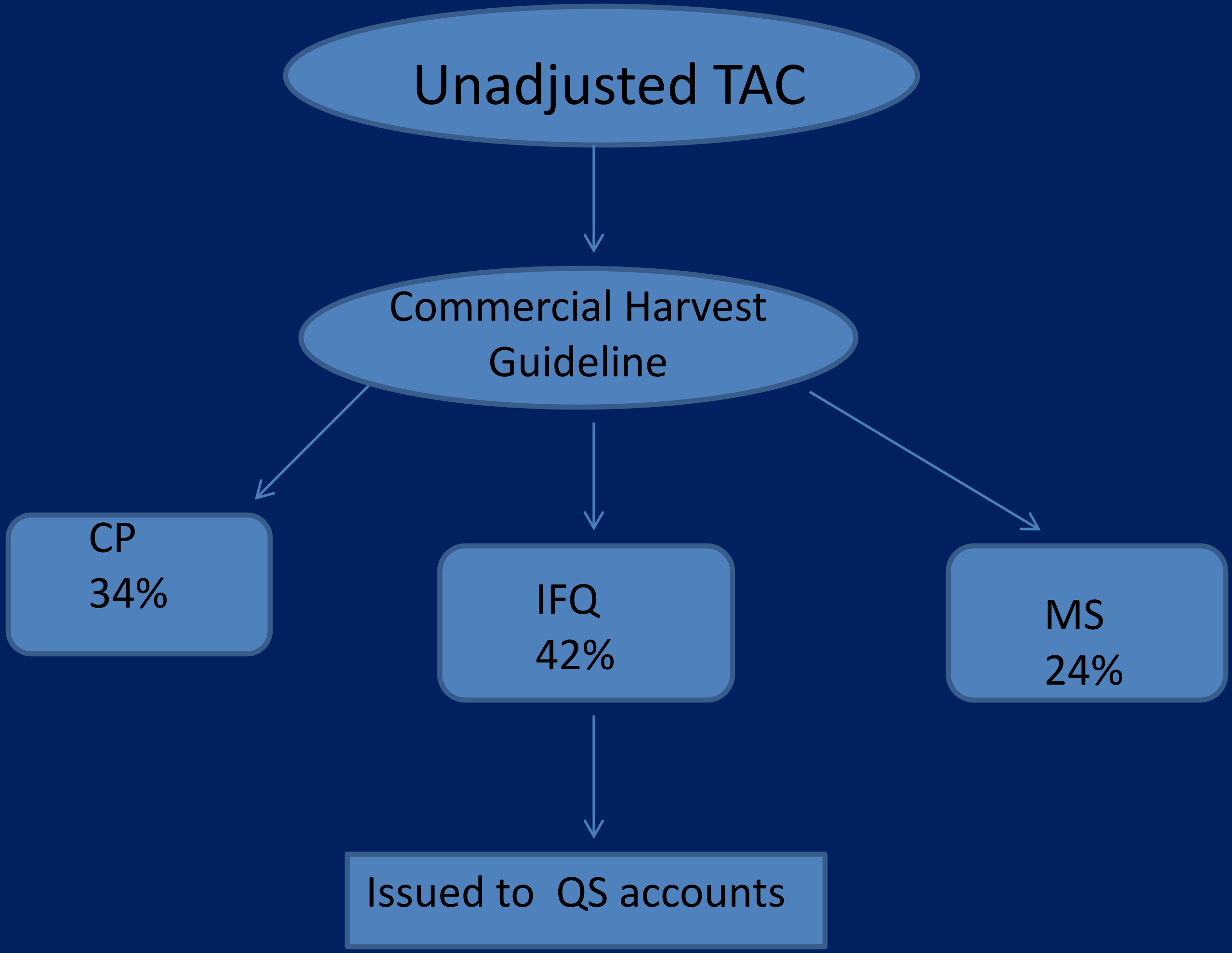
Approach A – TAC Plus



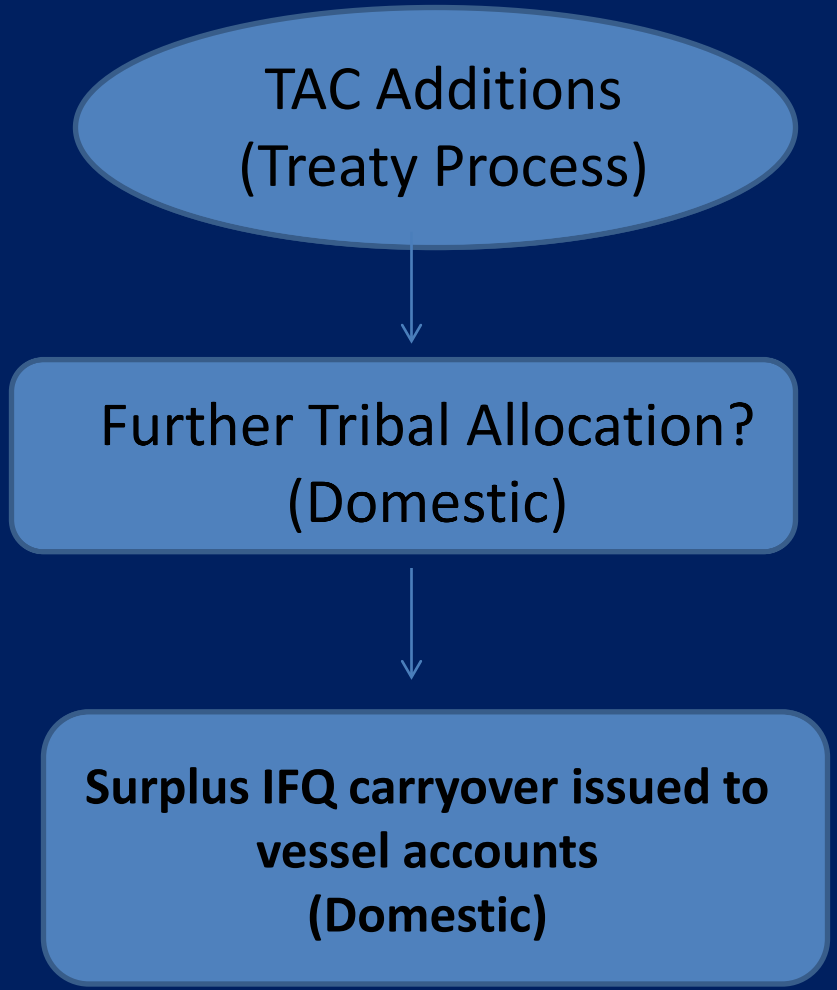
Approach B

1. Adopt the <u>unadjusted</u> TAC
2. Remove set-asides (tribal, research, etc.) ; resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Issue surplus IFQ carryover to vessel accounts from the TAC carryover
5. If there is any remainder from the TAC adjustment, allocate to sectors CP (34%), IFQ (42%), MS (24%)

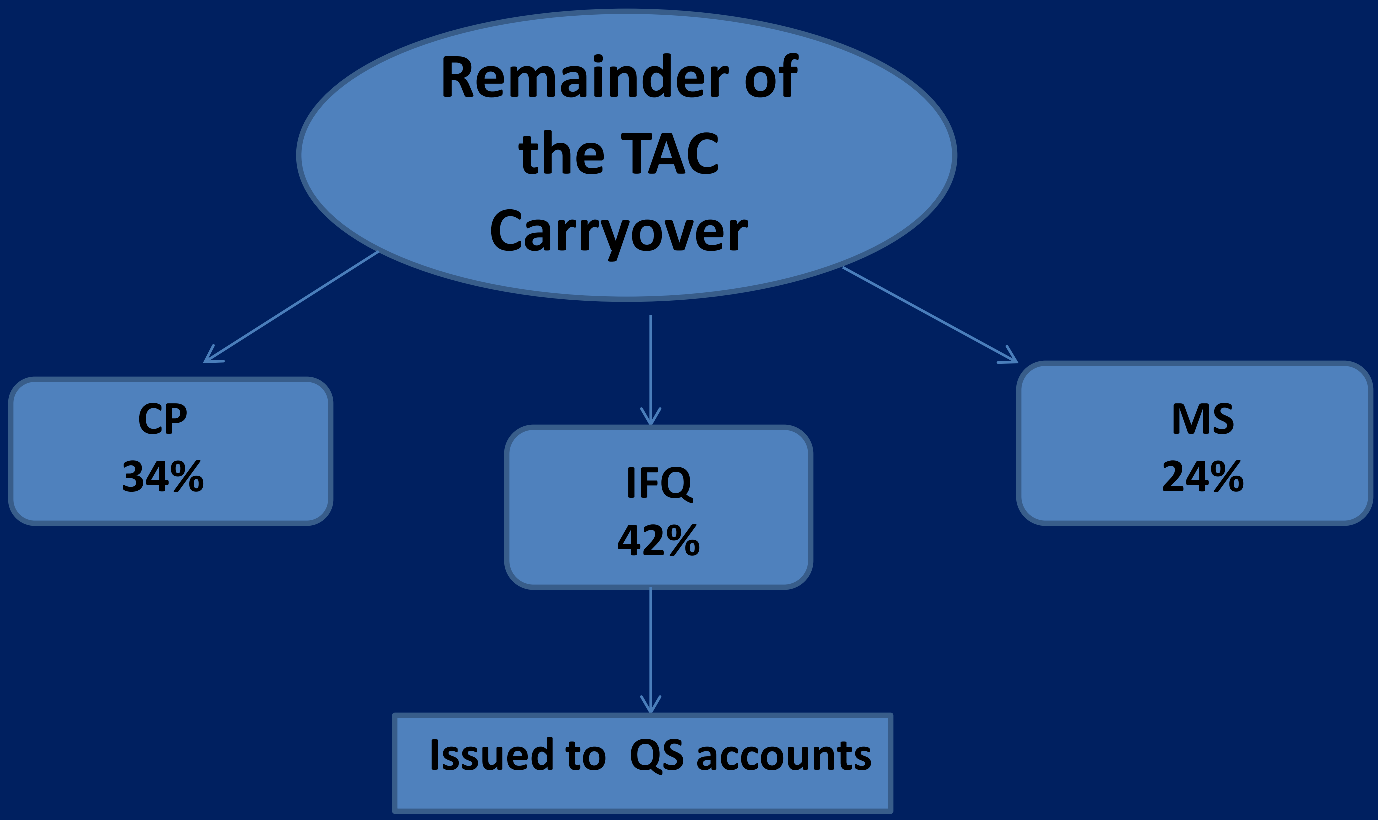
Approach B


Unadjusted TAC
Commercial Harvest Guideline
CP 34%
IFQ 42%
MS 24%
Issued to QS accounts

Approach B


TAC Additions
(Treaty Process)
Further Tribal Allocation?
(Domestic)
Surplus IFQ carryover issued to
vessel accounts
(Domestic)

Approach B

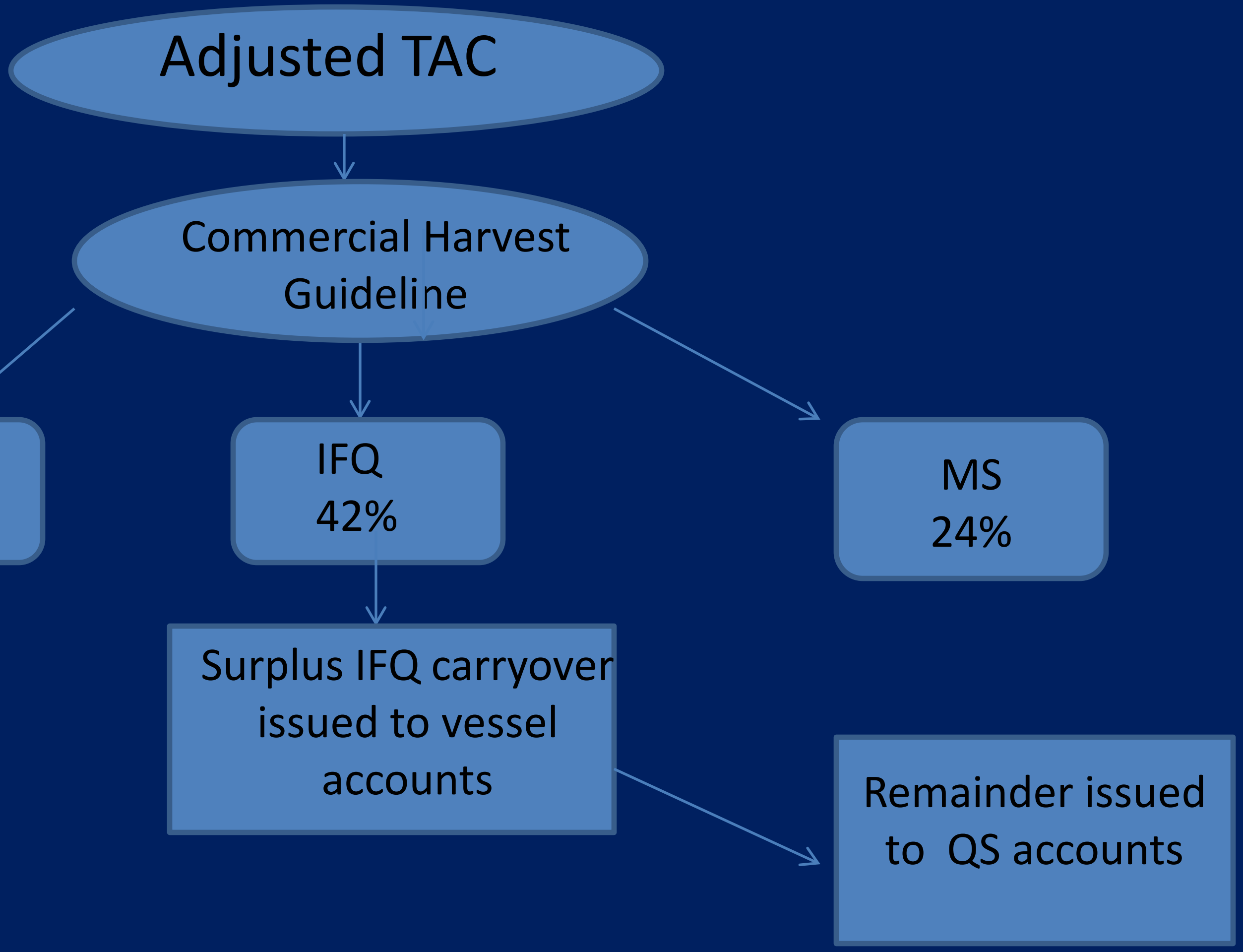


Approach B only works is there is a TAC carryover. A sub-approach would need to be developed in the event there was a TAC deficit.

Approach C

1. Adopt the <u>adjusted</u> TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Issue surplus carryover to vessel accounts from the IFQ allocation
5. Issue the remainder of the IFQ allocation to QS accounts

Approach C

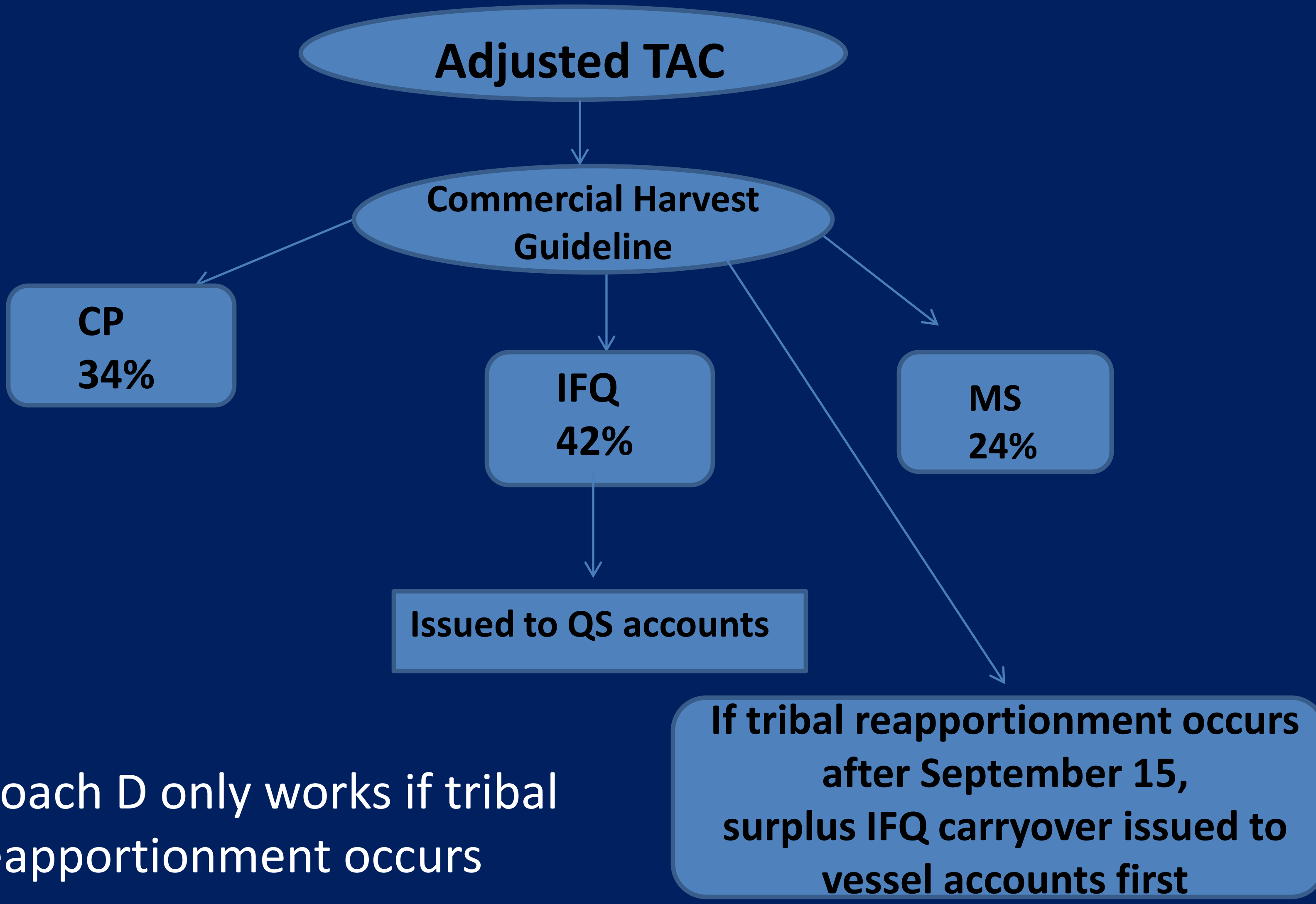


Approach C works whether the TAC is increased (surplus TAC carryover) or decreased (deficit TAC carryover)

Approach D

1. Adopt the <u>adjusted</u> TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. If tribal whiting is reapportioned in the fall: Issue surplus carryover to vessel accounts, allocate the remainder to sectors CP (34%), IFQ (42%), MS (24%)

Approach D

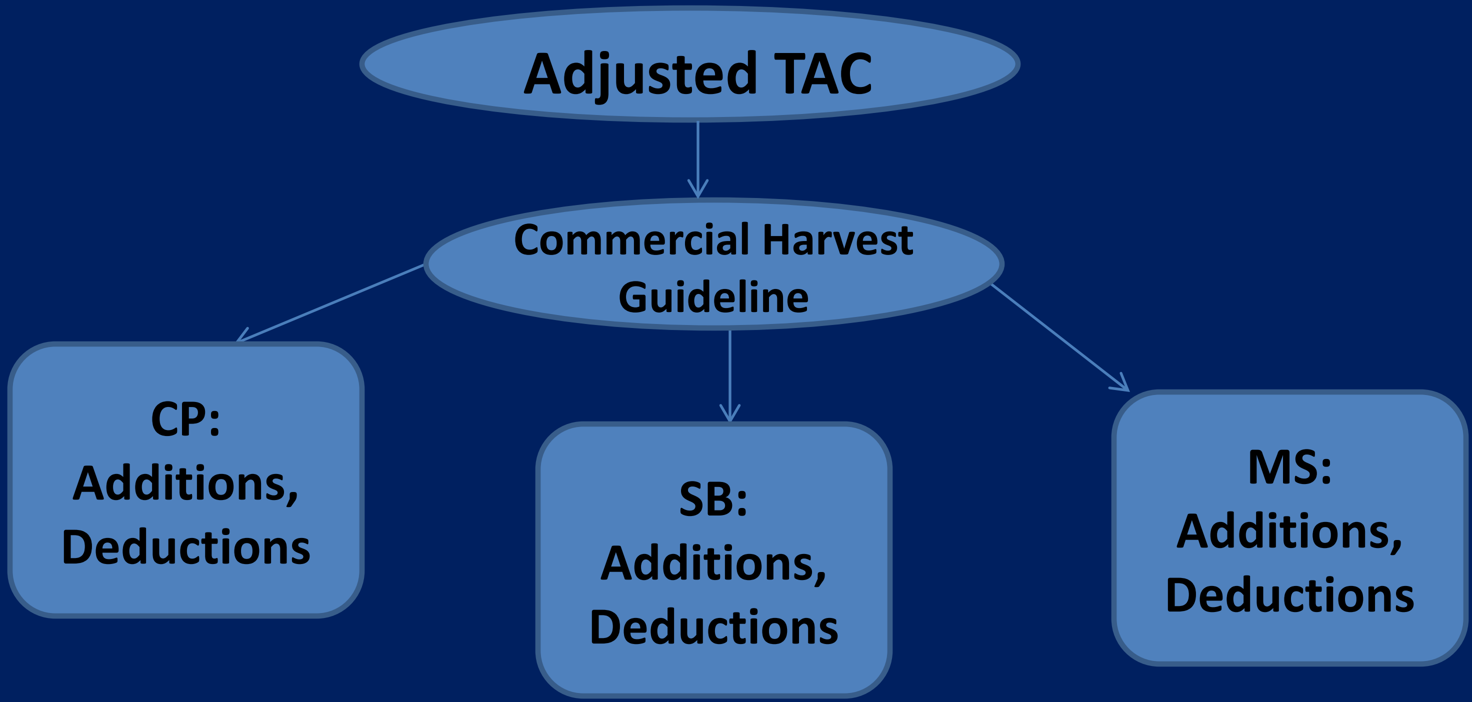


Approach D only works if tribal reapportionment occurs

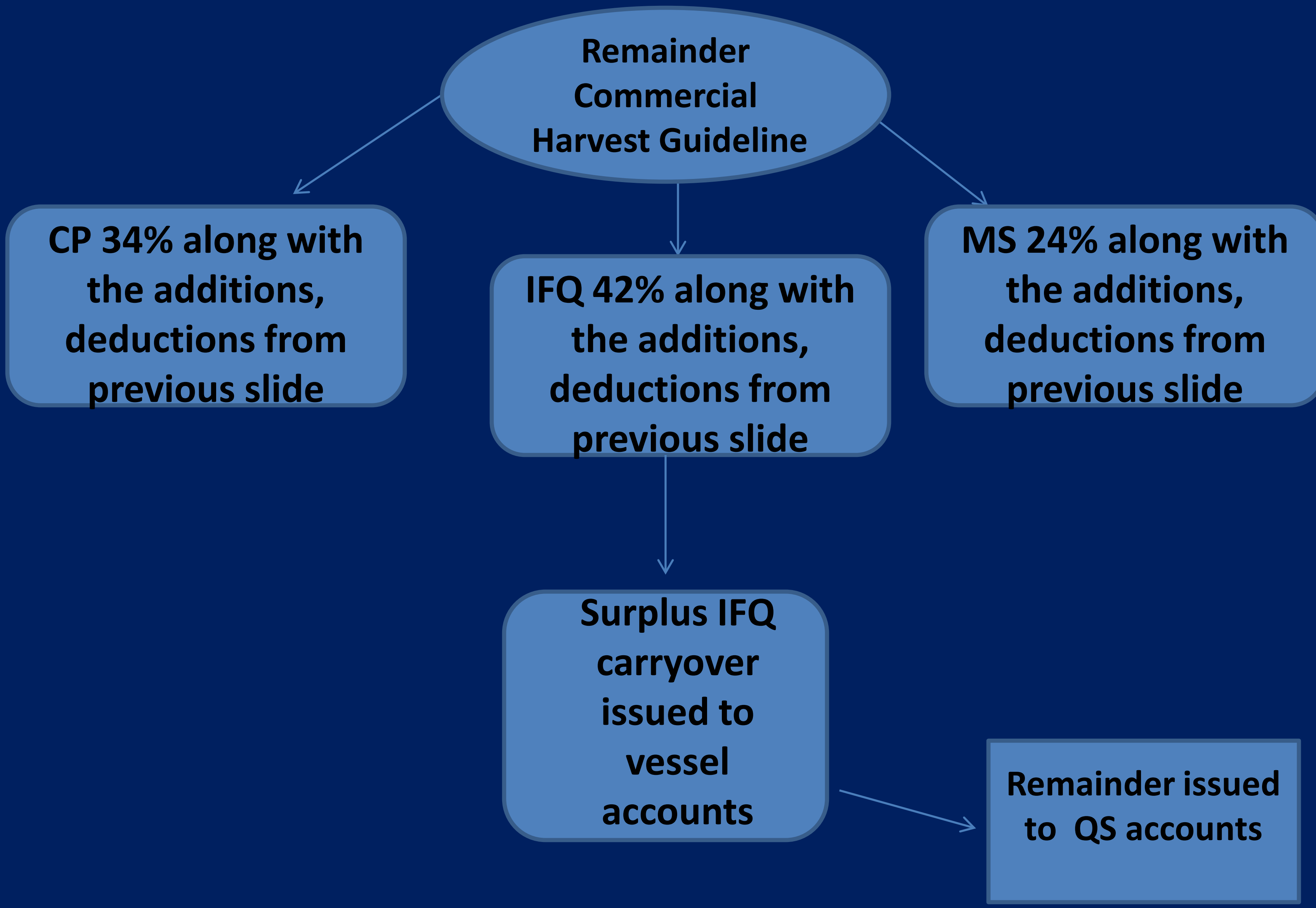
Approach E

1. Adopt the adjusted TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.), resulting value is commercial harvest guideline
3. Set aside the sector's contributions or deficits from the previous year (in the case of an overage it will be a deficit deducted from the results of step 4).
4. Allocate any remainder to sectors: CP (34%) + amounts from Step 3, IFQ (42%), MS (24%) + amounts from Step 3
5. From Step 3: Issue surplus carryover to vessel accounts from the IFQ allocation
6. From Step 4: Issue the remainder of the IFQ allocation to QS accounts

Approach E


Adjusted TAC
Commercial Harvest Guideline
CP: Additions, Deductions
SB: Additions, Deductions
MS: Additions, Deductions

Approach E


Remainder Commercial Harvest Guideline
CP 34% along with the additions, deductions from previous slide
IFQ 42% along with the additions, deductions from previous slide
MS 24% along with the additions, deductions from previous slide
Surplus IFQ carryover issued to vessel accounts
Remainder issued to QS accounts

Discussion

EXCERPTS FROM THE 2006 BIOLOGICAL OPINION ON SALMON REGARDING THE PACIFIC FISHERIES MANAGEMENT COUNCIL'S GROUNDFISH FISHERY MANAGEMENT PLAN

Endangered Species Act (ESA) Section 7 Consultation – Supplemental Biological Opinion
Consultation Number: 2006/00754

. . . .Another pattern that is apparent from recent observation is that bycatch rates [in the whiting fishery] tend to be highest early in the season. The at-sea portion of the fishery starts on May 15. Chinook bycatch rates were highest in May, declined in the month of June, and remained at low levels through the remainder of the season (Table 6). The main portion of the shoreside fishery in the area north of 42E00' N. lat. begins on June 15. Chinook bycatch rates declined through the first three weeks of the 2005 fishery and stabilized at lower levels thereafter (Table 7). Note that the overall bycatch rates in the shoreside fishery were higher than for the at-sea fishery in 2005. As discussed above, the shoreside fishery tends to fish closer to shore to reduce operating costs. But as a consequence, bycatch rates in the shoreside fishery tend to be higher overall. [p. 18]

Table 6. Bycatch rate of Chinook salmon (Chinook/metric ton whiting) in the mothership and catcher/processor sectors by month.

Month	**2001-2005 Average**	**2005**
May	0.047	0.068
June	0.026	0.022
July	0.007	0.001
August	0.001	0.000
September	0.001	0.000
October	0.004	0.001
November	0.007	0.011

Table 7. Bycatch rate of Chinook salmon (Chinook/metric ton whiting) in the shoreside sector by week.

Week	**Chinook Salmon Bycatch (Chinook/metric ton whiting)**
6/12 to 6/18	0.192
6/19 to 6/25	0.104
6/26 to 7/2	0.045
7/3 to 7/9	0.017
7/10 to 7/16	0.035
7/17 to 7/23	0.021
7/24 to 7/30	0.022
7/31 to 8/6	0.010
8/7 to 8/13	0.024
8/14 to 8/20	0.016

I.5 Trawl Trailing Actions

Agenda Item I.5.a, Attachment 1

Chafing Gear (1)

- Agenda I.5.a, Attachment 2 – Executive Summary
- Agenda I.5.a, Attachment 3 – Environmental Assessment (Electronic Only)

Chafing Gear (2)

- Up Until Recently **(Option 2b)**
  - Chafing gear allowed over 50% of circumference
  - Chafing gear panels Limited to 50 meshes in length
  - No limit on number of panels (cover entire length)
- Same as Opt 2b but eliminate 50 mesh limit **(Option 2a)**
- Change Leading to Need for Action
  - Limited placement to last 50 meshes of codend
- Final Preferred (April 2012) **(Option 1)**
  - Chafing gear cover bottom and sides (about 75% circ)
  - Panel length not limited (coverage of full length allowed)

Chafing Gear (3)

- Applies to midwater gear in all uses
  - **Whiting**
  - **Nonwhiting**

    (Widow, Yellowtail, Chilipeppers)

Gear Workshop Report

- Agenda Item I.5.a, Attachment 4
- To be addressed in September 2013

Lender Issue: Control Rule Safe Harbor (1)

- Agenda Item I.5.a, Attachment 5
- Safe Harbor Already Provided – Clarifications Needed
  - For who?
  - For what activities?

Lender Issue: Control Rule Safe Harbor (2)

- Who qualifies ?
  - Status Quo – exclusion from some provisions for *"banks and other financial institutions that rely on QS or IBQ as collateral for loans"*
  - **Alt 1** – add: primarily engaged in lending and not harvesting, processing, or distributing
    - Requires ownership disclosure for banks or financial institutions that are not state or Federally chartered
  - **Alt 2** – most restrictive – must be a state or Federally chartered financial institution
  - **Alt 3** – least restrictive – any person relying on QS or IBQ as loan collateral

Lender Issues: Control Rule Safe Harbor(3)

For what activities?: Status Quo control provisions

No Lender Exclusion Provided	Lender Exclusion Provided
(A) & (B) directs the business of an entity or authority over director, board, partners etc.	(E) Any activity related to quota
(C) Prevents or delays quota transfer (shares or pounds)	(F) Controlling management of the entity or being a controlling factor
(D) Through loan covenants affects day to day business activities	(G) Cause or prevent sale, lease, or other disposition of quota
(H) Any other means of control over shares	

Some confusion about overlaps between
(C) and (E), (C) and (G), (D) and (E)/(F), (A/B) and (F).

Alt 1. Provide lenders an exclusion for (C).

Alt 2. Eliminate exclusion for everything but (C) and provide a clause in all other sections: *except for lender activities covered under (C)*

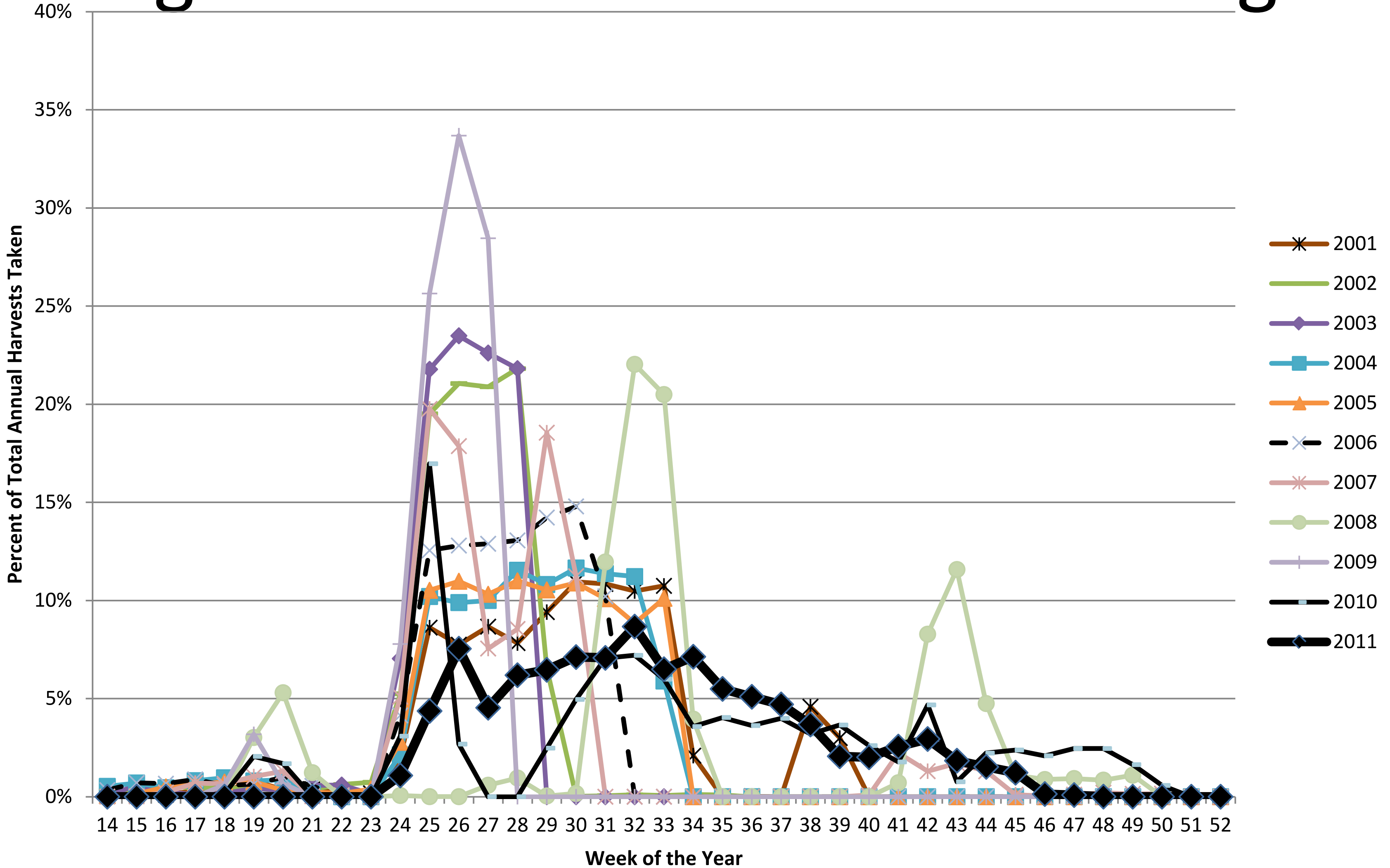
Alt 3. Under (C) exclude lender control over shares but not pounds.

Alt 4. Add lender exclusion for all paragraphs.

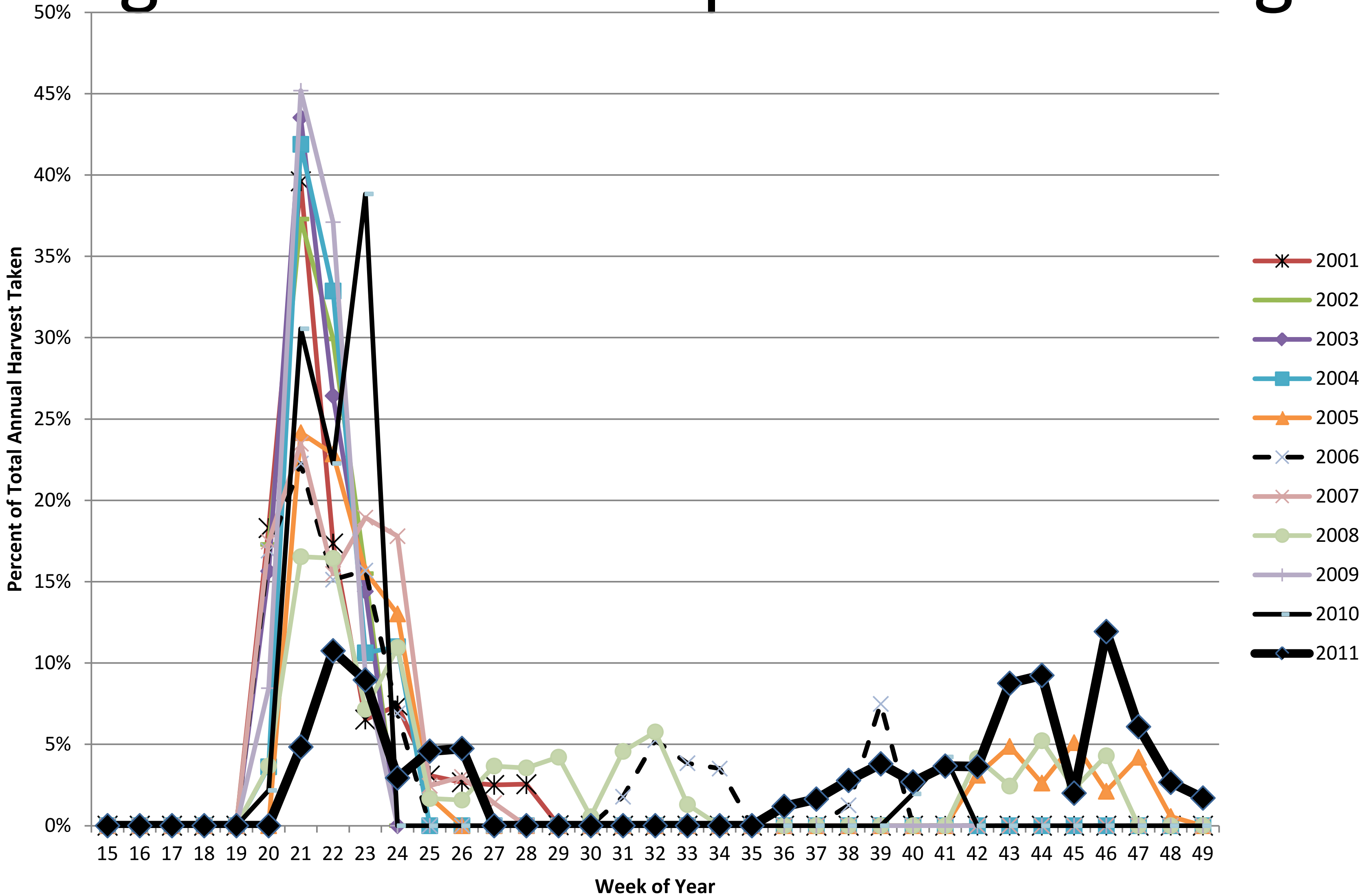
Whiting Season

- Agenda Item I.5.a, Attachment 6
- Moving shoreside start date from June 15 to May 15
- Framework Process for Adjusting Seasons
  - Applies only north of 40°30' N. Lat.
  - Does not apply to removing 5% early season cap
- Not trigger a ESA reconsultation for salmon
- Excerpt from 2006 Biological Opinion Included in I.5.a, Supplemental Attachment 11 (pre-A-20)
- 19 permits participate in both shorebased and mothership sectors (2004-2010)

Agenda Item I.5.a, Att 6,
Fig 3-1. Shoreside Harvest Timing



Agenda Item I.5.a, Att 6, Fig 3-2. Mothership Harvest Timing



Widow Reallocation Alternatives (1)

- Agenda I.5.a, Attachment 7
- Existing alternatives are based on preliminary work of the staff, endorsed by GAP at previous meetings, and presented to the Council.

Widow Reallocation Alternatives (2)

- Alternative 1 – Full reallocation based on permit history for 1994-2003.
- Alternative 2 – Pounds neutral. Reallocate **65.5%** of the QS based on history

  (everyone retains **34.5%** of existing holdings)
- Alternative 3 – Split the difference. Reallocated **32.75%** (half of 65.5%)

  (everyone retains **67.25%** of existing holdings)

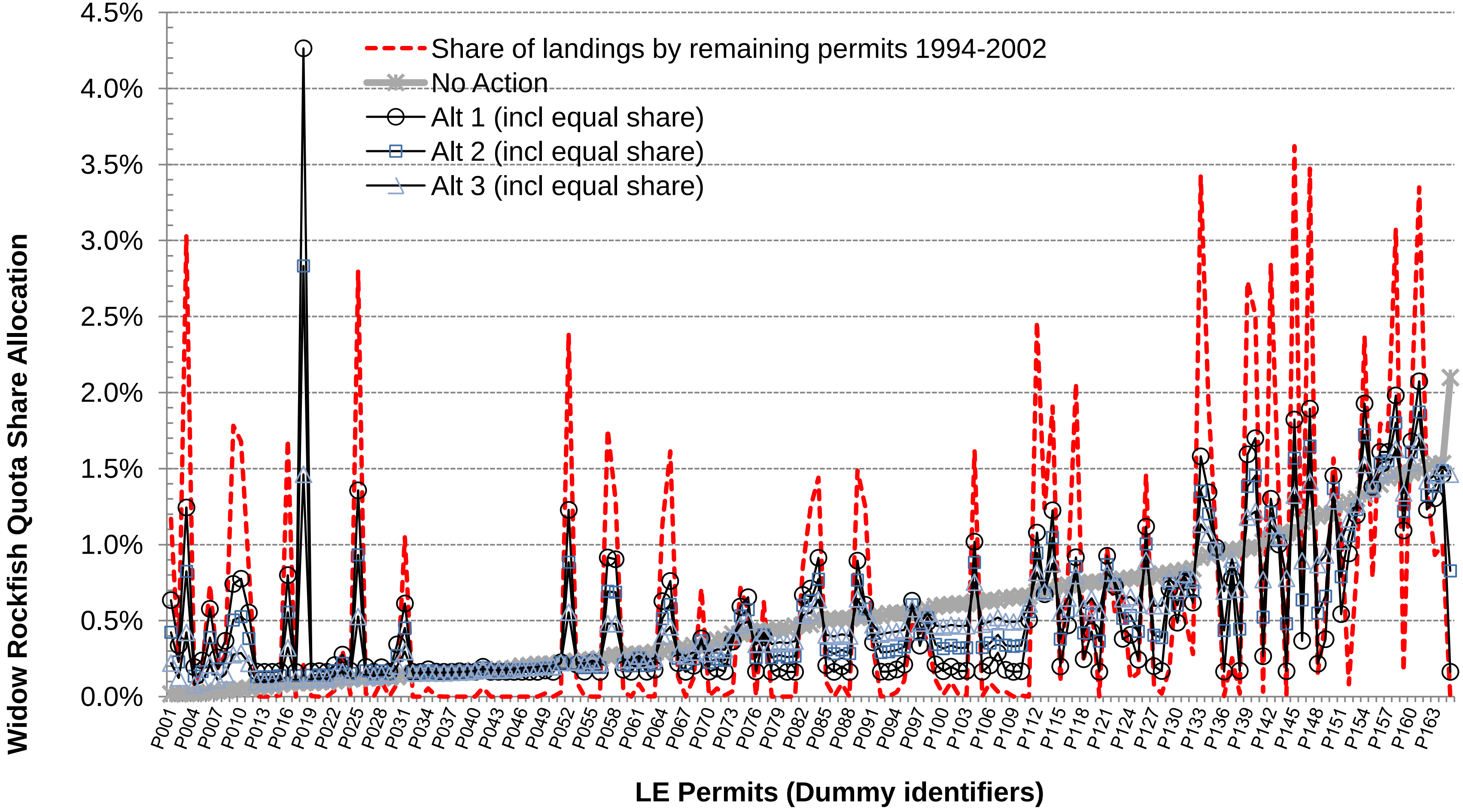
Widow Reallocation Alternatives (3)

For all options:

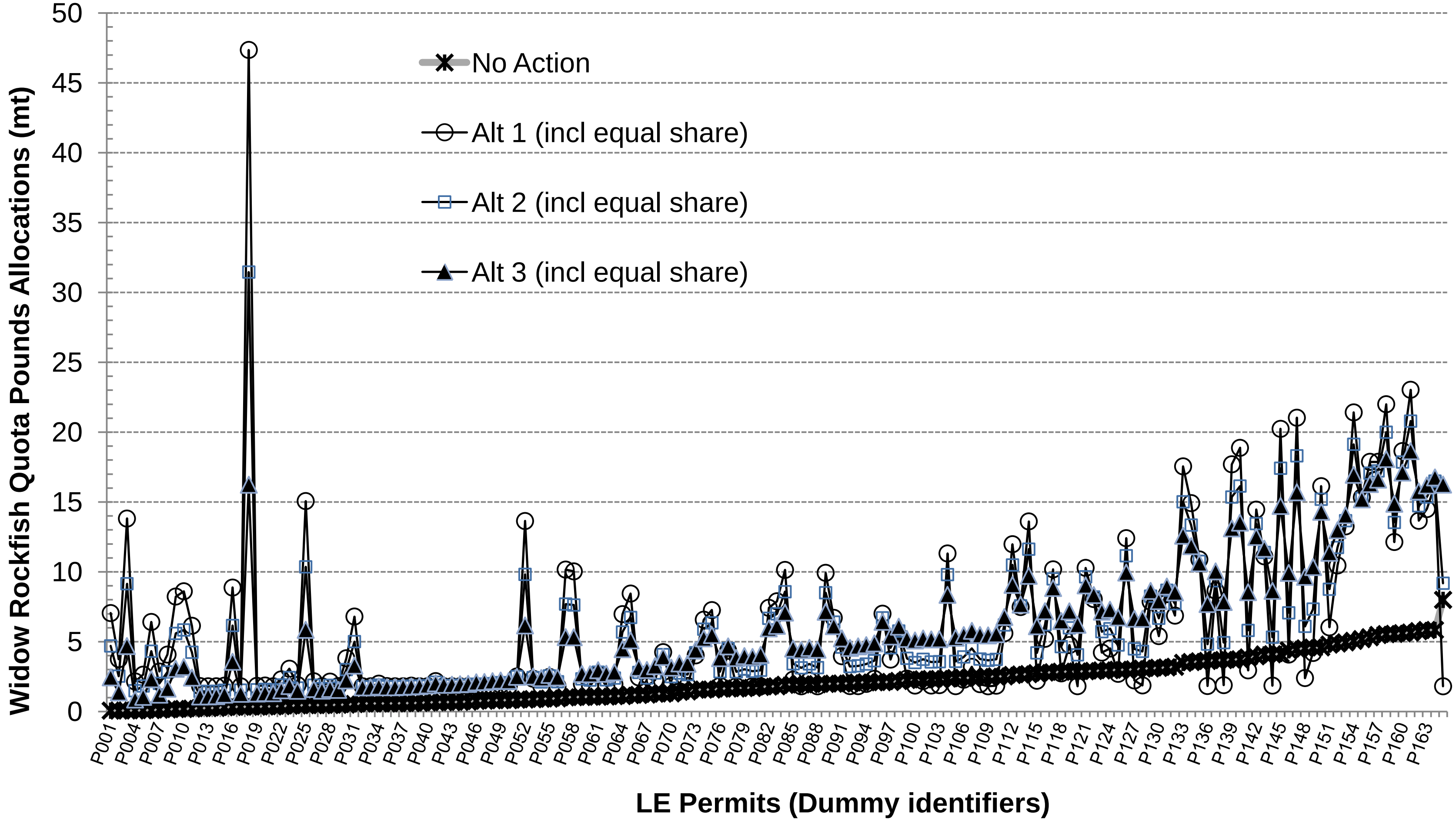
- Allocations of nonwhiting species QS
  - nonwhiting (previously on a bycatch need basis)
  - whiting trips (prorata).

  Change the split of widow QS between whiting and nonwhiting trips based on Amendment 21 guidance pertaining to rebuilt conditions for the shoreside split between whiting and nonwhiting.
- Leave all other aspects of the history based portion of the allocations the same, except as modified by the alternatives (e.g. drop years, relative pounds, etc.)

Agenda Item I.5.a, Att 7, Fig 3-1. QS to permits



Agenda Item I.5.a, Att 7,
Fig 3-5 – pounds to permits.



Widow Reallocation Alternatives (4)

For all options:

- Should equal allocation be included (36%)?
- Should years of overfished status be included in historic period used for allocation?

Other Issues Under I.5.a

- Carryover (whiting)
  - I.5.a, Attachment 8 and Sup Attachment 10,
  - I.5.b, Sup Workshop Report,
  - I.5.b, Sup US Advisory Panel Draft Minutes
- Electronic Monitoring (I.5.a, Attachment 9)
  - Scheduled scoping delayed – need additional resources
- Cost Recovery
  - Place holder – no action required
- Adaptive Management Program
  - I.5.b, NMFS Report – no specific action for this meeting

US Canada Whiting Treaty

October 22, 2012 Advisory Panel U.S. Delegation Minutes

A meeting of the U.S. Delegation of the Advisory Panel to the U.S. Canada Whiting Treaty was held on October 22, 2012 at 1300 hours.

Roll Call:

Joe Bersch, Mike Okoniewski and Richard Carroll attended in person at the United Catcher Boat office in Seattle, WA. Tom Libby and Dave Jincks attended by teleconference.

Members of the public, Dave Smith, Dan Waldeck, Kelly Ames and Heather Mann also attended by teleconference.

The Agenda consisted of two items:

1. Update on JTC and SRG Appointments
2. Treaty Implications Associated with the Implementation of U.S. Domestic Carryover Provisions

The Agenda was approved.

1. **<u>Update on JTC and SRG Appointments</u>**

Chairman Bersch gave the AP Members an update on the status of the Parties' appointment of the AP nominated positions on the JTC and the SRG. A meeting was held with Frank Lockhart, Paul Ryall, Barry Ackerman, Michelle McLure and AP Co-chairs Dave Dawson and Joe Bersch on October 19. Canada reported that they have received a total of $7500 to put towards the appointments. The U.S. Government has agreed to provide JTC and SRG Members reimbursement for travel and a stipend to attend meetings, but cannot pay anything for work outside of the meetings. They can pay travel only for Public Advisors to the SRG. These amounts will be consistent with what was paid to CIE reviewers in 2012. The AP Co-chairs voiced their disappointment with this level of funding and reiterated that the Treaty made it clear that these individuals are to be full participants in the Treaty process. As such, it is an obligation of the Parties to provide adequate funds and resources to allow for this.

Frank Lockhart suggested that it would be appropriate for the AP Co-Chairs to write representatives of their Governments asking for such funding to be made available so as to insure these Members' full participation in all aspects of the science and management processes as specified by the Treaty.

The AP requested that Joe follow-up with Frank Lockhart for contact information such that the AP can write a letter as appropriate. The AP also requested that Joe follow up with Michelle McClure to inquire about who was interested in serving.

2. **Treaty Implications Associated with the Implementation of U.S. Domestic Carryover Provisions**

The AP Members reviewed November 2012 PFMC Council Agenda Item I.5.a, Attachment 8- Whiting Carryover.

Discussion ensued regarding the interplay between the Treaty TAC setting process and the domestic management of the adjusted or unadjusted TAC in the U.S. and Canada. It was agreed that how the U.S. or Canada managed their individual portion of the TAC was up to each country, so long as it did not impact the overall apportionment of TAC or allow for fishing beyond the default harvest policy or the adjusted TAC. It was noted that in the 2012 TAC setting process, the JMC set a TAC which included carryovers for the U.S. and Canada and took into account historical utilization rates. The AP supported this bi-lateral TAC setting process and wants to insure that if the U.S. domestic regulations provide for implementation of a 10% carryover that it does not reduce the tools available to the AP or JTC at the Treaty level. Likewise, they do not support any regulations which may result in harvest in excess of the default harvest policy or adjusted TAC. Adding a domestic carryover on top of this TAC could lead to harvest in excess of the default harvest policy.

After full discussion, it was moved, seconded and unanimously approved that:

"The AP recommends that the PFMC should not approve "Approach A" or any other "adjusted TAC plus carryover" mechanism for apportionment of the U.S. portion of the TAC within the U.S.. The PFMC should take steps to encourage full utilization of the U.S. portion of the TAC annually and should insure that whatever mechanism is chosen that it is consistent with and encourages release of unused TAC consistent with the Tribal Reapportionment regulations."

While many of the Members of the AP who were present supported eliminating the 10% whiting carryover provision in the shoreside IFQ program altogether, it was determined that providing such advice was beyond the authority of the AP.

Joe Bersch will attend the Whiting Carryover Workshop on November 2 and present the views of the AP.

The meeting was adjourned.

Respectfully submitted,

Joe Bersch
AP Co-Chair

GROUNDFISH ADVISORY SUBPANEL REPORT ON TRAWL RATIONALIZATION TRAILING ACTIONS AND UPDATES

Mr. Jim Seger briefed the Groundfish Advisory Subpanel (GAP) on the suite of trailing actions before the Council. The GAP had a robust discussion, including significant public input and offers the following comments and recommendations.

As an overarching consideration, the GAP's position is that the Council and National Marine Fisheries Service (NMFS) should focus attention on trailing actions with the greatest potential to benefit the fleet overall. While some benefits have started to accrue from the trawl rationalization program, fishermen continue to have difficulty accessing their full complement of target species. At the same time, many additional costs have been, and more costs soon will be, imposed on the fleet. With that in mind, the GAP would like to see the Council focus on trailing actions that reduce program costs, provide additional flexibility, or provide additional access to target species. Based on this reasoning, the highest priority trailing action for the GAP is **electronic monitoring**.

As an additional overarching comment, the GAP understands that NMFS is recommending delaying action on several items due to concerns about being able to draft regulations in a timely manner, given everything else before the agency at this time. The GAP recommends that the Council move forward so that the only bottleneck is in NMFS rulemaking, rather than additional delay in Council action and further delay for regulation drafting.

Electronic Monitoring

As mentioned above, the highest priority for the GAP is to begin development of a trailing action to authorize electronic monitoring (EM). The GAP believes that the Council should begin scoping the issue at its March 2013 meeting. There are two primary goals to this effort: reducing program costs, and increasing operational flexibility.

High program costs, of which observer costs make up a significant portion, threaten the economic viability of fishing businesses and communities. At the same time, we have heard from many fishermen that difficulty in getting an observer has led to missed trips, which can represent significant missed opportunity. This problem is only likely to get worse. For example, it appears that some ports are simply not profitable for observer providers, and that some may stop providing coverage, or offer even more limited coverage (i.e. number of observers relative to number of active vessels in port) at increased cost.

We believe the solution is a thoughtful, planned approach to phase in a more cost-effective monitoring system that will allow fishermen to fish when conditions are right rather than when an observer is available. Development of that approach needs to begin as soon as possible. As a first step, the Council, in collaboration with NMFS Northwest Region, Office of Law Enforcement, and NMFS Northwest Fisheries Science Center, should identify goals and objectives for a monitoring program. This will help guide the EM tests currently underway, and will allow exploration of trade-offs between potential monitoring tools.

In addition to urging the Council to begin scoping at its March meeting, the GAP also recommends a detailed discussion between all the relevant stakeholders on this issue focused on implementing EM in this fishery. Ideally, this "EM workshop" would occur prior to the March meeting and would help inform the Council's thinking on goals and objectives, as well as enforcement, management, science, and industry considerations.

The GAP believes that the whiting fishery represents the lowest hanging fruit, as they previously had a functioning EM system under their EFP. Likewise, fixed gear vessels are prime candidates for EM in the short term. The GAP is confident EM can be successfully utilized on bottom trawl vessels as well, particularly under a full retention system which several trawlers in the audience testified is reasonable given the current limited discard.

Related to the difficulty in securing observer coverage in certain ports, we urge NMFS to finalize regulations to certify new observer providers. This could help alleviate those difficulties.

In addition to video monitoring, the GAP is also supportive of moving forward with development of an E-log book system, provided integrating the two does not slow implementation of EM.

We cannot adequately stress the importance of this issue. We urge the Council to begin discussions so that efforts underway to test the technology provide pertinent information, and of equal importance, that there is a parallel regulatory process underway so that the technology can be implemented as soon as possible.

Chafing gear

The GAP supports alternative 1 (the final preferred alternative adopted in April 2012). Alternative 1 comports with the chafing gear currently used by the majority of the fleet, and provides the best protection for expensive cod ends. The GAP recommends modifying the language of alternative 1 slightly to make clear that attaching the chafing gear inside or outside the riblines and straps should be allowed. NMFS implementation of the previous final Council action on chafing gear is a high priority for the GAP, as much of the fleet is currently out of compliance. This is a simple fix and should be taken care of quickly.

Safe harbors for lenders

The GAP notes that there are two decision points identified in the decision document: lending entities qualifying for an exception and the scope of the exception provided.

Under lending entities qualifying for an exemption, the GAP supports alternative 1 (preliminary preferred alternative). This alternative better clarifies who qualifies as a lender entitled to the exception, and ensures that the exception is limited to entities whose primary business is lending.

Under the scope of the exception provided, the GAP recommends a modified version of alternative 2:

Add the appropriate language providing an exception for lenders to paragraph C. Also, remove the exceptions provided to lenders in paragraphs E and F. Add, at the end of paragraphs other than C and G, language to the following effect: "with the exception of those activities allowed under paragraphs C **<u>and G</u>**."

While we previously supported alternative 3, we now believe it unnecessarily restricts lenders' ability to collect on loans in foreclosure by diverting quota pounds (QP) to the Adaptive Management Plan. Modified alternative 2 makes it possible for lenders to access available QP during foreclosure, thereby reducing lenders' risk, and making it more likely that there will be adequate access to financing.

The GAP believes these alternatives (option 1 under lenders qualifying for the exception and option 2 under scope of the exception) will best facilitate lending in the fishery by providing lenders with security so that they will not run afoul of the control rules by using quota share (QS) as collateral, and that they will be able to protect their interest in that collateral by preventing sale, lease, or other disposition of the QS, QP, or individual bycatch quota in the event of a foreclosure.

Whiting season

The GAP supports the preliminary preferred alternative to use a single May 15 start date for the entire fishery and remove the 5 percent California early season cap. A start date of May 15 equalizes the opportunity of all whiting sectors, giving the whiting sector as a whole flexibility to best time harvest and processing to maximize net revenues. It will also simplify the regulatory structure. Ultimately, the GAP would prefer to move forward with a year-round season, but we recognize that such an action requires significant additional analysis. The proposed change is aimed at securing an interim opportunity.

The GAP heard significant comment from the audience on this issue. Some in the mothership sector opposed the change, expressing concern about salmon bycatch. The document does not suggest that salmon bycatch would in fact increase with a May 15 start, and the shoreside sector unanimously supports the change. The GAP further notes that the data in the BiOp is based on the derby fishery. Current conditions are dramatically different.

Widow rockfish reallocation

Widow rockfish reallocation is a high priority for the GAP. However, the GAP understands that it is unlikely that electronic monitoring and widow rockfish reallocation can both move forward in the short term. The GAP believes that electronic monitoring is a slightly higher priority because it will benefit the fleet overall. The GAP understands that prioritizing electronic monitoring may result in delay on development of widow rockfish allocation alternatives, and in that event the GAP recommends delaying quota share trading for widow rockfish until such time that Council staff can focus on the issue.

With those comments in mind, the GAP recommends analyzing the following alternatives at the appropriate time. The rationale behind the options outlined below is to provide a broad suite of alternatives that clearly analyzes current and historical harvest, employment in harvesting and processing, investments and dependence on the fishery, and the current and historical participation of fishing communities.

For all options below, the portion of the quota share allocations based on 1994-2002/03 incorporate all aspects of the initial allocation formula, including drop years and equal sharing.

Each of the alternatives also includes adjusting the split of QS allocated between whiting and non-whiting trips based on the within shoreside splits specified in Amendment 21 for widow rockfish under rebuilt status.

GAP Alternatives:

1) Complete reallocation based on catch history using the same formulas (94-03) used for the original allocation of target species.

1b) Same as option 1, except change the end year in the formula to 2002, as the targeted widow fishery effectively ended in that year.

2) Same as alternative 2 in the decision document, except that the final year in the allocation formula should be 2002. This option takes into account recent participation using 2011 and 2012 allocations as a proxy for dependence and harvest.

3) Same as alternative 3 in the decision document, except that the final year in the allocation formula should be 2002.

3b) Same as alternative 3, except reallocate the 32.75 percent not allocated by the formula based on recent landings (average landings 2008-2010). This alternative was included to recognize that recency needs to be analyzed as part of this action.

The GAP also discussed an alternative that would analyze value of recent non-whiting groundfish landings (2003-10) as a proxy for dependence on the fishery. The widow allocation under this formula would be based on overall groundfish value pro rata. For example, if a fisherman had landed 3 percent of the value, he would be allocated 3 percent of the widow rockfish.

The GAP also discussed a variation of this alternative that would analyze recent landings of groundfish by weight (2003-10) as a proxy for dependence on the fishery.

Ultimately, the GAP did not endorse either alternative, and feels the range described in 1-3b above is adequate.

Finally, the GAP considered more recent alternatives such as harvest during 2011 and 2012, but ultimately rejected that approach because, in many instances, the link between limited entry permits and QS accounts has been severed. The GAP's intent was to provide a range of alternatives that included recent harvest and participation. If the Council believes the GAP recommended alternatives have not adequately covered recency, then additional alternatives should be explored.

Whiting carryover

The GAP recommends suspension of surplus whiting carryover until the 5-year review. The GAP notes that the Whiting Treaty Advisory Panel and the majority of the participants at the whiting carryover workshop supported using the carryover process in the Treaty rather than the carryover process in the groundfish FMP. The GAP agrees with these recommendations.

Cost recovery

A majority of the GAP recommends delaying implementation of cost recovery until January 1, 2014. First and foremost, cost recovery fees coupled with buyback, increasing responsibility for observer costs, and high fuel prices have the potential to drive some fishermen out of business. This is especially true in light of the fact that the fleet is still accessing only a small fraction of the total target species available. Delaying cost recovery will provide fishermen with further opportunity to take advantage of underutilized species (e.g. yellowtail rockfish, lingcod etc.). It would also align with an effort currently underway to refinance the 2003 buyback loan. Finally, there is a fair start issue. Fishermen who fish early in 2013, before cost recovery goes into effect, won't pay fees on those landings, while those who fish later in the year will.

A minority of the GAP believes that cost recovery should go forward as scheduled. Cost recovery is a requirement of law and was clearly identified as an obligation that was to be met in exchange for allocations and the benefits of an individual transferrable quota program. However, the minority fully agrees with the rest of the GAP that emphasis needs to be given to changes in regulations that will allow the fleet to access those benefits, such as by modifying Rockfish Conservation Area lines and obsolete gear restrictions.

Adaptive Management

The GAP believes the development of an Adaptive Management Program is of low priority given all of the much more important rulemakings that NMFS needs to complete to make this program successful. The GAP recommends that the Council suspend action on this item until there is a demonstrated need. Much of the initial rationale behind adaptive management had to do with community stability and fostering new entry. It is unlikely we will know whether we have a problem in either category until quota share transfer is allowed. Moreover, the GAP believes that the best way to ensure community stability is to ensure that harvesters and processors remain viable by reducing program costs and removing outdated regulations that limit access to fish. In particular, an EM program may contribute to community stability by reducing disparities in observer costs between communities.

PFMC
11/06/12

Agenda Item I.5.b
Supplemental GMT Report
November 2012

GROUNDFISH MANAGEMENT TEAM REPORT ON TRAWL RATIONALIZATION TRAILING ACTIONS AND UPDATES

The Groundfish Management Team (GMT) recognizes that as the TIQ program unfolds, unintended consequences (both positive and negative) have emerged. This is not unexpected; we are all learning and adapting as this program evolves. These issues are complex and require a lot more discussion than the GMT has had time for at this meeting, or has had time for at previous meetings. However, the team recognizes the importance of these trawl trailing actions, particularly as they relate to economic and social (i.e. fishing community-related) outcomes of the TIQ program. **Some guidance from the Council would be helpful regarding whether the team should focus more time on these trawl trailing actions.**

The GMT understands the workload, complexities, and difficulties involved with carrying out trailing actions to the point of implementation in regulation. Even those trailing actions that are ready for selection of the Final Preferred Alternative, the amount of additional work and time required to create the final regulation is still extensive. Nonetheless, it is important to point out that many of these trailing actions fit within many of our National Standards (see http://www.nmfs.noaa.gov/sfa/domes_fish/national_standard.htm). We are reminded that National Standard guidelines are intended as aids to decision making.

Prioritizing trailing actions is a difficult task. If the Council desires, the GMT could develop a method for ranking each trailing action discussed under Agenda Item I.5. The GMT discussed methods of prioritizing the list of trailing actions using objective criteria, such as the National Standards (NS) guidelines or objectives of the TIQ program. **The GMT would like guidance on whether development of such tools would be useful for the Council for prioritizing trailing actions.**

Long-term Carryover

The GMT would like the Council to be aware that we have made progress on certain analyses we have had in mind for evaluating concerns about the carryover. These analyses may help the Council gauge the workload and analysis requirements involved in considering a long-term solution to the carryover program.

When concerns over the conservation performance of the IFQ carryover arose, we began exploring how we might evaluate the program quantitatively. In doing so, we've explored a few simple simulation models of the carryover program. The most recent version is structured to look at carryover over a five year period and 1,000 iterations. We can vary assumptions about how much quota pound (QP) is targeted for full use (and deficit harvest), and how much QP targeted for under-harvest and surplus carryover. Varying these assumptions and allowing for random variation in the levels of QP use allows examination of a number of scenarios. The simulations do not tell us which scenarios are most likely to happen in the fishery but they do allow some evaluation of what results we could expect under a specific scenarios.

The main results we looked at were annual overages, where QP used in the year is greater that the QP allocated for the year; and a multi-year average, where QP used over a multi-year period is greater than the sum of the QP allocated for each year in the period (i.e. cumulative average). A multi-year average approach has been discussed as one option for addressing concerns about the IFQ carryover program. As we have heard from the SSC, if cumulative catch over a multi-year period remains below the cumulative allocation for that period then biological objectives that were set at the beginning of the period are maintained.

In conducting the simulations over a limited number of scenarios, we noticed that annual overages were common. Some scenarios saw overages in three out of five years, even occurring three years in a row. At the same time, none of these annual overages resulted in a multi-year overage. Even in scenarios where annual overages occurred in 60 percent of the years, no year saw a cumulative overage. An example of one iteration from a simulation is shown in Table 1.

In exploring whether these results would hold across a wider range of scenarios, we concluded that the problem was much simpler. In brief, we expect cumulative overages will happen only when deficit outweighs surplus carryover and other under-harvest ("net deficit"). The basic reason this is true is because deficit borrows from the future allocations whereas surplus arises from under harvest of past allocations. Assuming deficit harvest remains within reasonable bounds, all QP must come from some year's allocation. Having explored this logic, we were then able to create simulation scenarios where cumulative overages did occur (Table 2).

Our read of these findings is that the carryover could be run, under a multi-year approach, with little inseason oversight. The red flag would be net deficit carryover years. **We can prepare formal analysis for review by the Scientific and Statistical Committee (SSC) early next year if the Council is interested.** The analysis is pretty straightforward.

Table 1. Example of a single simulation run where annual overages of the IFQ sector allocation occurs but no cumulative allocations are seen.

	Annual							*Cumulative*		
	Allocation	QP pool	QP used	+/- (%)	Surplus	Deficit	Net	Allocation	QP used	+/- (%)
2013	5,613.7	5,613.7	5,246.8	93.5%	355.6	0.1	355.5	--	--	--
2014	5,438.8	5,794.3	5,449.3	100.2%	255.3	0.1	255.1	11,052.5	10,696.1	96.8%
2015	4,023.4	4,278.5	4,046.2	100.6%	232.5	0.2	232.3	15,075.9	14,742.3	97.8%
2016	4,376.2	4,608.5	4,382.3	100.1%	226.3	0.0	226.3	19,452.1	19,124.6	98.3%
2017	4,822.8	5,049.1	4,831.4	100.2%	217.7	0.0	217.6	24,274.9	23,956.0	98.7%

Table 2. Example of a single simulation run where cumulative overages do occur because of net deficit carryovers.

	Annual							*Cumulative*		
	Allocation	QP pool	QP used	+/- (%)	Surplus	Deficit	Net	Allocation	QP used	+/- (%)
2013	5,613.7	5,613.7	5,667.6	101.0%	24.9	79.6	-54.7	--	--	--
2014	5,438.8	5,384.1	5,401.7	99.3%	29.3	57.1	-27.9	11,052.5	11,069.3	100.2%
2015	4,023.4	3,995.5	4,040.5	100.4%	26.7	71.6	-44.9	15,075.9	15,109.7	100.2%
2016	4,376.2	4,331.3	4,326.9	98.9%	71.3	66.9	4.4	19,452.1	19,436.6	99.9%
2017	4,822.8	4,827.2	4,861.5	100.8%	58.5	92.8	-34.3	24,274.9	24,298.1	100.1%

Pacific Whiting Carryover

On the Council's consideration of IFQ carryover for Pacific whiting, we would expect very similar dynamics as those discussed above in terms of the possible effects of surplus and deficit carryover for IFQ whiting. There are a couple of major differences, however.

First the treaty-level carryover provisions raise issues about allocations between U.S. and Canada and allocations between sectors here, as discussed in Agenda Item I.5.b, Supplemental Workshop Report. The GMT does not wish to comment on those dynamics.

The other difference is that whiting is assessed each year whereas the other stocks in the FMP are assessed less frequently. The stock assessment is a reset of sorts for carryover: any under- or over- harvest is factored into the updated estimates of stock biomass, the corresponding default TAC, and the forecasts of where the stock will be the next year under various catch scenarios. Those forecasts are what the Council, in advising the U.S. JMC members, and the JMC itself look to in weighing risk when setting the TAC. Allowing surplus carryover during an assessment year is another factor to consider in making that policy decision.

For instance, this year the JMC recommended total allowable catch (TAC) based on consideration of how much of the adjusted TAC might be harvested. The adjusted TAC was boosted from the unadjusted TAC based on fish not harvested in 2011. If a similar level of under harvest occurs in 2012, then actual harvest will be less. The JMC may have had a "target" harvest level in mind based on some judgment of where catch would fall between the adjusted and unadjusted TAC levels.[1]

Our point is that the risk/policy call posed by carryover when assessments are updated may look different than they do in years between assessments. This makes whiting IFQ carryover somewhat different given the annual assessment process. At the same time, the whiting TAC setting policy--whether by allowing IFQ carryover only or taking into account adjustments for surplus and deficit at the TAC level for all sectors--involves a consideration of how surplus and deficit harvest may affect harvest objectives.

[1] *See the JMC March 2012 meeting summary*: The JMC agreed to set a target catch of 230,000 mt, based on a decision table in the JTC report that projects a 50% chance (risk neutral) that at this level, the spawning biomass in 2013 would be greater than it is in 2012. http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Whiting-Management/upload/Mar-2012-JMC.pdf

NMFS SUMMARY OF ADAPTIVE MANAGEMENT PROGRAM

In June 2009, the Council recommended as part of Amendment 20 that NMFS establish the Adaptive Management Program (AMP). NMFS approved Amendment 20 and published the Program Components rule on December 15, 2010, which promulgated AMP in regulation (75 FR 78344), setting aside 10% of the non-whiting quota to achieve several purposes.

The purposes adopted by the Council and approved by NMFS were to give managers flexibility to use quota share to address the following objectives:

1) Community stability;
2) Processor stability;
3) Conservation;
4) Unintended/unforeseen consequences of IFQ management; or
5) Facilitating new entrants.

While the above purposes were identified in Amendment 20, specific implementation details were scheduled for a trailing action. Since January 2011, the resulting quota pounds (QP) from the AMP have been passed through to QS holders in proportion to their QS of each species.

The pass through, in current regulations, is set to expire at the end of 2014. NMFS believes the Council needs to incorporate planning for the AMP program, beginning now, in order to be able to implement provisions by January 1, 2015.

Given the conservation benefits experienced in the first two years of the trawl catch share program, NMFS suggests that the Council may want to focus their initial discussions on AMP implementation toward one or two of the remaining purposes: community/processor stability, and new entrants into the fishery. In particular, there is evidence that early attention to the issues faced by new entrants may be important to address concerns that have arisen in other catch share fisheries. A narrow focus may make the implementation process more achievable and yield positive results for the beginning of the program.

NMFS believes that the AMP was an innovative tool developed by the Council and that it is important that work on achieving its promise needs to begin now. NMFS is prepared to lead preliminary scoping on this issue in 2013. Although NMFS believes this program will evolve as the trawl rationalization program evolves, a narrow focus at the beginning of the program may be the most efficient way to begin and achieve an implementation date of January 1, 2015.

NOAA FISHERIES

This file contains the Powerpoint presentation with selected “screen shots” from the videos. Videos were not submitted electronically to the Council office. For information regarding the videos, please contact the presenter directly:

Mr. Colby Brady
National Marine Fisheries Service
Telephone: 206-526-6117
Colby.Brady@noaa.gov

Computational Vision-based Monitoring (CVM)

Current Agency Collaborative Research Efforts

NOAA FISHERIES

Northwest Region

November 6, 2012

Alaska Regional Office-SFD efforts

Pilot studies to test Archipelago Marine Research Electronic Monitoring (EM) data:

- Count halibut discard
- Obtain halibut lengths

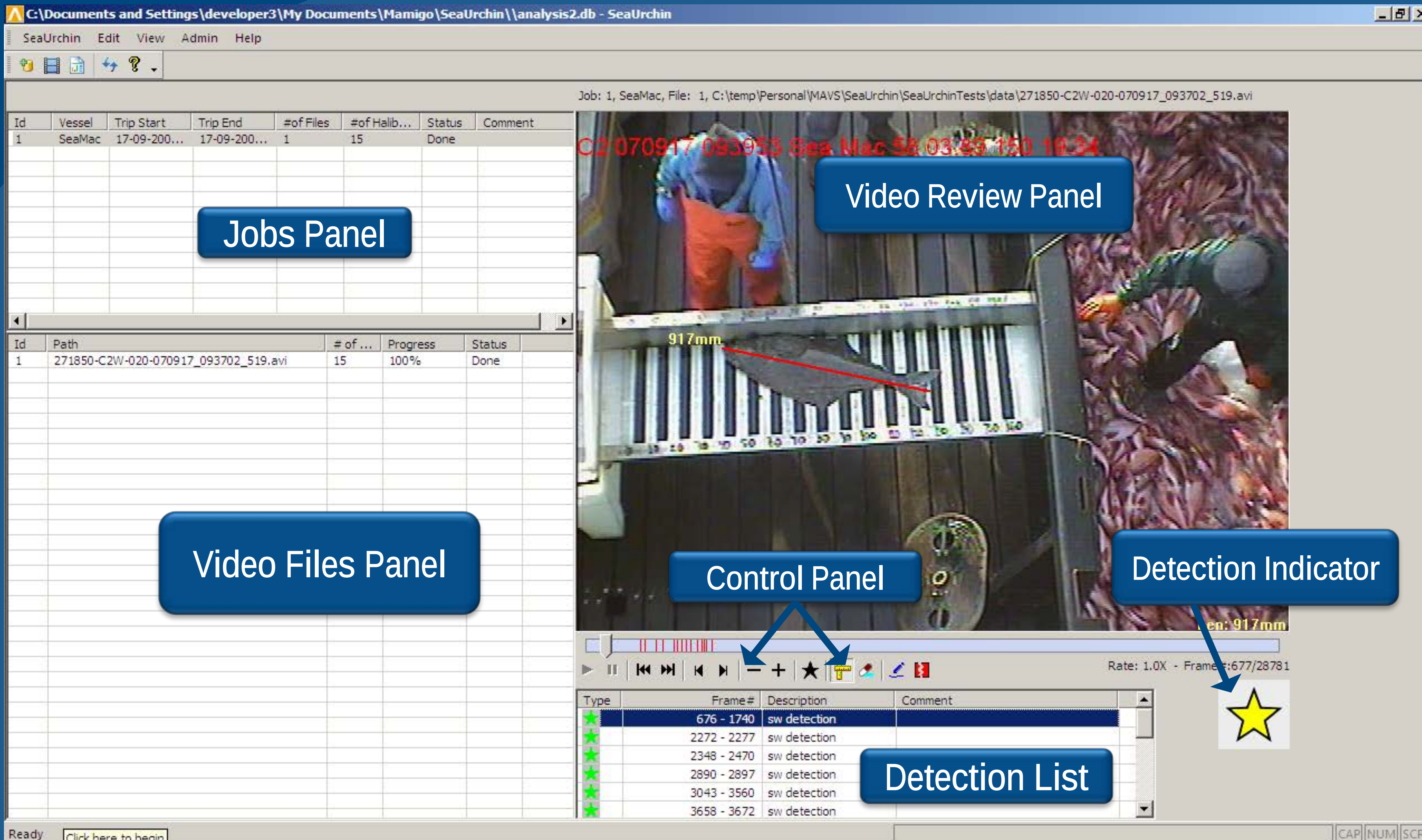
Studies showed:

- Successful using Archipelago EM data except-
- Not cost-effective
- Data not timely

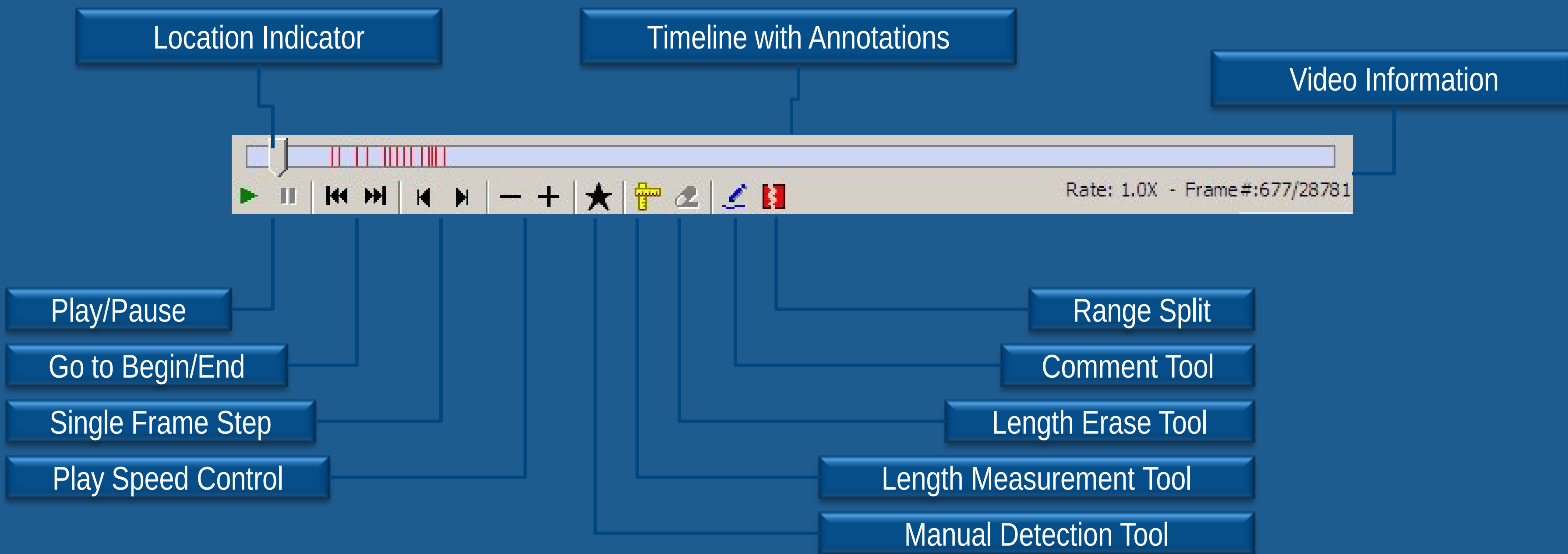
AK-SFD contracted Mamigo, Inc. to develop software:

- Count halibut discard
- Obtain halibut lengths
- Provide software analysis user interface

Graphic User Interface



Video Tool Bar

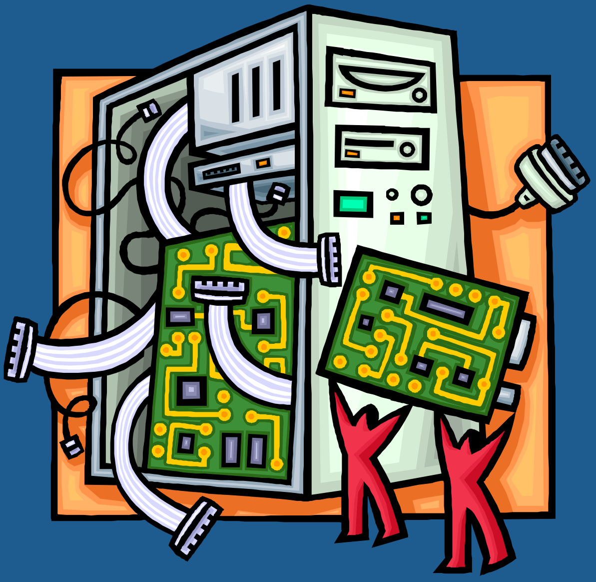


Extraction Result

Mamigo Recommendations

Frame Rate

- Replicate frame & add to video stream, “frame stuffing”
- Video rated at 8 fps, but actual below 4 fps
- Eliminate analog/digital conversion capture cards
- Improve processor type



AFSC Research Overview:

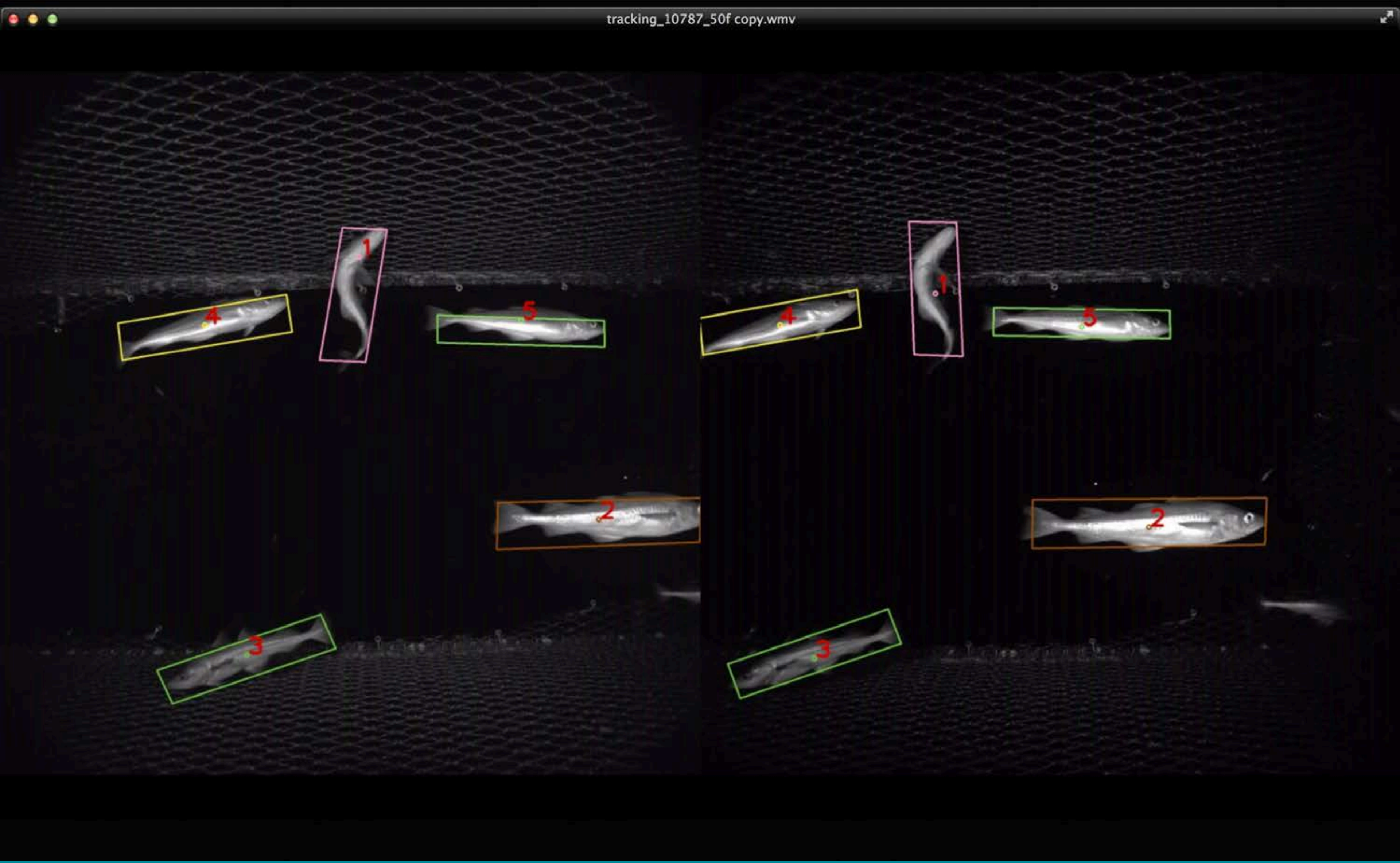
University of Washington
Paul G. Allen School of Electrical Engineering and Computer Science
Dr. Hwang,
Meng-Che Chuang (graduate student)

in collaboration with

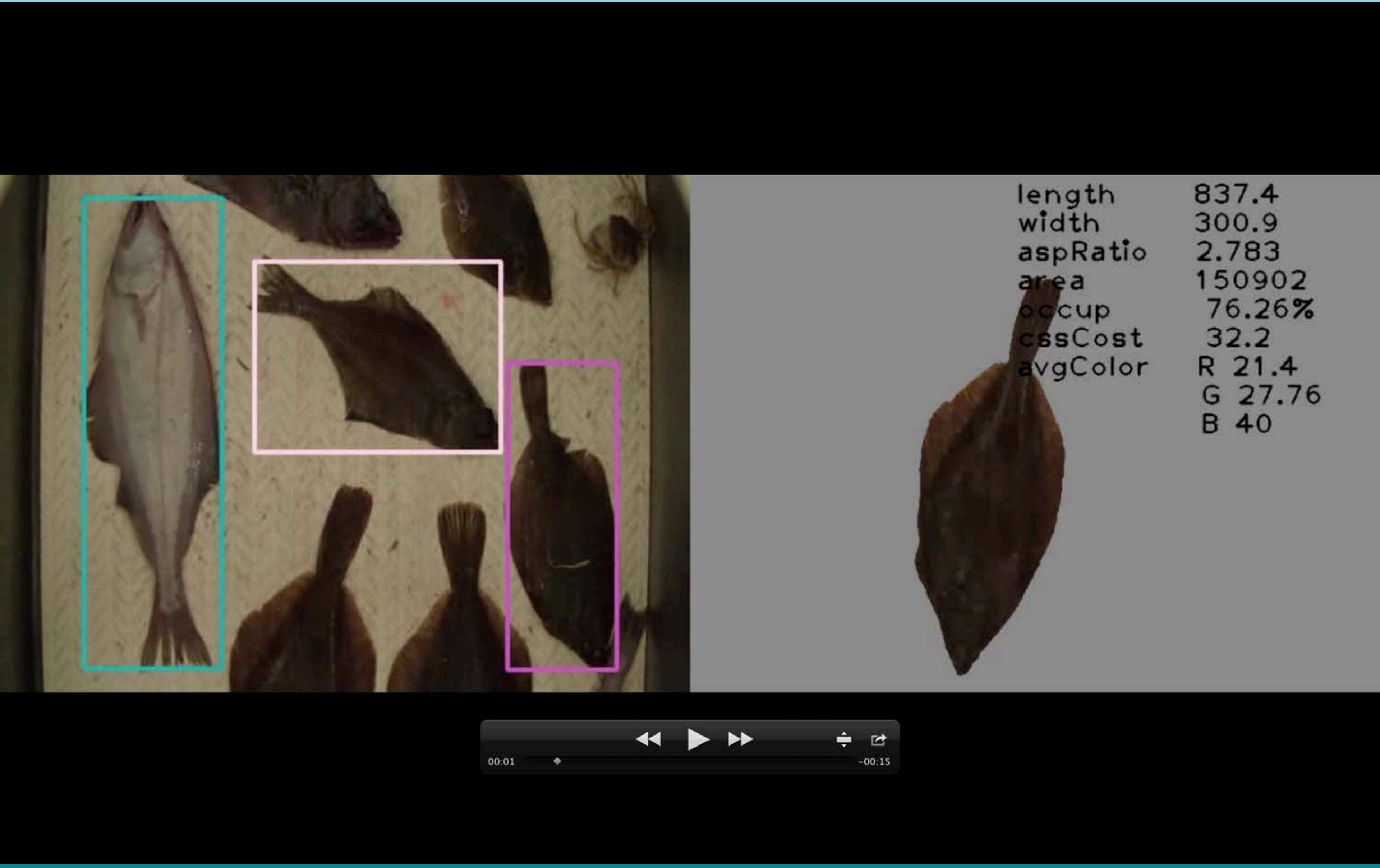
Alaska Fisheries Science Center
Kresimir Williams and Craig Rose

- Funded by a National Cooperative Research Program Conservation Engineering grant.

Tracking, length, & bounding box algorithms (underwater).



Tracking, length, & bounding box algorithms (conveyor belt)



NWR-SFD Research Collaborators

- General Vision Inc. & CogniMem Technologies Inc
  - Guy Paillet & Anne Menendez.
- University of Washington Paul G. Allen School of Electrical Engineering and Computer Science
  - Dr. Hwang, Meng-Che Chuang.
    - AFSC funded research from generosity of **Craig Rose, Kresimir Williams.**
  - Dr. Shapiro, Lynn Yang.
- Pacific Seafood, (Warrenton, Oregon plant)
  - Mike Okoniewski, Rick Harris, Mike Brown, Dominic Kohlasch.
- Oregon Department of Fish and Wildlife
  - Dan Erikson, Dave Douglas, Liz Hanwacker.

CogniMem Technology

- General Vision Inc.
  - Applied research arm of CogniMem image recognition chips.
  - Assisted Agency with EM computer vision “Discard Detection test” from Archipelago EM data.
  - Currently assisting Agency with development of “proof of concept” Computational Vision-based Monitoring units.
    - Shoreside unit in development with web-based data transmission strategy.
    - Vessel prototype in development.

CogniMem Technology

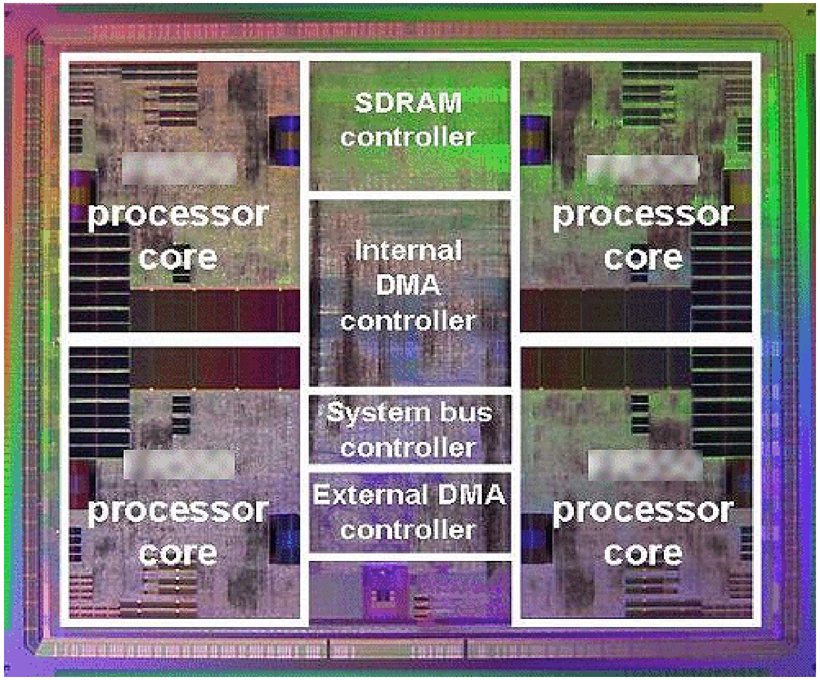
Modern CPU processors

- Memory bottleneck
- High power consumption

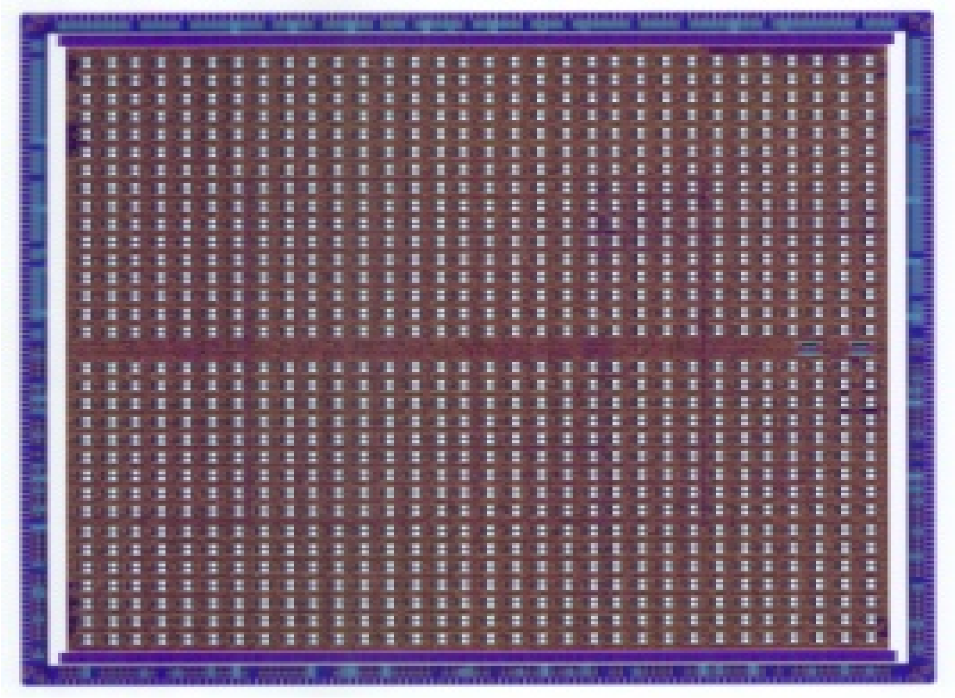
CM1K Image Recognition Chip

- Memory and processing logic combined in a same element
- Parallel architecture of identical elements
- Simple access to all elements connected in parallel

A multicore processor

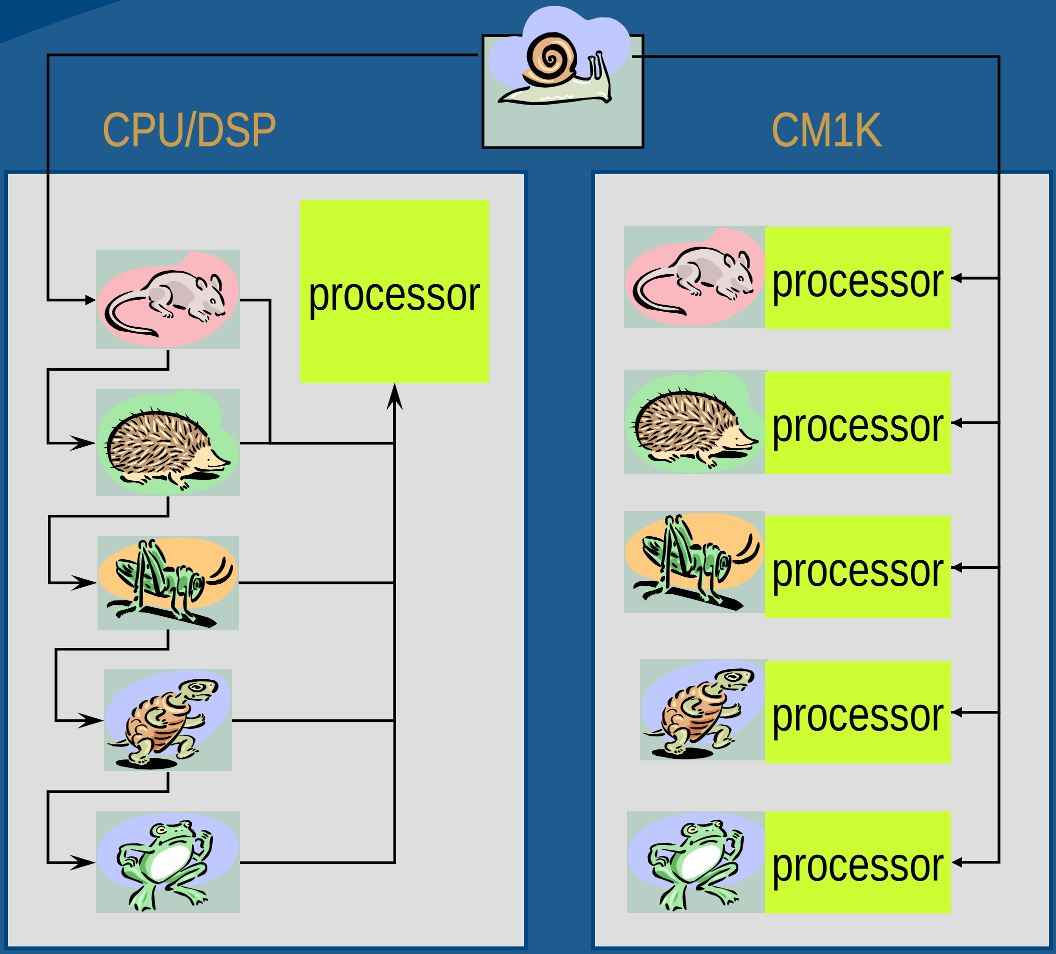


The CM1K pattern recognition chip with 1024 identical cognitive memories in parallel



CogniMem's Image recognition Chip (CM1K)

1 processor for <u>many</u> memory entries



1 processor for <u>each</u> memory entry

Much faster than normal CPU processor

CogniVision Training

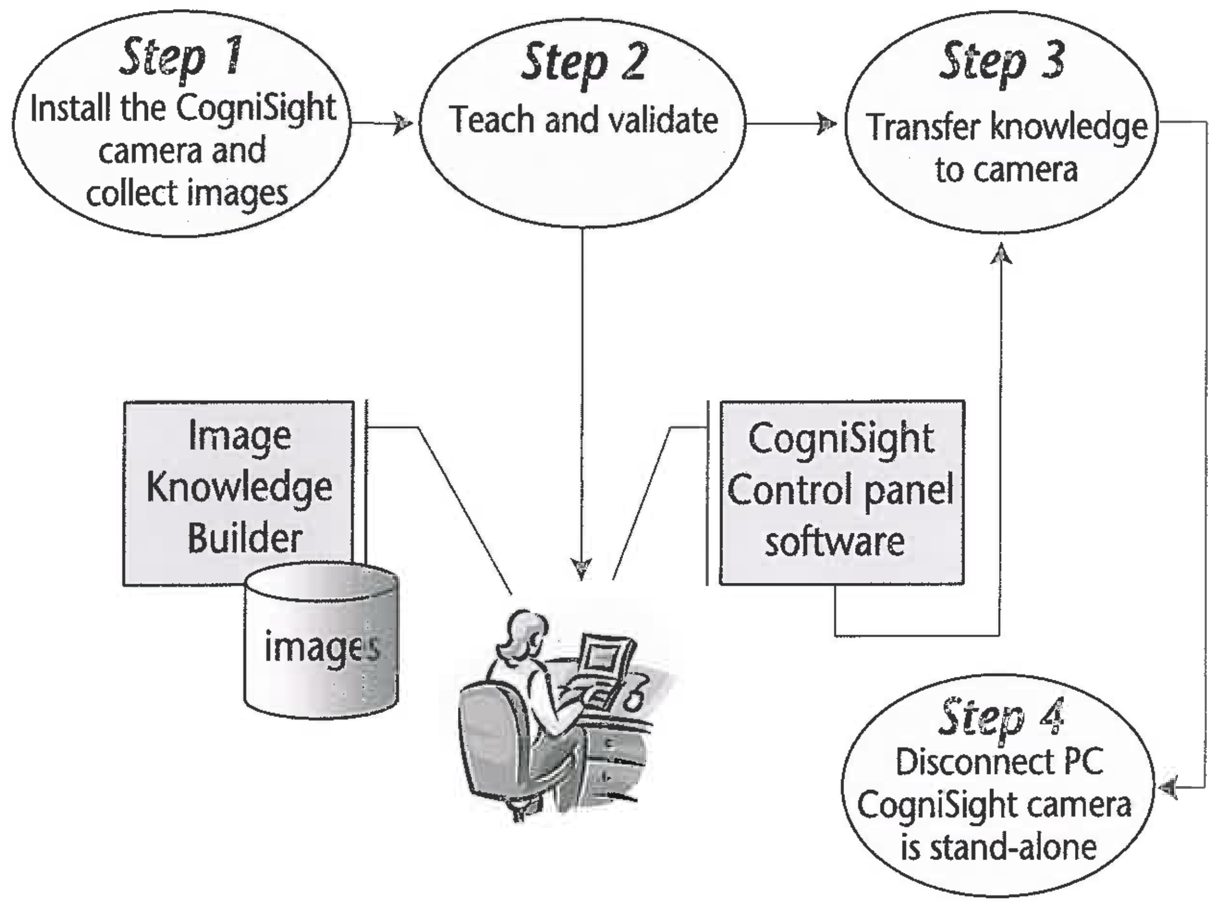
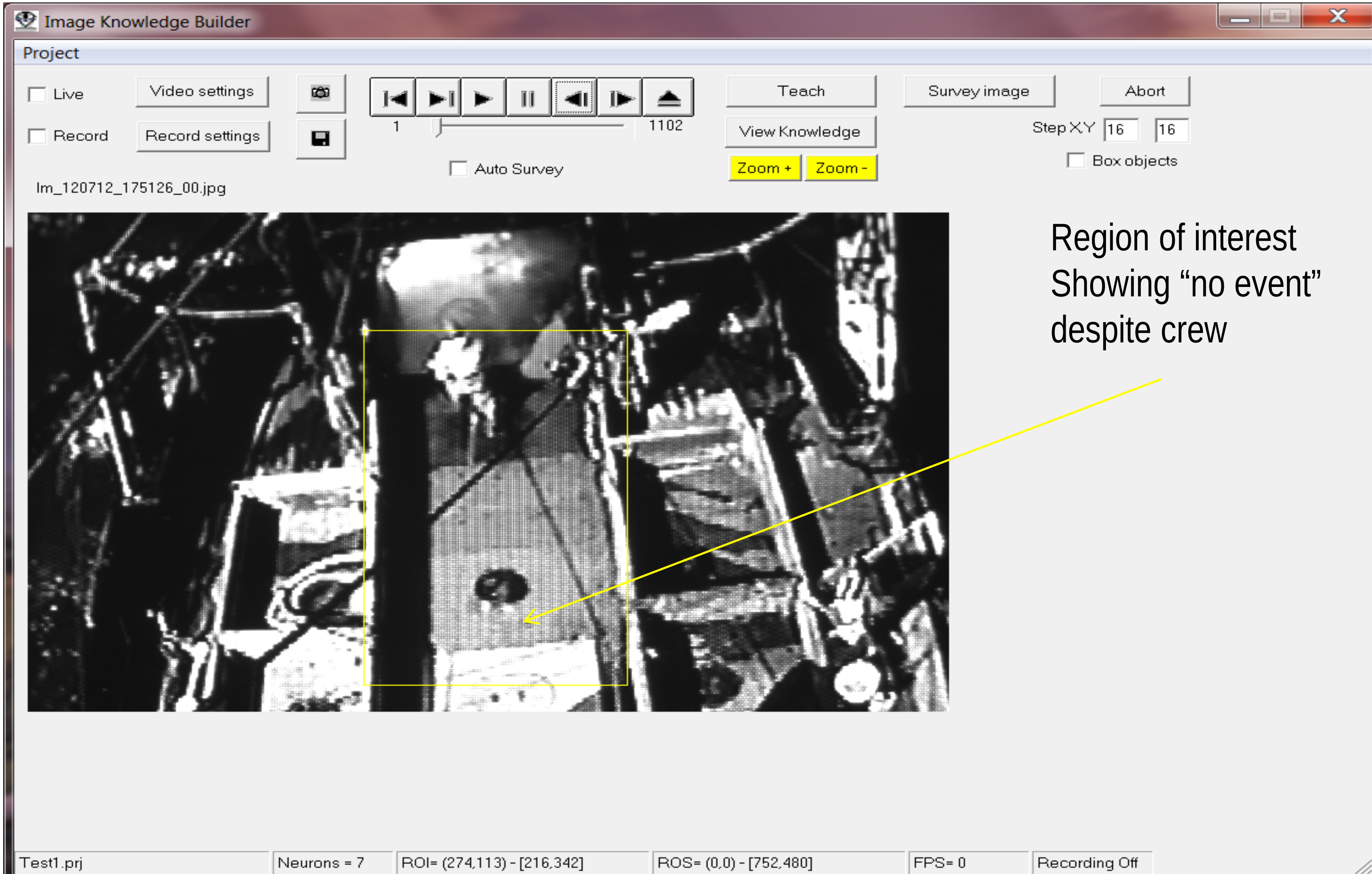


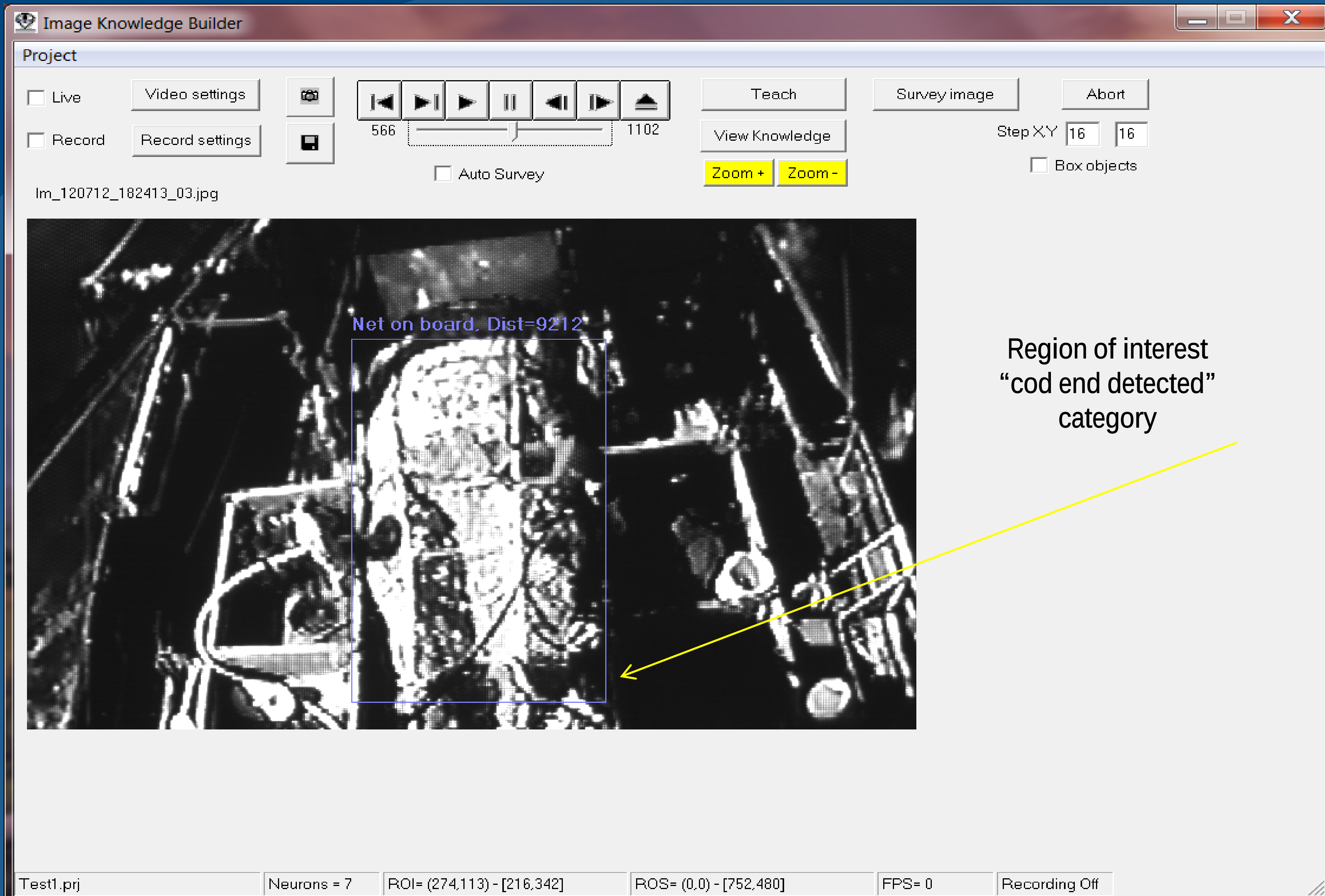
Figure 11. Methodology Flow Chart

CogniMem deployment (~60 N. Atlantic herring processors)

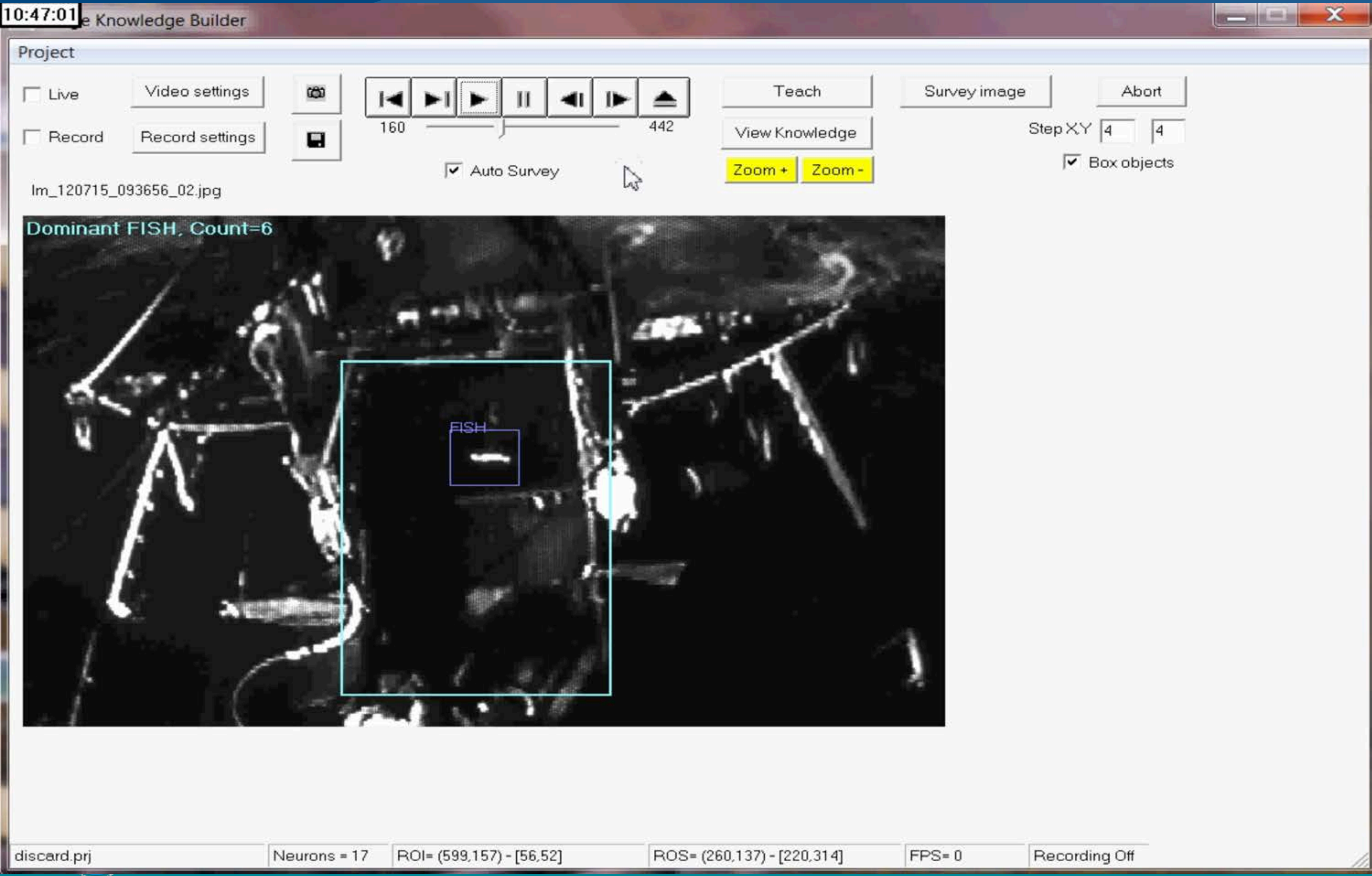
Image Knowledge Builder (IKB®) showing "no fishing event"



“Cod-end reaches ramp”



Discard Detection Test, General Vision Inc.



Discard Detection Test

- Lesson learned:
  - Software able to be trained to detect discard event imagery.
  - Improvements in EM Hardware needed for robust automatic detection of discard events:
    - Improved Frame rates needed.
    - Improved resolution needed.
    - Use of digital image sensors needed.
    - "Road blocks in artificial intelligence practicality result from the lack of appropriate hardware architecture," Guy Paillet, General Vision co-founder.

Traditional EM, Archipelago Marine Research Inc.

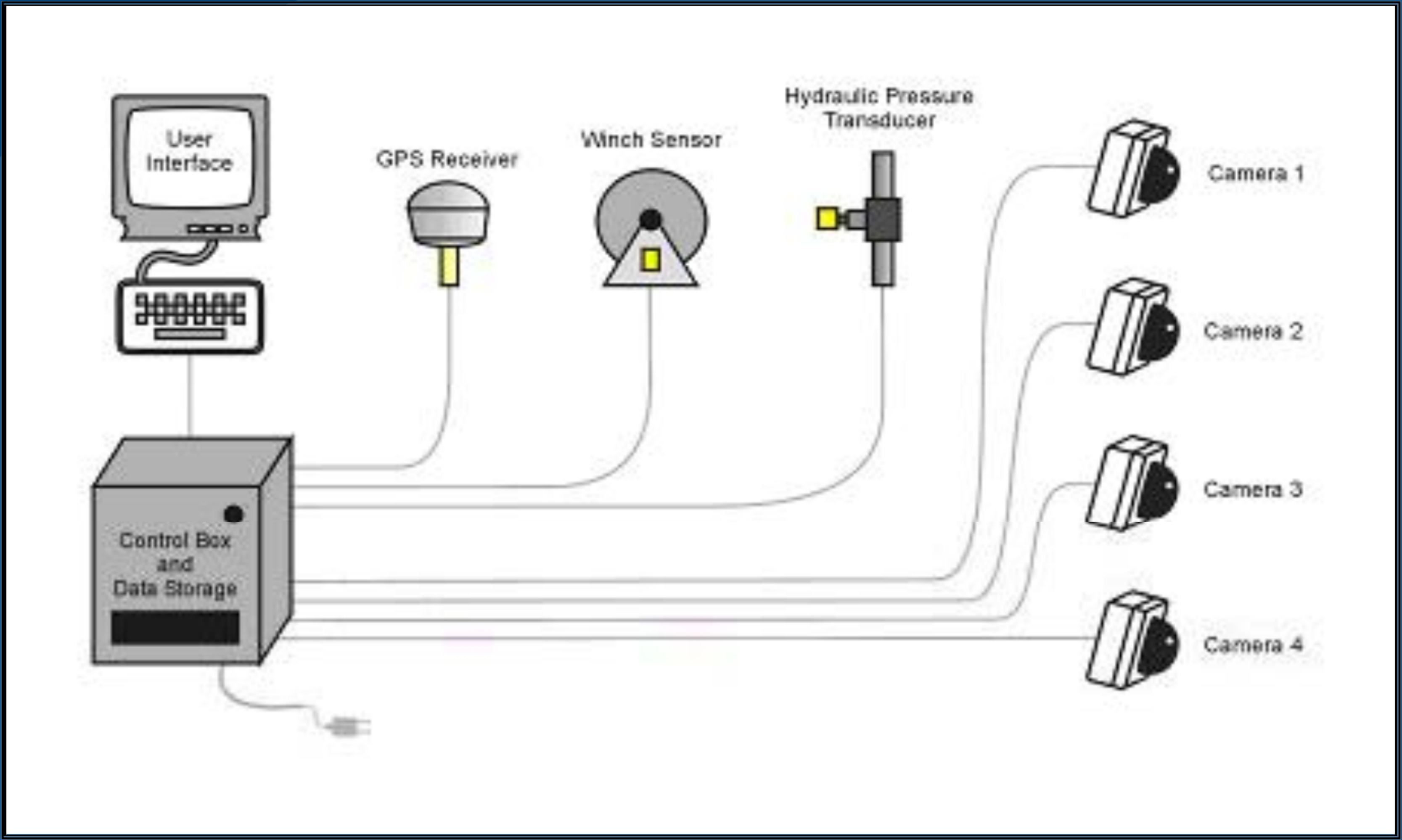
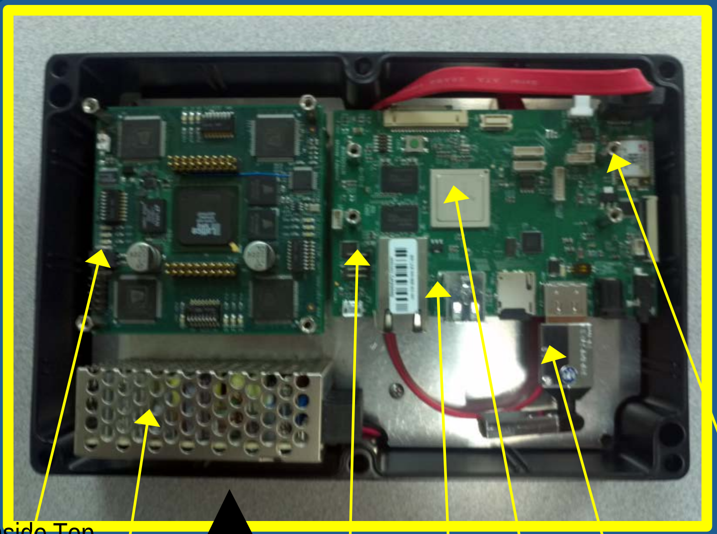


Figure 1. Schematic of V4 Electronic Monitoring system.

General Vision Inc., Vessel Prototype



Inside Top

Inside Bottom

Outside IP68

CogniBlox (2)
Real time
Cognitive Video

Power supply
24 Volts input

Gigabit
Ethernet

2 USB HS

HDMI
Output (test)

WiFi
Module
For Tablet
connection

512 GB SSD
(600 Mbytes/second)
SATA 2

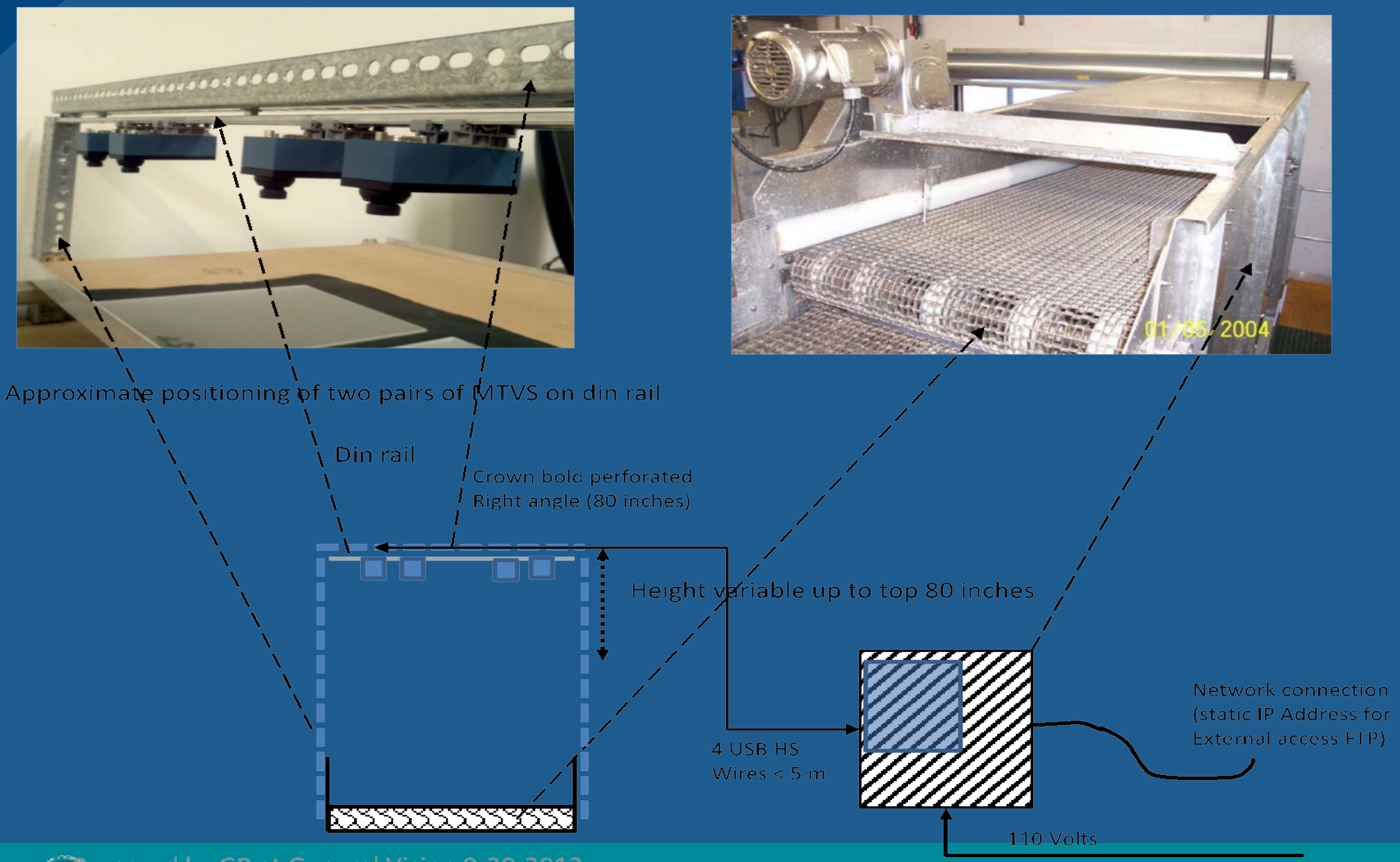
Dual Core
i.MX6XX ARM
Running Android

Interface up to 8 cameras
HD_SDI
1080p synchronized

General Vision Inc. & Pacific Seafoods

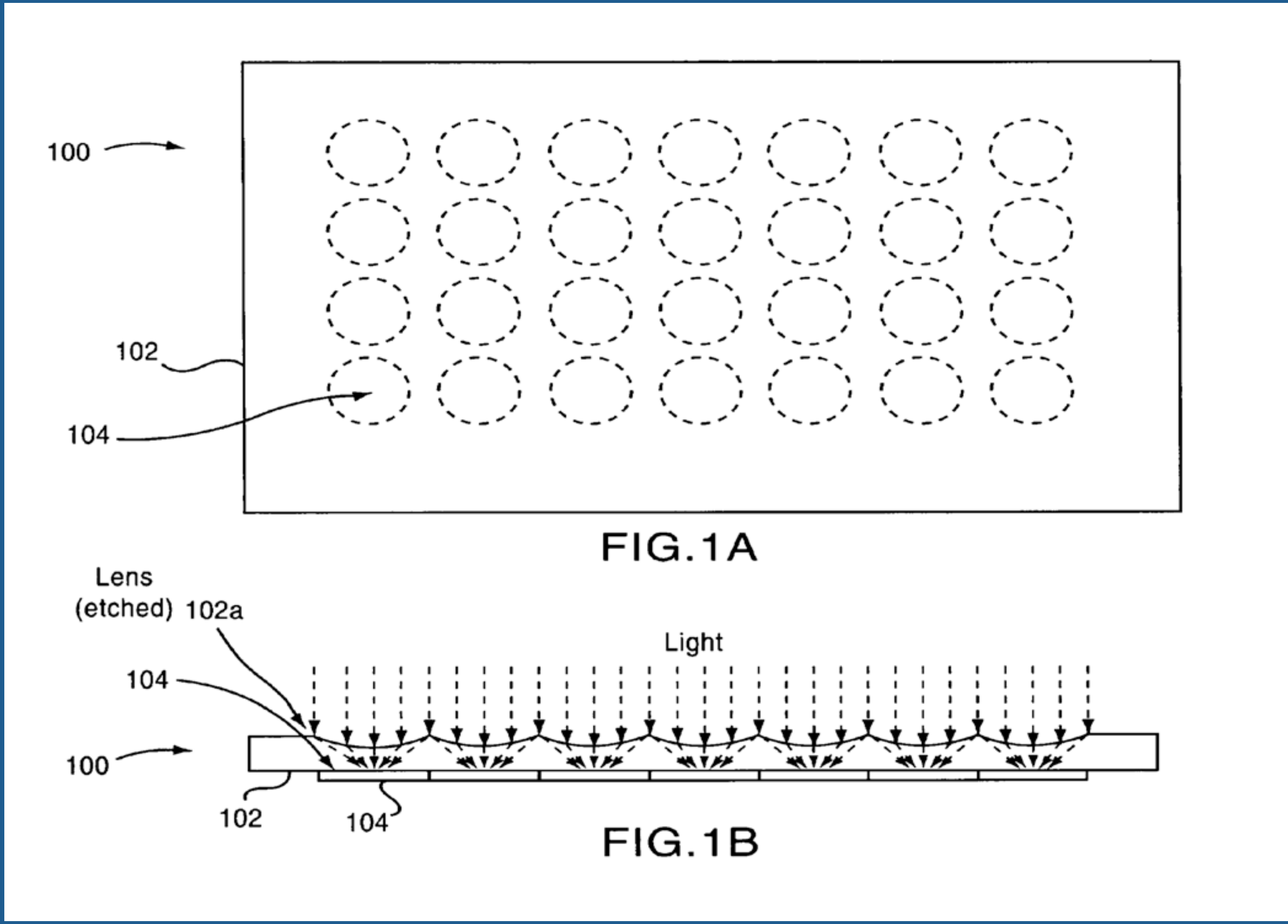
Shoreside Prototype Development

NOAA Pacific Coast Seafood installation data



Prepared by GP at General Vision 9-30-2012

Revised Installation Strategy: Intelli-Glass



NWR-SFD Research Goals

- Accurate Discard Event Data.
- Reduced review time.
- Low Monitoring Costs.
- Near Real Time Computational fisheries management.
  - Real Time management becomes more of a tangible possibility.
    - Vessel-Vessel on the grounds bycatch reduction.
- Speciation capabilities.
- Length and Volume 100% census of *all* catch and discards possible with continued development.

Agenda Item I.5.b
Supplemental PSMFC Report
November 2012

ELECTRONIC MONITORING UPDATE
Pacific States Marine Fisheries Commission (PSMFC)
October, 2012

I. Vessels with cameras:
  1) At-sea/shoreside whiting catcher vessels
     a. Currently 4 vessels with camera systems delivering shoreside & at-sea (6 at peak)
  2) Fixed gear boats
     a. 5 boats in Morro Bay/Half Moon Bay area
     b. Cameras were installed late August
     c. PSMFC created logbook for this fleet based on a Geoff Bettencourt logs
        i. Logbook will be paper based until we get closer to finalizing form at which point PSMFC will look for funding to make electronic
        ii. Expectation at this time is vessels will quit fishing early December
     d. All rockfish are retained for this fleet
  3) Groundfish trawlers
     a. Pacific Seafood Group has tentatively agreed to cameras on 11 trawlers
     b. PSMFC doesn't have funding to install these cameras or review video at this time
     c. Pacific has suggested full retention fishing except for fish they can't legally keep, fish that are too big to pump (6' sharks) and pots, logs, etc.

II. Funding:
  1) PSMFC expects to have funding to maintain current monitoring levels through the end of the year with respect to Archipelago Marine Research sub-contract tasks
     a. AMR is doing maintenance; sharing hard drive retrievals and video review
     b. PSMFC is/will be using AMR software to review video
  2) PSMFC has been working on securing additional funding

III. PSMFC staff:
  1) PSMFC has hired 1 video reviewer; Archipelago will help train
  2) PSMFC has moved a data analyst to Portland to compare video data to observer data
     a. Analyst has worked for a year doing WCGOP data support
     b. Analyst will be trained on video review process

IV. Data comparison between video & observer data
  1) We do not have observer data at this time; delays were primarily data sharing problems based on confidentiality; these issues have since been resolved
     a. Long term PSMFC will be drafting an MOU on data sharing w/NMFS
  2) PSMFC are capturing video data from 100% of the tows/hauls
  3) PSMFC will compare on haul by haul data against at-sea compliance monitor data
     a. Current plan is to compare video and observer data for 10%, 25% and 50% of hauls to help inform the decision on appropriate sampling rates
     b. PSMFC has help from statistician to model rare event occurences and how that might impact appropriate sampling effort
  4) PSMFC will be focusing primarily on discards relying on fish tickets to capture retained data

SUMMARY OF THE PACIFIC WHITING CARRYOVER WORKSHOP

A workshop was held on Friday, November 2 in Costa Mesa, California to discuss approaches for implementing the surplus carryover provisions for Pacific whiting in the shorebased individual fishing quota (IFQ) program (Agenda Item I.5.a, Attachment 8, November 2012). Council and National Marine Fisheries Service (NMFS) staff reviewed the Pacific whiting treaty process and timelines, Council role, and the carryover approaches (Agenda Item I.5.a, Supplemental Attachment 10). An additional implementation approach, Approach E, was included in Supplemental Attachment 10. The approaches discussed at the workshop are summarized on page 4 of this document, and a brief summary of individual input is described below.

During a review of the existing regulations, participants were reminded that the eligible surplus carryover in the shorebased IFQ program is calculated by multiplying the carryover percentage by the cumulative total of quota pounds (QP) (used and unused) in a vessel account for the base year, less any transfers out of the vessel account or any previous carryover amounts (see regulations at 660.140(e)(5)). Further, QP issued as a result of tribal reapportionment are not included in the calculation of eligible surplus carryover (see comment 15 in 77FR28497). NMFS further clarified that when QP are issued to vessel accounts as a result of tribal reapportionment, they are kept in a separate column from regularly-issued QP and are debited prior to the removal of non-tribal QP. However, if a vessel has already caught fish, when reapportionment happens, NMFS counts the QP from reapportionment against the fish already landed and credits the vessel back for previously-used, regularly-issued QP. The effect of this accounting is that in the event of a tribal reapportionment, fish already harvested from regularly-issued QP may again become eligible for surplus carryover after the fact, de facto making the tribal fish eligible for carryover. Participants raised significant concern over this policy decision since it could have consequences for the treaty process (in terms of the total allowable catch adjustment process) and inequities among the non-tribal sectors. Participants suggested that using "first in, first out" accounting would better accomplish the Agency policy of not allowing reapportioned fish to be eligible for surplus carryover.

Comments of the US Advisory Panel

Mr. Joe Bersch, co-chair of the Advisory Panel to the Pacific whiting treaty process, spoke on behalf of the US members of the Advisory Panel. Prior to the workshop, the US members of the Advisory Panel discussed the approaches outlined in Agenda Item I.5.a, Attachment 8 (excluding Approach E). The US members of the Advisory Panel recommended that the Council reject Approach A or any other adjusted total allowable catch (TAC) plus carryover mechanism for apportionment of the US TAC. The US members of the Advisory Panel encouraged the Council to take steps to encourage full utilization of the US TAC annually and ensure that the approach adopted is consistent with and encourages release of unused TAC consistent with the tribal reapportionment regulations. Draft minutes of the US Advisory Panel meeting are provided as Agenda Item I.5.b, Supplemental US Advisory Panel Draft Minutes.

Summary of Individual Input

Commenter 1: An individual that participates in both the shoreside and mothership sectors recommended the following approaches be removed from further consideration: Approach A: TAC Plus Carryover, Approach B: TAC Adjustment Funds Carryover, and Approach D: Tribal Reapportionment Funds Carryover. He recommended Approach E, which expands the carryover provisions to the at-sea sectors (catcher-processor and mothership). If the Council does not support expanding the carryover provision to all sectors, he would support Approach C, which would issue the shorebased IFQ program surplus carryover to vessel accounts from the shorebased IFQ allocation. If Approach C is not supported, he recommends analyzing the approach that would remove the surplus carryover provision for Pacific whiting (i.e., the 2012 approach). He was concerned, however, that removing the provision could result in a greater number of vessels fishing into deficit. He said this was of particular concern, given the lag in reporting from the West Coast Groundfish Observer Program. Further, he noted that the situation could result in the TAC being exceeded, and in the following years all sectors would be affected if the TAC were adjusted downward to account for the overage.

Commenter 2: An individual from the mothership and shoreside sectors recommended the following prioritization for analysis (highest priority to lowest):

1) Approach C: Issue from Shorebased IFQ Allocation
2) Approach E: Expand Carryover to At-sea Sectors
3) No surplus shorebased IFQ carryover for Pacific Whiting
4) Approach B: TAC Adjustment Funds Carryover
5) Approach D: Tribal Reapportionment Funds Carryover
6) Approach A: TAC Plus Carryover

He said he suspects many participants in the shorebased IFQ program may support the surplus carryover provision and Approach C appears to be the least complex. He was interested in exploring Approach E, yet acknowledged that expanding the carryover provision could increase complexity and may have tribal implications. He also believed that Approach B was overly complex.

Commenter 3: An individual spoke on behalf of the United Catcher Boats (UCB) organization. Prior to the workshop, the UCB Board of Directors met to discuss the approaches outlined in Agenda Item I.5.a, Attachment 8 (excludes Approach E). The UCB does not support the surplus carryover provision for Pacific whiting in the shorebased IFQ program, and therefore supports the 2012 approach.

Commenter 4: An individual representing owners of a permit with substantial shoreside IFQ and two mothership processors (whose owners also have shoreside IFQ interests) recommended the 2012 approach, where the surplus carryover in the shorebased IFQ program is not implemented. If the Council does not want to eliminate the carryover provision, he recommended that implementation be delayed until after the need for the surplus carryover provision for Pacific whiting in the shorebased IFQ program can be analyzed during the five year program review. If the Council wants to maintain the surplus carryover provision in the shorebased IFQ program, he thought Approach C, which funds the surplus carryover from the

IFQ allocation, would be most appropriate since it has the fewest implications to the other sectors. He did not support Approach A or any other approach that allocates amounts greater than the US TAC. He did not support Approach E, which expands the carryover provision to the at-sea sectors, because he was concerned that the approach was overly complex and has tribal implications that have not been adequately considered. The individual also recommended that the Council and NMFS have further discussions regarding how QP from tribal reapportionment are deducted from the shorebased IFQ vessel accounts. He recommended further analysis and discussion regarding how such accounting impacts the amount of eligible surplus carryover in the shorebased IFQ program.

Commenter 5: A representative of the Pacific Whiting Conservation Cooperative supported the comments of Commenter 4. He recommended the 2012 approach where the surplus carryover in the shorebased IFQ program is not implemented. He also recommended that if the Council wants to maintain the surplus carryover provision in the shorebased IFQ program, then Approach C, which funds the surplus carryover from the IFQ allocation, would be most appropriate since it has the fewest implications to the Treaty process, tribal fishery, and the at-sea sectors. He also expressed concern about the ability to implement any approach in 2013, because of the complex dynamics inherent in the approaches. It was not clear to him if previous analyses fully analyzed the interplay between whiting surplus carryover and the Treaty process, as well as potential effects on the tribal whiting fishery and the at-sea whiting sectors. He agreed with the US Advisory Panel that promoting full utilization of the annual whiting TAC should be a high priority. Finally, he also recommends revisiting the accounting procedures used by NMFS when tribal fish are reapportioned to the shorebased IFQ program, that is, further discussion on the "last in, first out" approach reportedly used by NMFS. On this issue, he agreed with the concerns raised by Commenter 4.

Commenter 6: An individual representing shoreside Pacific whiting processors supported the US Advisory Panel recommendation to remove the surplus carryover provision in the shorebased IFQ program. He also recommended the elimination of all IFQ carryover and reliance on market trading to fully utilize the QP allocations. Finally, he recommended full utilization of the annual TAC.

Alternatives Supported by Individuals at the Workshop

No Surplus IFQ Carryover – the 2012 approach

1. Adopt the adjusted Pacific whiting total allowable catch (TAC) (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors: catcher-processor (CP) (34%), IFQ (42%), MS (24%)
4. Shorebased IFQ carryover is not issued

Approach C – Shorebased IFQ Allocation Funds Carryover

1. Adopt the <u>adjusted</u> TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Issue surplus carryover to vessel accounts from the IFQ allocation
5. Issue the remainder of the IFQ allocation to QS accounts

Approach E – Expand Carryover to At-Sea Sectors

1. Adopt the <u>adjusted</u> TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.), resulting value is commercial harvest guideline
3. Set aside the sector's contributions or deficits from the previous year (in the case of an overage it will be a deficit deducted from the results of step 4)
4. Allocate any remainder to sectors: CP (34%) + amounts from Step 3, IFQ (42%), MS (24%) + amounts from Step 3
5. From Step 3: Issue surplus carryover to vessel accounts from the IFQ allocation
6. From Step 4: Issue the remainder of the IFQ allocation to QS accounts

Alternatives Not Supported by Individuals at the Workshop

Approach A – TAC Plus Carryover

1. Adopt the adjusted TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.) ; resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. Issue surplus IFQ carryover to vessel accounts from the previous years vessel account underage
5. This amount is in addition to the TAC, thus the total allocations are greater than the TAC

Approach B – TAC Adjustment Funds Carryover

1. Adopt the <u>unadjusted</u> TAC
2. Remove set-asides (tribal, research, etc.) ; resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)

4. Issue surplus IFQ carryover to vessel accounts from the TAC carryover
5. If there is any remainder from the TAC adjustment, allocate to sectors CP (34%), IFQ (42%), MS (24%)

Approach D – Tribal Reapportionment Funds Carryover

1. Adopt the adjusted TAC (includes additions or deductions per the treaty)
2. Remove set-asides (tribal, research, etc.); resulting value is the commercial harvest guideline
3. Allocate to sectors CP (34%), IFQ (42%), MS (24%)
4. If tribal whiting is reapportioned in the fall: Issue surplus carryover to vessel accounts, allocate the remainder to sectors CP (34%), IFQ (42%), MS (24%)

Attendee List

Ms. Kelly Ames, Council Staff
Mr. Joe Bersch, Phoenix Processor LP, Co-Chair Pacific Whiting Advisory Panel
Mr. Richard Carroll, Ocean Gold Seafoods, Pacific Whiting Advisory Panel
Mr. Mark Cooper, Trawler
Mr. Kevin Duffy, National Marine Fisheries Service, Northwest Region
Mr. Dan Erickson, Oregon Department of Fish and Wildlife
Ms. Jamie Goen, National Marine Fisheries Service, Northwest Region
Mr. Dale Meyer, Arctic Storm Management Group
Mr. Corey Niles, Washington Department of Fish and Wildlife
Mr. Brad Pettinger, Oregon Trawl Commission
Mr. Jim Seger, Council Staff
Mr. Dan Waldeck, Pacific Whiting Conservation Cooperative

PFMC
11/04/12

October 2012

Oregon Coast Bank

To: Mr. Dan Wolford
Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Re: Trawl Rationalization: Lenders

Dear Chairman Wolford,

It is my intention to provide a view from the lenders perspective of the commercial fishing industry. Oregon Coast Bank (OCB) is a small state chartered community bank founded 10 years ago in Newport, Oregon. Since that time OCB has financed vessels in salmon trolling from Oregon to Hawaii, crabbers along the Pacific coast to the Bering Sea, and trawl fisheries from Oregon to the Gulf of Alaska. We have sponsoned and lengthened boats, helped our fishermen buy boats coming out of the Gulf of Mexico and financed nets, pots, electronics, freezing/cooling systems and other equipment necessary to fish in the waters of the Pacific Ocean. Besides vessel purchases and modifications we supply operating lines of credit, finance insurance premiums, fishing permits and quota shares. We usually have about $10 million and between 50 and 60 vessels in our loan portfolio. In the ten years of Oregon Coast Bank's existence we have repossessed exactly one vessel.

During much of these past ten years we have been in a kind of 'sweet spot' with an abundance of collateral for most of these loans. Many of our fishermen are older with significant equity in their vessels and their quota shares and permits and, even if we were unsure if it were possible to secure a perfected lien, only serve to add to an already significant pile of collateral.

In years past we would see a fisherman with a boat survey showing a 'replacement value' of $1 million and a 'market value' of $500,000 plus $200,000 in trawl quota. For many of our fishermen the quota was awarded without cost based on their years of fishing history. If that fisherman were asking for anything less than $400,000 we were in the game. That is so because banks evaluate lending opportunities based on investment risk of the bank's capital; the greater the risk, the tighter the loan underwriting requirements, and the larger the required owner's capital contribution.

Below is an actual vessel collateralized at OCB. Current loan size is based at 70% loan to Value (LTV) of collateral. Inability to effectively collateralize would lead to loans in the 50% LTV range or lower. The chart shows both a 70% LTV minimum owner investment and a 50% LTV owner investment.

	Before; IFQ	After; IFQ
Survey dates	Nov-05	Jun-11
Vessel replacement value	$ 925,000	$ 1,500,000
Vessel market value	$ 525,000	$ 780,000
trawl quota value	$ 50,000	$ 500,000
Acceptable loan size 70%	$ 402,500	$ 896,000
Owner investment 30%	$ 172,500	$ 384,000
Acceptable loan size 50%	$ 287,500	$ 640,000
Owner investment 50%	$ 287,500	$ 640,000

*note: Farm Credit is already at 50% LTV

One of our principal concerns, which the above chart shows, is that the current crop of fishermen will be replaced by younger fishermen with fewer of the advantages enjoyed by the earlier group. In that future a typical fisherman may be buying that same boat now with a market value that has increased from $525K to $780K (the last several years have had higher landings and better pricing) and will need to purchase a quota now costing $500,000 (because of the IFQ program) or more. His capital investment will have doubled and he will be carrying close to 7 figures in debt to service. Loan risk has nearly tripled and the permit/quota collateral is now extremely important. (Note: Even the vessel's value is based on the assumption that it has access to permits and, if that is not the case, the survey value of the vessel will be diminished.)

In many ways the rules of bank financing are simple -- The liquidation value of the assets has to be able to cover all the debt and related repo and sales expenses. If there is no ability to absolutely count on obtaining all of a vessel's permits and quotas the smaller family fishing families are going to feel the squeeze. The strength of the lien is the deciding factor. Please see Addendum 1.

Another of the tenets of banking says that multiple sources of income are better than a single source of income. So, in a bank's eyes, a fisherman participating in multiple fisheries is superior to one dependent on a single fishery and a fishing family (or corporation) with multiple boats and permits will have less risk to an investing bank. For the small fishing families to stay in the business, they cannot afford to be short changed in the measurement of collateral and the resultant access to capital.

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Banks already take on significant amounts of risk lending on these permits when they attempt to determine the market value of the collateral. That market value can ebb and flow depending on the quantity and quality of the product and the current market value of the catch. Still, banks are used to doing this with nearly every type of loan collateral in their portfolio. However, it adds unacceptable levels of risk if the bank has to also wonder if they have a legally perfected lien and, in the event of borrower default, will be granted access to their collateral and be able to use it (rent or lease) in the short term before eventual sale of the vessel and permit (IFQ). **Eliminating lien perfection doubts is a necessary step in assuring that lenders can accurately value all of the collateral as supporting their loans and will, ultimately, result in cheaper more accessible credit for a wider range of fishermen.**

If it is a concern that banks may try to own and hold a large share of the quota you can be assured that banks are legally unable to do this. (See; Comptroller of the Currency circular on "Activities Permissible for a National Bank") State and Federal chartered banks have regulations that dictate what type of business they can operate. The current list consists mostly of financially based businesses (i.e. insurance, title & escrow, credit card processing).

To follow that thread a little further we can compare commercial fishing with commercial real estate. Outright ownership of either is not permitted in bank law or regulation. (Bank occupied real estate, such as a branch, is an exception). Banks are allowed to own real estate through foreclosure or a deed-in-lieu-of negotiation but there is an unspecified timeline in which a bank has to sell the foreclosed properties. In that period a bank may let it sit, rent it, or lease the asset to help offset its holding expense. The bank is required to show that it is actively marketing the property or explain to bank examiners the lack of progress in disposing of the property. **Having time to dispose of the properties in an orderly manner lowers the risk of loss to the bank and the unspecified timeline prevents the bank from being forced to sell the assets at a deeply discounted rate and thus harming the market.**

Additionally, these options make it possible for the bank to perhaps design a loan where the permit is leased to a young borrower for a period allowing him/her to save up funds or work off the down payment. In a case like this, a term loan could then be made finalizing the purchase and introducing the next generation of fishermen into the market.

If your desire is to have an industry that can flourish because it has multiple lending options then please give the financial institutions the tools and latitude to make it possible.

Sincerely,

Fred Postlewait
CEO/President

Jake Postlewait
AVP

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Addendum 1
Lien Descriptions

Below is a list of types of liens. The first is a Real Estate Deed of Trust, although not applicable for fishing vessel loans, it is the strongest of liens and is a good example of a strong collateral lien.

Liens #2 and #3 are vessel liens, #2 is the Preferred Ship Mortgage, the most common of FV liens. #3 is for non-documented vessels that do not go through the Coast Guard. The vessel is titled, and the financial institution (FI) has possession of the title.

Lien #4 (Uniform Commercial Code or UCC) is the weakest of the liens. UCC's are used on both FV loans and permit loans. FV loans and permit loans will have a PSM which is the FI's primary lien. The UCC although flawed, strengthens the lien overall using the standard rule of 2 is better than 1.

IFQ or Fishing Permit loans, because there is no lien registry or entity that is willing to take responsibility guaranteeing lien position, often have both a PSM and a UCC with the only goal of drawing an inquiry from another lender wanting to know about the lien. OCB has been fortunate to work with ODFW for the past 10 years where the bank provided a list of liens involving Oregon shrimp, crab, and salmon permits. Although there is no formal agreement ODFW checks the OCB lien list before transferring permits. ODFW, on a few occasions, has stopped has permit transfer.

1. Real Estate Deeds of Trust (not applicable to FV loans)
    a. The strongest of liens
        i. The entire deal can be escrowed with an additional title policy (insurance) coving both the buyer & lender.
        ii. You can pull a preliminary title report (research liens)
            1. Shows taxes owed, IRS liens, or other potential liens
            2. Title policies insure your lien position doesn't change.
                a. Excluding tax liens that take priority

2. Coast Guard Preferred Ships Mortgages (PSM)
    a. Can order a prelim by way of an Abstract in Title
    b. No insurance that your lien is in 1st place throughout the loan
    c. Liens can go in front of the PSM
        i. This can eat away at the liquidation value's ability to cover debt and related expenses.
            1. Maritime lien priority list;
                a. Liens for seamen's wages, maintenance and cure. (lien expires after 6 months)
                b. Salvage and general average liens(ship wreck salvage or tow; 2 year statute of limitations)

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c. Tort (personal injury, death, and property damage from collision: 3 year statute of limitations)
d. Trade (before PSM in time; someone who performs a craftsmen trade on the boat, ie; electrician or marine carpenter)
e. PSM
f. Trade (after PSM in time)
g. State-created liens of a maritime nature
h. Liens for penalties and forfeitures under federal law
i. Preferred non-maritime liens including tax liens
j. Attachment liens (garnishment)
k. Maritime liens in bankruptcy

3. Oregon Marine Board: Titled Vessel
    a. Vessels come with a title much like automobile
        i. Designed for smaller vessels or built outside the USA
    b. FI possess the title
4. Uniform Commercial Code (UCC's)
    a. Meant for non-titled equipment
    b. Filed with the state
        i. Flawed research system.
        ii. There is nothing that stops a transaction (sale).
        iii. You have to go to court to get the collateral back, causing additional expense requiring a larger margin in LTV.

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9/18/2012

To Whom It May Concern;

For the second time in the last three weeks I have been forced to miss valuable fish days, during calm weather as a result of “glitches” in the IFQ vessel catch accounting system. At this very moment that I compose this letter I am rolling my guts out in the trough as I head off shore to fish in an up to 25 knot forecast of winds out of the northwest. Yesterday was flat calm, however I could not take advantage of the better weather because my vessel account was in deficit over a few pounds of overfished species. This being fish I had not even caught. Unfortunately I didn’t discover this until 1:30 am and my deck hand and observer had already driven long distances to be there ready to go. Of course there is no one available to speak with regarding any problems during my business hours. As a result I lost out on a market opportunity for an order of sand dabs, an underutilized species I target with our Scottish seine gear. The lone Scottish seiner participating in west coast IFQ, not to mention the only boat with this gear type in the country. The reason that this is relevant to the issue at hand is that now I have to wrestle stronger winds and current as I fish near the RCA. In my area the fish I target, primarily sand dabs, chilipepper, petrale, and English sole prefer to be right on the edge of the shelf between 80 and 100 fathoms or deeper. Due to nature of how my gear works, when it is blowing northwest I am driven to a point near the line upon completion of my set. Once the process of my haul back begins I am at the mercy of Mother Nature and if she had her way I would be blown into the RCA every time during the period of transferring the net/fish from the ocean surface to the boat. In order to counter this phenomenon I am forced to take action through dangerous steering maneuvers that put me, my crew and my observer at risk but I have no choice. I am not allowed to be on the wrong side of that line. There have been occasions where I was simply overwhelmed by the elements that resulted in me finishing my side haul well into the RCA. Sure enough I received calls from the OLE. This is the source of an intense nightmare for me and the bottom line is that yesterday would have been a better day. I will note that to this point in my own personal experience OLE has treated me fairly by keeping an open mind allowing me my explanations. I would also say that all other personnel involved in helping implement IFQ that I have developed phone relationships with over the last two years have been as helpful as possible when available.

Please allow me to try to explain the two incidents that have resulted in missed fish days, both for being in deficit over fish I did not catch.

In the first incident I noticed that I was in the red over 21 pounds of cow cod. “What the …..?” So I immediately called my observer for an explanation. Right away he agreed that there must be an error and that he would look into it and call me back. This was on a Saturday and I wanted to fish on Monday (again no one for me to talk to during non business hours). After a half hour my observer called me back with an explanation that he incorrectly put a code number on his work sheet that caused the computer to extrapolate the .5 lb. cowcod I did catch and spit it out that I had caught 21 lbs. This wound up being reported as observed discard. He said that he did talk to his de-briefer and the way that it was relayed to me by my observer was that it would be taken care of and it was ok to go fishing. So I went fishing. During my second set I got a call from our regional enforcement agent and he informed me that it appeared as though I was out fishing while my vessel account was in deficit. I explained to him what I knew at that point about the situation. He said that there would be an investigation and if what I was saying was true that it would get taken care of and that there shouldn't be a problem. He did make it very clear to me that by no means does anyone leave port with an account in deficit unless there is direct clearance from OLE. As I said before I thought it was taken care of. Though the conversation was not threatening in any way, inevitably words like fishing in deficit, non compliant, and fines were words that were spoken in that conversation. It left me pretty rattled. We spoke again on Tuesday and he assured me that my story had been verified but it would take until Friday morning for the computer to upload the correction so I would have to stay put until then. I sincerely believe he felt my pain. Ultimately he contacted me on Wednesday to let me know he had made some calls and gotten me cleared to go fishing. I appreciated that but by this time the damage had been done. I had lost a fish day and valuable sleep over the whole thing. Later that evening I had a phone conversation with Pete Leipzig, Director of the Fisherman's Marketing Association about the incident. He assured me that he could cite many examples of other fisherman who had experienced a similar situation. I have to say that at that point I felt disgusted to realize that there are no overriding provisions in place to immediately correct these problems when they arise. Personally I feel it is urgent that fisherman have the ability to speak to someone with authority outside of government business hours.

The next incident involved submitting a delivery when the computer system was experiencing a seven hour down period. As result of this my trip, unbeknownst to me, was not properly submitted in a timely fashion. I confirmed its export date through the e-tix program at the time of submission and assumed that it would go through my account at midnight as per usual. Then I went fishing for two days. When I returned and checked my vessel account Monday morning I noticed that my previous trip was not showing up. Instantly frantic assuming I had made another bad move I called various NOAA personnel wondering what had happened. They all said "we'll look into it and get back to you." By late that afternoon I had received multiple calls from NOAA personnel explaining the error and I was assured it had been taken care of. So I told my deck hand and observer (at my expense) to be ready to go at 1:30 in the morning. Right before I left the house I decided it would be prudent to make sure everything was kosher in my vessel account. The red numbers popped out at me like missiles. It turns out that in the course of correcting the error my account had been double debited. I am not the only fisherman that this happened to. This caused a deficit because of a few pounds of OFS I had caught during the trip in question. I had to call the guys and tell them to go home while I could only roll over in bed and stew about the situation. Had I not checked my account and gone fishing in deficit maybe I would have been slapped with a fine for my negligence being a two time offender in the last three weeks. I don't know. I realize there are always going to be bugs when implementing a new system. Obviously these are issues that need to be addressed. I can only speak for our operation but given the 20 column spread sheet, each column representing another hand in the till and the crazy cost of doing business there is not a whole lot if any left over at the end of the day. We cannot afford to miss days over computer errors when the time and weather is right to go fishing. I find it ironic that as fisherman we are held accountable to the highest possible standards but after five and half months of fishing this year not one pound of observer discard had shown up in my vessel account. As my irritation over this increased and I started badgering personnel for an explanation all I got was a “sorry, troubles with the system, we’re working on it.”

While numerous components of IFQ have clearly been beneficial, many stifling requirements exist that negatively affect our fishing business, to the point of exhaustion every day. Every move we make from the time we throw the lines until we land our last pound of fish is accounted for. But in the name of sustainability and the common goal of creating a better system for the present and future generations I am all in favor of, whatever it takes. I remember a time, not long ago, when in the morning if we decided the weather was good enough we would simply throw the lines and go fishing whenever and wherever we thought it would be best. Under those circumstances it was difficult enough to achieve success given the challenges we face on the ocean. I don’t care who you are. If you have never depended on fishing for a living then you simply have no idea how hard, stressful and dangerous it can be. Heap on layers upon layers of often time’s complicated and confusing rules and regulations and it will often push the limit of what one can take. As a result of these experiences I now operate under a paranoia that I may be out fishing, out of compliance over problems that I did not even create and hear about it with disastrous consequences afterwards. I don’t feel that this is a fair place for me to be and chances are there are others out there who have similar concerns. It is my opinion that nobody in their right mind would willfully do something that they know to be against the rules. We fishermen are under a microscope.

On two separate occasions I was invited to sit in on small round table discussions with Dr. Lubchenco regarding the pending IFQ implementation. Knowing that there would be growing pains I looked her in the eye and expressed my support as long as it was done correctly. I was tired of shoveling over beautiful chilipeppers only to watch them float away belly up. After two years and close to one hundred deliveries under the new system I honestly feel that we are on the right track. However, I feel that it is very wrong that as a fisherman I am told to stay tied up for several days to give the computer a chance to upload the correct information.

When I sat down to write in a simple complaint about my recent experiences I never intended to be so long winded. It is only one fisherman’s perspective. No response is necessary, however I am welcome to feedback. If you feel there is anything within this content that could be considered towards improving the system feel free to share these thoughts with others.

Sincerely,

Steven B. Fitz

Captain, F/V Mr. Morgan

Half Moon Bay, CA

p.s. Believe it or not, and by now many of you who are reading this know this to be true, I am once again stranded at home today over yet another (third separate incident) accounting system error causing me to be in deficit. This incident occurred after completion of writing this letter. I have now lost out on three trips. These errors have now resulted in significant losses to our business. It has also created negative feelings between me and my deckhand and my fish buyer and had negative impacts on my personal life as well. How am I and the system suppose to be successful under these circumstances. This is NOT right!! Please fix this.

Chairman Dan Wolford
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

October 23, 2012

Chairman Wolford:

Years of preparation and hard work have resulted in the West Coast Groundfish IFQ Program (the "IFQ Program") meeting many of its objectives in its first years of implementation. It has an excellent chance at meeting its conservation and economic goals, and at being viewed as a resounding success. However, nationally, this program, like other catch share programs, will continue to be under close public scrutiny. We believe the IFQ Program will be viewed as a national model of success largely if it can deliver benefits to diverse fishing operations located in fishing communities across the West Coast. We also believe that this success is currently threatened by real issues of increased cost, decreased flexibility and reduced safety that are resulting from the current application of 100% on-board observer monitoring.

We strongly believe that the conservation and management goals can co-exist with the social and economic goals of the IFQ Program and the Council's FMP. We support the Council's commitment to 100% individual accountability and ask the Council to prioritize the review and approval of the use of multiple monitoring tools, including electronic monitoring, for this program. Doing so could alleviate some of the issues of concern and strengthen the probability that this program meets its goals and continues to stand out as an exemplary program nationally.

The attached document incorporates input about 100% on-board monitoring from over 20 stakeholders. We commissioned a consulting group to outline the issues of concern, gather information on monitoring approaches used elsewhere, and gather financial information from fishermen to create a model that can be used to look at the profitability of vessels and communities under various monitoring scenarios. This model can help stakeholders consider the impacts and assess the potential trade-offs related to the monitoring program. We would be happy to work with you to make any needed adjustments and to work with the Council and NMFS to apply the model to particular communities.

As noted above, the fishermen interviewed for this project strongly support 100% individual accountability and are ready to participate in analysis and implementation projects that can reach that goal in ways that also allow for flexibility and more profitable fishing businesses. Currently, their support for 100% individual accountability is tempered by the following concerns about the on-board observer requirements, including:

1) The costs of current management and monitoring for the IFQ Program are too high for many fishing businesses and will likely result in consolidation and the contraction of some fishing communities in the near future.

2) The cost of observers varies across the fishery. The cost of observers is not constant across vessels or communities. The cost to the vessel varies based on the provider(s) available in your region and the number of trips the vessel takes or the vessels in the community take. Costs to the vessel currently can vary from about $61.50 to $290.00 per sea day ($390 to $620 without NMFS financial assistance), depending on how many trips are taken in a month. As such, certain communities of vessels with higher sea day costs actually pay more now and will continue to do so in the future.
   There are also some indications that observer providers may be unable to supply observers to some ports at the current prices.

3) In addition to the challenges related to cost, the limited pool of observers made available in certain communities is reducing the flexibility of fishermen and affecting their operational decisions. This situation has already resulted in:

   a. *Vessels in some communities have lost days to fish due to the unavailability of observers.* Vessels in some ports have lost profitable market opportunities because observers have not been available when fishermen have a weather opening to fish. Weather and market conditions were once the primary limiting factors in fishing; now availability and cost of observers often impact fishing decisions.

   b. *Vessels in some communities are fishing in more dangerous weather, again due to the limited availability of observers.* Interviews discovered multiple concerns about decreased safety at sea as a result of fishermen's increasing need to go fishing when observers are available instead of when weather is good.

In 2007, the Council identified several objectives for the IFQ Program including to "increase operational flexibility" and to "increase safety in the fishery." With the current monitoring approach, these objectives may not be fully realized. However, electronic monitoring may be the tool to enable achievement of these objectives. We ask that the Council move forward in creation of an amendment that will enable implementation of the use of electronic monitoring in a timely manner if it is deemed a viable alternative to onboard observer coverage.

As a result of the serious challenges stated above, industry members are looking for solutions. With all of its other priorities, the Council was unable to fully consider potential monitoring options for the IFQ Program prior to implementation. We now request that the Council explore electronic monitoring options through the amendment process. By doing so, the Council will best be able to approve and NMFS will be able to implement regulations regarding the use of electronic monitoring as soon as it becomes a fully tested and viable option. We ask that the Council:

1. Identify monitoring goals and objectives appropriate for this fishery;

2. Evaluate the tradeoffs (including operational flexibility, safety, and community impacts) of the various monitoring tools under consideration for possible future use in this fishery;

3. Devise an agenda and timeline for an amendment that explores various monitoring options; and

4. Conduct scoping in spring 2013 for a monitoring amendment that includes observer coverage and electronic monitoring options.

Thank you for your consideration.

Michelle Norvell
Project Manager
Fort Bragg Groundfish Association

William Blue
Central Coast Seafood Marketing Assoc.
F/V Morning Light and F/V Brita Michelle

Lynn Langford Walton
Ilwaco Fishermen & Marketing Coop
F/V South Bay

Shems Jud
Oceans Program Deputy Regional Dir.
Environmental Defense Fund

Michael Bell
Senior Marine Project Director
The Nature Conservancy

Peter Leipzig
Executive Director
Fishermen's Marketing Association

Edward Backus
Vice President, Fisheries
Ecotrust

Brad Pettinger
Director
Oregon Trawl Commision
*Electronic signature unavailable at time of delivery; confirmation of support received via email.

To: The Nature Conservancy (TNC)
Fr: Kate Quigley, Cap Log Group, LLC (CapLog)
Dt: October 20, 2012
Re: Introduction to Economic Model and Summary of Monitoring Concepts for the West Coast Groundfish IFQ Program

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In September 2012, CapLog was asked to work with The Nature Conservancy (TNC) and an advisory group of fishing representatives from multiple fishing communities, as well as other NGOs to complete two tasks:

(1) Develop a simple tool that will help stakeholders assess the potential impact on individual groundfish fishing businesses and their communities as the fishing industry takes responsibility for paying for 100% on-board monitoring and other fishery management costs.

(2) Present a short summary of monitoring tools that have been used in other fisheries to reach monitoring goals comparable to the West Coast Groundfish IFQ Program (the "IFQ Program").

Economic Model and Findings

CapLog solicited 2011 economic data from twelve groundfish fishing businesses in several communities in California and Oregon. The businesses approached included two gear types: trawl and pots/traps. The average per trip (groundfish) landings for these vessels ranged from 2,000 to 35,000 pounds. Their cost and landings information allowed CapLog to build a model that can be refined and shared with West Coast fishing operations and communities. In addition, this model has provided individuals volunteering data a detailed snapshot of both their current financial performance and the potential financial impact on their businesses of increased responsibility for covering monitoring and management costs. Find below summary findings from the participating vessels, as well as an explanation of the model intended for vessels, their communities and other industry stakeholders. *CapLog does not intend for the summary information provided below to be considered actual projections; rather we view this paper and the associated model as a tool to contribute to thinking about the impact of different decisions on the financial viability of both vessels and communities of vessels.* Copies of the model will be available to interested parties on-line at: http://www.caploggroup.com/Cap_Log_Group/Tools.html

Monitoring Standards and Tools

CapLog worked with a team of advisors that included persons with significant experience in the West Coast Groundfish IFQ Program, as well as international experts to: (a) Summarize recent and existing studies of monitoring tools; (b)Outline possible monitoring objectives that would support the goals of the IFQ Program; and (c) Collate a few examples of monitoring tools that have been used in similar fisheries within and outside of the US. *CapLog does not seek to provide a comprehensive review or analysis of such tools; as documented in the first section, such work is already underway with regards to electronic monitoring in this fishery. Rather, CapLog seeks to identify practices and tools that are being tested or have been used in other multispecies trawl fisheries with bycatch concerns in order to help others explore useful monitoring approaches and tools used elsewhere.*

Economic Model and Findings

The financial viability of groundfish fishing businesses will be impacted when the industry becomes responsible for paying for 100% on-board observer coverage and other fishery management fees. While some businesses may continue to operate their vessels for reasons unrelated to the financial viability of groundfish fishing (e.g., in order to provide work for crew outside of other fishing seasons), the increased costs associated with covering monitoring will potentially make their groundfish fishing businesses less viable. Persons knowledgeable and active in the fishery will likely not be surprised by this statement.

Summary of Economic Findings from Participating Vessels

Twelve vessels provided some level of data (e.g., costs, landings, revenue). This data was used to build an economic model for individual and multiple vessels. For purposes of showing how the model might be used, below we present data from five vessels that provided the most complete data and agreed to share this information with the public. **These vessels may or may not be a representative sample of the over 100 active vessels in the fishery. Readers should NOT assume that the information presented below can be extrapolated across the fleet.** That said, the analysis suggests that the viability of various fishing communities will likely be affected to different degrees by the shift to industry-paid observer coverage.

Sample Use of Model to Understand Changes in Cost for Vessels or Communities

The model can show how the shift in responsibility for paying for 100% on-board observer coverage and other scheduled management fees may affect a group of vessels. The tables below were generated using the model; they show the impact of the projected increase in costs resulting from monitoring and managements costs being shifted to industry.

Table 1: Estimated Current Monitoring and Management Fees for IFQ Program
Based on actual vessel 2011 data and on current industry payment responsibilities

Monitoring Regime	Gross Revenue from Groundfish Trips	Trawl Buyback Fee (5%)		IFQ Cost Recovery Fee (3%)		Groundfish Trip Monitoring Costs (recurring)		First Receiver Catch Monitoring Costs (recurring)		Total Management and Monitoring Costs	
		Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev
Vessel One	$ 660,000	$ 33,000	5.0%	$ -	0.0%	$ 26,015	3.9%	$ -	0.0%	$ 59,015	8.9%
Vessel Two	$ 350,000	$ 17,500	5.0%	$ -	0.0%	$ 10,080	2.9%	$ -	0.0%	$ 27,580	7.9%
Vessel Three	$ 308,000	$ 15,400	5.0%	$ -	0.0%	$ 7,344	2.4%	$ -	0.0%	$ 22,744	7.4%
Vessel Four	$ 276,000	$ 13,800	5.0%	$ -	0.0%	$ 5,124	1.9%	$ -	0.0%	$ 18,924	6.9%
Vessel Five	$ 352,000	$ 17,600	5.0%	$ -	0.0%	$ 6,100	1.7%	$ -	0.0%	$ 23,700	6.7%

Table 2: Estimated Future Monitoring and Management Fees for IFQ Program
Based on actual vessel 2011 data and on planned industry payment responsibilities

Monitoring Regime	Gross Revenue from Groundfish Trips	Trawl Buyback Fee (5%)		IFQ Cost Recovery Fee (3%)		Groundfish Trip Monitoring Costs (recurring)		First Receiver Catch Monitoring Costs (recurring)		Total Management and Monitoring Costs	
		Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev
Vessel One	$ 660,000	$ 33,000	5.0%	$ 19,800	3.0%	$ 75,625	11.5%	$ 4,582	0.7%	$ 133,007	20.2%
Vessel Two	$ 350,000	$ 17,500	5.0%	$ 10,500	3.0%	$ 56,000	16.0%	$ 1,575	0.5%	$ 85,575	24.5%
Vessel Three	$ 308,000	$ 15,400	5.0%	$ 9,240	3.0%	$ 40,800	13.2%	$ 2,039	0.7%	$ 67,479	21.9%
Vessel Four	$ 276,000	$ 13,800	5.0%	$ 8,280	3.0%	$ 18,900	6.8%	$ 1,260	0.5%	$ 42,240	15.3%
Vessel Five	$ 352,000	$ 17,600	5.0%	$ 10,560	3.0%	$ 22,500	6.4%	$ 2,250	0.6%	$ 52,910	15.0%

The vessel data analyzed on the previous page validates a concern voiced by many of the groundfish fishermen that additional monitoring cots will negatively impact the fishing fleet. The primary reasons include:

a. *The cost of observers varies across the fishery.* The cost of observers is not constant across vessels or communities. The cost to the vessel varies based on the provider(s) available in your region and the number of trips the vessel takes or the vessels in the community take. Costs to the vessel currently can vary from about $61.50 to $290.00 per sea day ($390 to $620 without NMFS financial assistance), depending on how many trips are taken in a month. As such, certain communities of vessels with higher sea day costs actually pay more now and will continue to do so in the future. This finding is reflected in the difference in costs currently borne by different vessels in the sample (for example, Vessel One currently pays a higher amount per day of on-board monitoring than Vessel Three).

b. *The observer companies may not be sufficiently profitable in many locations in the fishery to continue to provide consistent observer coverage at current rates.* There are indications that observer providers may be unable to supply observers to many locations at the current prices. If observer providers are not profitable at current prices, they will either have to increase their rates for observer coverage or decrease service offerings in certain areas; both outcomes would exacerbate the financial impact to certain vessels. Further discussions with observer companies may be warranted to inquire about likely future sea day prices for different communities, as well as to identify possible ways to structure contracts to ensure the profitability needed to provide such coverage.

Using Model to Estimate Impact on Financial Viability of Groundfish Fishing Businesses

In addition to understanding the relative cost of monitoring and management fees now and in the future, the model is built to allow users to consider the potential impact of this shift on the financial viability of groundfish fishing businesses on a vessel level or within a particular community. It does so by allowing the user to consider three separate but related income streams associated with the IFQ Program: quota leasing, groundfish fishing operations and groundfish labor (captains and crew).[1] This allows users to make reasonable assumptions and use real data from groundfish fishing businesses on landings, revenue and operating costs to understand impact on their fishing businesses or a community of fishing businesses. They can compare the business' net income with an opportunity cost (adjusted for the number of days fishing for groundfish) to suggest a likelihood of continued participation in the West Coast Groundfish IFQ Program. The model allows them to enter such data and assumptions and then explore the impact of the change from current responsibilities for paying for monitoring and other management fees to planned future responsibilities for the 100% on-board monitoring program and the IFQ Cost Recovery Fee.

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[1] Although there is overlap between each (e.g., business owners owning QS, vessel captains owning fishing businesses), in order to understand the financial viability of groundfish fishing businesses and fishing communities supported by those businesses, it is helpful to consider these separate income streams. For example, a viable groundfish fishing business ultimately needs to generate sufficient revenue to pay for the full costs of participating in the fishery and operating its business. These full costs include both leasing all of the QP required to land groundfish (from affiliated or unaffiliated entities) as well as paying a captain and crew (even if it may own QP and have an owner-captain that does not receive a crew share). If such cost factors are not included, the groundfish business may be subsidized by either the owner of the QS or by the captain and crew.

The model may be helpful in exploring the differential impact in particular communities of the shift in responsibilities for paying for these fees. In doing so, it is important to recognize that some vessels may choose to remain active in the fishery for non-economic reasons that are not fully considered by this tool.

Using Model to Estimate the Effect of Other Monitoring Approaches on Groundfish Fishing Vessels Businesses

In addition to understanding the potential economic impact (both on individual vessels and communities of vessels) of the shift in payment for the 100% on-board monitoring program, the model allows users to begin to explore how alternative monitoring tools, such as electronic monitoring, might affect the costs and the subsequent financial viability of vessels and communities. The model classifies both one-time (investment) and recurring costs for electronic monitoring, based on assumptions entered by users.

Table 3 below uses an estimate of $165 per day for the recurring electronic monitoring costs and assumes 100% electronic monitoring and no on-board monitoring for the sample vessels. It holds all of the other data and assumptions constant. The example highlights how a reduction in one of the programmatic costs associated with groundfish fishing could affect the profitability of a particular vessel or a group of vessels.

Table 3: Estimated Future Monitoring and Management Fees for IFQ Program with 100% Electronic Monitoring (rather than 100% On-board Monitoring)
Based on actual vessel 2011 data and on planned industry payment responsibilities

Monitoring Regime	Gross Revenue from Groundfish Trips	Trawl Buyback Fee (5%)		IFQ Cost Recovery Fee (3%)		Groundfish Trip Monitoring Costs (recurring)		First Receiver Catch Monitoring Costs (recurring)		Total Management and Monitoring Costs	
		Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev	Cost	% of Rev
Vessel One	$ 660,000	$ 33,000	5.0%	$ 19,800	3.0%	$ 24,956	3.8%	$ 4,582	0.7%	$ 82,339	12.5%
Vessel Two	$ 350,000	$ 17,500	5.0%	$ 10,500	3.0%	$ 23,100	6.6%	$ 1,575	0.5%	$ 52,675	15.1%
Vessel Three	$ 308,000	$ 15,400	5.0%	$ 9,240	3.0%	$ 16,830	5.5%	$ 2,039	0.7%	$ 43,509	14.1%
Vessel Four	$ 276,000	$ 13,800	5.0%	$ 8,280	3.0%	$ 6,930	2.5%	$ 1,260	0.5%	$ 30,270	11.0%
Vessel Five	$ 352,000	$ 17,600	5.0%	$ 10,560	3.0%	$ 8,250	2.3%	$ 2,250	0.6%	$ 38,660	11.0%

As stated before, the results from five vessels presented above do not necessarily represent the situation across the entire fishery; that said, further use of models like this one at a fishing community level may be helpful in informing stakeholders of the effects of the increased responsibility for paying for the costs of management and monitoring on vessels active in their communities. Likewise, they can help inform how alternatives to 100% on-board monitoring that meet the necessary monitoring requirements may improve the economic viability of fishing vessels and communities in this fishery.

Monitoring Standards and Tools

Summary of Electronic Monitoring Pilot Studies in the Pacific

Morro Bay

TNC contracted with Archipelago to expand upon a 2008 study in Morro Bay. Six vessels were monitored over a five and a half month period and for a total of 332 hauls, taking place during over 125 days at sea. EM system data collection was 91% overall for all participating vessels and trips and the majority of the lost data was of low risk since it occurred during transit to and from the fishing grounds. Every vessel carried an observer and skippers filled out a haul-by-haul fishing logbook for every trip. The EM data collected was matched up and used for catch assessment comparisons with 97% of all hauls recorded by observer and fishing log.

EM and observer fishing event and catch data were available for over 105,000 total fish catch items and a total of 276 fishing events. EM data had 1% less pieces of catch than observer overall, with high agreement on piece counts of sablefish (1% difference) and grouped rockfish (4% difference), the two most important species groups of this study (for market and conservation reasons, respectively). There were 328 events compared between EM and fishing log data. The total piece comparison between EM and fishing log data was very good, since fishing log data contained 0% different total catch items and 1% more and 4% less items for sablefish and rockfishes respectively. All but one of 329 fishing events captured on video were usable (deck lights failed during a night haul on the one unusable record). While sun glare during the day and backlighting by deck lights during night hauls can adversely affect video quality, determining catch count and composition was essentially unaffected.

Pacific States Marine Fisheries Commission

In conjunction with Archipelago, the PSMFC is testing the use of electronic monitoring to demonstrate the feasibility of using electronic monitoring (EM) for compliance monitoring on selected commercial fishing vessels as an alternative to human observers.

Short Term Goals: (1) Compare EM to the observer data to determine confidence levels; (2) Set up EM review and camera install and maintenance infrastructure; (3) Solve the issues through a collaborative group.

Long Term Goals: (1) Maintain the biological integrity of the existing system; (2) Save some money for the fishermen and taxpayers; (3) Insure the confidence of the landing and discard data; (4) Integrate with electronic logbooks; (5) Look for opportunities to add to stock assessment information.

An update on this pilot program will be provided at the November 2012 Council meeting and is available in the Briefing Book.

<u>Develop Video Monitoring for Full Retention Fisheries (WA, OR)</u>
Grantee: Marine Conservation Alliance Foundation

This project will develop a video-based catch monitoring system and computer-aided video review software. By reducing the number of human observers and reviewers involved in the monitoring of full-retention fisheries, the cost of the observer program should decrease.

Full-retention fisheries or fisheries with minimal discards that do not require observer speciation should benefit from the application of video technologies, as observers often have no duties when not recording catch on deck. In such fisheries, video systems have been tested to allow for more observer coverage at lower costs and on smaller vessels that have difficulty accommodating observer, but video has generally been found to be as costly as live observer coverage, due in part to inefficient review processes. Reducing the video review time should allow for faster data turnaround and greater observer coverage in areas with fixed budgets for observers. This project will collect video from the shoreside whiting fishery off the coast of Washington and Oregon. Movement-recognition algorithms will be developed and used to develop the interface that will allow video reviewers to quickly assess significant on-deck events, eliminate unproductive review time and reduce the cost of implementing video observing programs.

<u>Development and Evaluation of Image Recognition Software (CA)</u>
Grantee: Fishermen's Marketing Association, Inc.

This project will develop and evaluate image recognition software that can be used to screen video images collected onboard commercial fishing boats. It will track discard activities and identify the species of fish being discarded.

Brief Overview of Monitoring Standards and Tools Used in Other Fisheries

CapLog interviewed nine fisheries monitoring experts from the US, British Columbia, Nova Scotia and New Zealand in order to identify practices and tools that have been successfully employed in fisheries with similar profiles to the non-whiting Pacific Groundfish fishery (multispecies trawl gear, constraining species and significant bycatch). CapLog identified the following fisheries as potentially the most comparable to the Pacific IFQ Program:

1) British Columbia Groundfish Trawl – 100% on-board observer coverage
2) Northeast Groundfish Trawl – 25% on-board observer coverage (including 8% on-board coverage by scientific observers)
3) EU North Sea Groundfish (Denmark, England, Scotland) – electronic monitoring
4) Australian Southeast Multispecies Trawl Fishery – 5% on-board observer coverage
5) New Zealand Multispecies Trawl – 0-30% on-board observer coverage depending on vessel size due to cost concerns
6) Nova Scotia Groundfish Fishery – 2-20% on-board observer coverage depending on area
7) Alaska Groundfish Fishery – 30-100% on-board observer coverage depending on vessel size and poundage caught for certain species

The following observations are based on the interviews and available literature:

1) Observer coverage rates (particularly those associated with trawl gear) can fluctuate from year-to-year in each fishery and are not generally available through technical reports or on-line;

2) Monitoring standards are not effectively identified in most of these programs. In many cases, once an IFQ was implemented, the existing programs were expanded without identifying what the monitoring needs were; and

3) Needs faced by each fishery varied widely. In fisheries outside the US, the monitoring frequently focused on recording marine mammal and seabird interactions. Most fisheries outside of the US did not have the depleted stock concerns that exist for West Coast Groundfish IFQ Program.

This brief overview validated the challenge facing the Council and the importance of the on-going work to test electronic monitoring tools and software for the West Coast Groundfish IFQ Program. Experts consistently identified on-board observers for trawl vessels and electronic monitoring for fixed gear vessels as the most established monitoring tools being used. The experts identified a worldwide struggle to find affordable monitoring for fisheries where only a small level of risk is acceptable. Some people have suggested focusing on the trade-offs between the monitoring tool and other options as a way to illustrate the impacts of use. One individual suggested discussing the potential trade-off between the ABC buffer and the level of monitoring used.

In summary, this initial overview highlights that the West Coast Groundfish IFQ Program has an opportunity to take an international leadership role both in establishing clear objectives (standards) for the monitoring program and in identifying and implementing affordable monitoring for a fishery with a low level of risk tolerance. One possible step in the review of monitoring options might be for the Council to link its requirements for monitoring tools to objectives it has established for the IFQ Program.

Possible core monitoring requirements might include:

1. Documenting species, locations and weights of groundfish (a) to ensure compliance with a vessel's quota pounds and (b) to determine total mortality of groundfish species by collecting weight and species retained.
2. Determining the weight and identification of species discarded at sea.
    a. Estimating the total mortality of halibut.
3. Documenting interactions with protected species.
    a. The species and condition upon release also needs to be recorded.

Additional requirements that may or may not be part of the catch monitoring program include:

4. Collecting information on where fishing activities are occurring and what gears are being fished.
5. Collecting biological samples in order to determine stock structure, fecundity and overall spawning stock biomass estimates.
6. Collecting economic data from fishermen and first receivers in order to calculate relative contributions to both cost recovery and the buyback program and track success of the program.

OCEANA Protecting the World's Oceans
222 NW Davis Street, Suite 200
Portland, OR 97209 USA
+1.503.235.0278
oceana.org

November 1, 2012

Mr. Dan Wolford, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

RE: **Trawl Rationalization Trailing Actions; Final Alternatives for Chafing Gear**

Dear Mr. Wolford and Council members:

Oceana is writing in support of the status quo alternative in the draft Environmental Assessment on chafing gear.[1] Current regulations already provide for a fair and reasonable compromise that allows mid-water trawl nets in the groundfish fishery to have chafing gear covering 50% of the terminal 50 meshes of the codend (50 CFR 660.130). All of the action alternatives would result in negative impacts to the marine ecosystem by increasing bycatch and increasing habitat impacts.

The main purpose of chafing gear is to allow "mid-water" trawls to contact the seafloor without sustaining net damage. By definition, however, mid-water trawl gear is to be deployed in the mid-water column, not on the seafloor. It is precisely this distinction between mid-water and bottom trawls that has been the basis for separating these two gear types in the context of management. For example, while the PFMC has implemented a series of Essential Fish Habitat Conservation Areas that are closed to bottom trawling, the mid-water trawl fishery is exempt from these closures under the notion that they do not make bottom contact. It is now recognized the mid-water trawls do in fact drag the seafloor.[2] As you are aware, NMFS and the PFMC are required to minimize the adverse impacts of fishing gears on essential fish habitat. The action alternatives do the opposite and we would expect both a full analysis of these impacts as well as mitigation measures.

We understand the industry desires to change current regulations so that the West Coast groundfish fishery regulations more closely resemble the liberal chafing gear regulations on mid-water trawls in the Alaska groundfish fishery; where there are no limits to chafing gear placement on the trawl codend. The problems with accommodating the industry's desires are two-fold. First, the draft Environmental Assessment is clear that all of the action alternatives allowing more chafing gear will have negative impacts to the marine ecosystem through a combination of habitat impacts and bycatch. Second, while the Alaska pollock fishery is allowed

[1] PFMC and NMFS. 2012. Trawl Rationalization Actions: Chafing Gear. Draft Environmental Assessment. Agenda Item I.5a Attachment 3

[2] Whiting trawl captains self-reported that between zero and 25% of tows contact the bottom, with a median range of three to eight percent of tows on the bottom. Devitt, S. 2011. Pacific hake mid water trawl fishery EEZ West Coast USA/ EEZ Canada: surveillance report 2. Intertek Moody Marine Ltd. Nova Scotia, Canada. 39 pp.

to use more chafing gear, the Alaska fisheries are also subject to many other conservation standards designed to limit bycatch and protect habitats. Similar conservation standards have not been implemented in the West Coast mid-water trawl groundfish fisheries.

All of the action alternatives analyzed in the EA would have negative consequences to the health of the marine ecosystem. The EA finds allowing more chafing would have:

1. Negative impacts to ESA-listed eulachon by increasing the take and mortality of these threatened species (EA at 75)[3],
2. Negative impacts to ecosystem prey, by increasing the bycatch of other forage fish like Pacific herring, myctophids, Pacific sardine, Pacific saury, and shortbelly rockfish (EA at 75)[4], and
3. Increased impacts to seafloor habitats (EA at 72).

In June 2012, the Council established a forward-thinking objective of protecting currently unmanaged forage species and recognized "the importance of forage fish to the marine ecosystem off our coast". While the Council has yet to take regulatory action on that front, the Council is now considering regulatory actions that would increase fishery impacts to a wide suite of managed and unmanaged forage species. Given that the protection of forage species is an important objective for the Council, it should not authorize the use of gear that will increase the incidental take of forage species. Instead we request you continue to work to implement a prohibition on directed fishing for unmanaged forage fish and implement a maximum retainable bycatch allowance as has been done off Alaska.

Further, the Council is now engaged in a 5-year review of essential fish habitat for groundfish, which, contrary to the initial Amendment 19 regulatory package that assumed bottom contact was negligible, contains new information on the extent of seafloor contact with mid-water whiting trawls. Clearly, any whiting management regulations, including consideration of changes to chafing regulations must demonstrate that the fishery is operating under management measures that minimize the adverse impacts of fishing.

What is more, in February 2011 NMFS issued a biological opinion on the impacts of the U.S. West Coast groundfish fishery on eulachon and other ESA-listed species.[5] While NMFS found no jeopardy under the current chafing regulations, the biological opinion does not apply to the 2013-2014 fishery and it does not foresee potential new regulations allowing more chafing gear. As the EA states, increasing chafing gear placement on the trawl codend may increase eulachon bycatch. NMFS must evaluate these impacts and ensure that the direct and cumulative impacts on eulachon do not cause jeopardy to the species.

[3] "All of the action alternatives have the potential to reduce escapement of eulachon a threatened species through the codend meshes compared to status quo regulations." PFMC and NMFS. 2012. Draft EA at 80

[4] "The projected impact to forage fish (ecosystem component species) is negative under all of the action alternatives because of greater chafing gear coverage compared to status quo regulations." PFMC and NMFS. 2012. Draft EA at 80

[5] NMFS 2011. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion. Operation of the Pacific Coast Groundfish Fishery in 2012. Available at PFMC. March 2012. Agenda Item F.3.b Attachment 3

If the industry desires consistent regulations on chafing gear across the West Coast and Alaska, it should not do so by lowering West Coast regulations to the lowest common denominator at the expense of our forage fish and seafloor habitats. In other words if it's too costly to have nets designed for two different regions, just use the nets that meet the West Coast chafing gear regulations in the Alaska fisheries. Conversely, if the Council and NMFS want to loosen chafing gear restrictions here to accommodate the mid-water trawl industry, it should also consider additional conservation measures to reduce and avoid bycatch and protect habitats as the Alaska region has implemented. It is important to remember that not only are the chafing gear regulations different between the two regions, but so too are the conservation measures designed to mitigate the effects of fishing. Managers in the North Pacific region have implemented a number of conservation measures for the Bering Sea/Aleutian Islands and Gulf of Alaska mid-water trawl groundfish fisheries that are not implemented here, including:

1. Large areas closed year-round to all trawling (including mid-water trawls) to protect seafloor habitats and reduce bycatch (e.g. Pribilof Island Habitat Conservation Area and the Nearshore Bristol Bay trawl closure)
2. Hard bycatch caps on prohibited species catch including Chinook salmon, chum salmon and others that if reached, shut down the fishery (e.g. Bering Sea fishery closes if Chinook limit reached) and/ or specific area closures (e.g. chum salmon and herring savings areas).
3. Prohibition on directed harvest for nine orders of forage fish, and a maximum retainable bycatch allowance of forage fish taken in the trawl fisheries.

Last, we are concerned by the analysis provided in the "Executive Summary of the Chafing Gear Environmental Assessment"[6] which was provided to the PFMC as a separate submission. This document, actually does not provide a summary of the Environmental Assessment, but rather evaluates the environmental impacts of the proposed action in comparison to a baseline described as "present conditions." These present conditions are that industry has not been complying with current chafing gear regulations and NMFS has not been enforcing current chafing gear regulations. As such, this "Executive Summary" takes a different approach than the Environmental Assessment and implies that the environmental impacts of loosening the chafing gear regulations will result in no change to the environment. Not only does this conclusion contradict the analysis in the Environmental Assessment, which rightfully analyzes the status quo regulations as the baseline, but it also creates a confusing and contradictory Administrative Record whereby it is difficult for the public and the decision maker to evaluate the tradeoffs between status quo and various alternatives.

As public participation, clear analysis, and informed decision-making are the heart of the National Environmental Policy Act, the Executive Summary must be rewritten to summarize the Environmental Assessment and it should be made clear that the environmental impacts of the action alternatives compared to status quo regulations are in fact negative as illustrated by the

[6] PFMC and NMFS 2012. Chafing Gear Environmental Assessment Executive Summary. Agenda Item I.5.a Attachment 2.

EA. As such, the conclusion in the Executive Summary that loosening restrictions on chafing gear would have 'no change' in terms of environmental impacts must be changed. As written it is akin to a proposed action to raise a highway speed limit from 65 to 85 that relies on an analysis that there would be no change in terms of public safety or fuel usage because many people already drive 85. While the impacts of the current behavior of the fleet and the lack of enforcement should certainly be recognized and analyzed, it is simply impermissible to use an environmental baseline that entrenches illegal activity and a lack of enforcement of current regulations in order to give the appearance of an environmentally neutral regulatory change.

For the above reasons, Oceana requests the Council adopt the status quo alternative to maintain current chafing gear regulations on mid-water trawls in the West Coast groundfish fishery.

Thank you for time and consideration of these comments.

Sincerely,

Ben Enticknap
Pacific Project Manager

Phoenix Processor Limited Partnership

333 First Avenue West, Seattle, WA 98119 USA tel: (206) 286-8584 fax: (206) 286-8810

November 2, 2012

November 2012 Council Meeting, Public Comment

Re: Agenda Item I.5, Proposed Change in Shoreside Whiting Primary Season Start Date

Dear Chairman Wolford and Members of the Pacific Fishery Management Council:

Phoenix Processor Limited Partnership (PPLP) owns two mothership processors, owns permits in both the shoreside and at-sea sectors of the rationalized Pacific whiting fishery, and is a member of the Whiting Mothership Cooperative (WMC) and United Catcher Boats (UCB). Many of the partners in PPLP also own and operate catcher vessels and permits in the whiting fishery. PPLP opposes the proposed change in the shoreside whiting primary season start date.

Regulations at 50 CFR § 660.131(b)(2) specify ten factors that must be considered before changing the start date. PPLP previously commented on each in detail in April 2012; we reaffirm and incorporate those comments by reference. Of most concern are Chinook salmon bycatch impacts. The entire whiting fishery – shorebased, mothership, catcher processor, and tribal sectors – all operate under an annual threshold limit of 11,000 Chinook salmon. Catch in excess of this limit triggers reinitiation of Endangered Species Act consultation, which we seek to avoid. Changing the start date for the shoreside fishery from June 15 to May 15 will likely increase overall Chinook salmon bycatch.

The draft analysis relies on outdated and incomplete information

The draft analysis relies on the 1997 Environmental Assessment prepared in support of the original decision to establish the June 15 start date, ignoring information presented in the 1999 Biological Opinion (BiOp) and Incidental Take Statement (ITS) for the groundfish FMP,[1] and that contained in the 2006 Supplemental BiOp,[2] which reaffirmed the ITS. While the draft analysis acknowledges the existence of these documents, it does so by stating a changed date would be within the existing consultation. But this ignores the information within the BiOps relevant to a decision under the Magnuson-Stevens Act – the 1997 EA does not represent the best scientific information available.

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[1] NMFS, December 15, 1999, *ESA Section 7 Consultation on Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery*, Northwest Region, Sustainable Fisheries Division.

[2] NMFS, March 11, 2006, *Endangered Species Act Section 7 Consultation - Supplemental Biological Opinion: Reinitiation of Section 7 Consultation Regarding the Pacific Fisheries Management Council's Groundfish Fishery Management Plan*, Northwest Region, Sustainable Fisheries Division.

The 2006 Supp'l BiOp shows higher salmon bycatch by the shoreside sector early in the season

The 2006 Supp'l BiOp notes that "higher bycatch tows tend to occur in shallow water[,]" that "[t]he shorebased fleet in particular tends to fish closer to shore largely because of the time savings and fuel costs associated with moving offshore[,]" and that "[a]s a result, the bycatch rate tends to be higher in the shorebased fishery."[3] Moreover, "bycatch rates tend to be highest earlier in the season."[4] The draft analysis does not acknowledge these findings, the differences in Chinook salmon impacts between the at-sea and shoreside whiting fisheries, or how these impacts occur over time. It would not take much analysis to show this –tables similar to Figures 3-1 and 3-2 should be prepared to analyze weekly Chinook salmon bycatch for the past ten years (both in absolute numbers and rates per metric ton).

Inadequate range of alternatives

Despite increased Chinook salmon impacts, the draft analysis does not include alternatives to mitigate such impacts. For instance, the WMC has adopted a performance standard with sanctions that apply to vessels that exceed acceptable bycatch rates.[5] The failure to analyze mitigation measures such as these is another deficiency of the draft analysis.

Potential for increased non-whiting fishery impacts

There is also increased risk of bycatch due to non-whiting fishing under the guise of participation in the shoreside whiting fishery. Targeted fisheries for widow and yellowtail rockfish currently occur coincident with the shoreside whiting fishery, with increasing effort early in the year.[6] These non-whiting fishermen are able to access the Rockfish Conservation Area by declaring into the Pacific whiting IFQ fishery. While the need to obtain QP to cover catch of IFQ species "*may* constrain total harvest,"[7] it does not eliminate the risk of "lightning strikes" due to the risky behavior of fishing for rockfish in the RCAs. Moving the start date exacerbates this risk. What would happen when a non-whiting fisherman fishing in the RCA catches enough yelloweye and/or canary rockfish to shut down the entire trawl fishery? The draft analysis does not answer this, or even ask the question.[8]

Status quo minimizes bycatch to the maximum extent practicable

Any regulation promulgated to implement an FMP must be consistent with the National Standards of the Magnuson-Stevens Act, including National Standard 9, which requires minimization of

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[3] *Id.* at 17.

[4] *Id.*

[5] *See* November 2012 PFMC Meeting, Supplemental Informational Report 5, *Whiting Mothership Cooperative, Preliminary Report on the 2012 Pacific Whiting Fishery*, at 23.

[6] *Attachment 6* at 15, *see also* September 2012 PFMC Meeting, Agenda Item H.5.b, NMFS Report, *West Coast Groundfish IFQ Fishery, Mid-year Catch Report (January-June) 2012: Emerging Trends*, at 21, Table 12.

[7] *Attachment 6* at 15 (emphasis added).

[8] The unsupported argument that the QP incentive "may constrain total harvest" also fails to address risks of increased bycatch of non-IFQ groundfish species.

bycatch "to the extent practicable[.]"[9] The Merriam-Webster dictionary defines practicable as "capable of being put into practice or of being done or accomplished: feasible."[10] The last fifteen years of shoreside whiting harvests demonstrate the feasibility of starting the Pacific whiting shoreside fishery on June 15. Absent any showing otherwise, the proposed change is inconsistent with National Standard 9.

There is no demonstrated need for the proposed action

Actual harvests in the shoreside whiting fishery show that landings have shifted later in the year. As NMFS' June 2012 Report on the IFQ fishery shows, the amount of shoreside Pacific whiting caught in the first half of 2012 has declined by more than 13 million pounds, less than half of what was caught in the same period in 2011 and a ~25% reduction in harvests relative to the available allocation.[11] This continues the trend shown in Figure 3-1, which also shows shoreside whiting harvests shifted later in the year, and argues against a need to move the start date earlier in the year.

There is no industry agreement

Finally, the proposal to move the Pacific whiting primary season start date for the Shorebased IFQ Program does not, in fact, enjoy industry consensus. PPLP opposes the proposed action; so too does United Catcher Boats. There is no unanimous industry agreement; we consider this a contentious issue. In our view, it would be irresponsible to change the whiting start date for a single entity when such action increases the risks to the entire groundfish fishery.

This disagreement underscores the need for thorough analysis. Deferring action would provide an opportunity to incorporate information from the BiOps and also more recent and improved data from observer information collected under the trawl rationalization program. The Situation Summary on this agenda item notes that implementation in 2013 "might not be possible," which is all the more reason to take no action until the analysis can be prepared. PPLP urges the Council to select the no action alternative and not schedule this proposal for consideration again unless and until a commitment can be made to correct the deficiencies in the draft analysis.

Respectfully Submitted,

James M. Mize

Safety and Compliance Manager, Premier Pacific Seafoods, Inc.
On behalf of Phoenix Processor Limited Partnership

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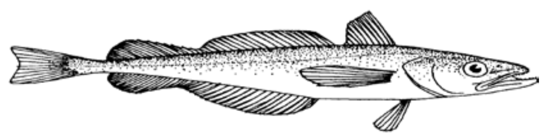
[9] 16 U.S.C. 1851(a)(9).

[10] 2012. Merriam-Webster Online Dictionary. *Available at* http://www.merriam-webster.com/dictionary/practicable (last visited October 31, 2012).

[11] September 2012 PFMC Meeting, Agenda Item H.5.b, NMFS Report, *West Coast Groundfish IFQ Fishery, Mid-year Catch Report (January-June) 2012: Emerging Trends*, at 21, Table 12. Whiting harvests in the shoreside whiting fishery in 2011 through June 30 were 23,832,545 pounds, equal to ~12% of the total 2011 allocation; for the same period in 2012, the harvest was 10,860,236, equal to ~9% of the 2012 allocation.

Agenda Item I.5.c
Supplemental Public Comment 5
Novembeer 2012

West Coast Pelagic Codend Chaffers



Shoreside

Mothership

Catcher Processor

Status Quo

Status Quo codend regulations was a 2007 bottom trawl codend Chaffer regulation change that inadvertently was applied to the pelagic trawl codend.

Chaffing gear can only be applied to the last fifty meshes of the codend, and can encircle no more than 50% of the last 50 meshes of the codend.

ALTERNATIVE 1
Final Preferred Alternative

- Chaffer may cover the bottom and sides of the codend in either one or more sections. Chaffers can only be attached at the open end of the codend (end closest to the trawl mouth) and sides. The terminal end (end closest to terminal end of codend) or the end of each chaffer section if using multiple chafers must be left unattached. The only chaffer allowed on the top codend panel would be reinforced netting panels under lifting ~~and constraining~~ straps. ~~Codends, and chaffers~~ Chaffers will conform to codend mesh size regulations.

Alternative 1 V.S Status Quo

Alternative 1 was brought to the Council by Industry as a replacement for current regulations.

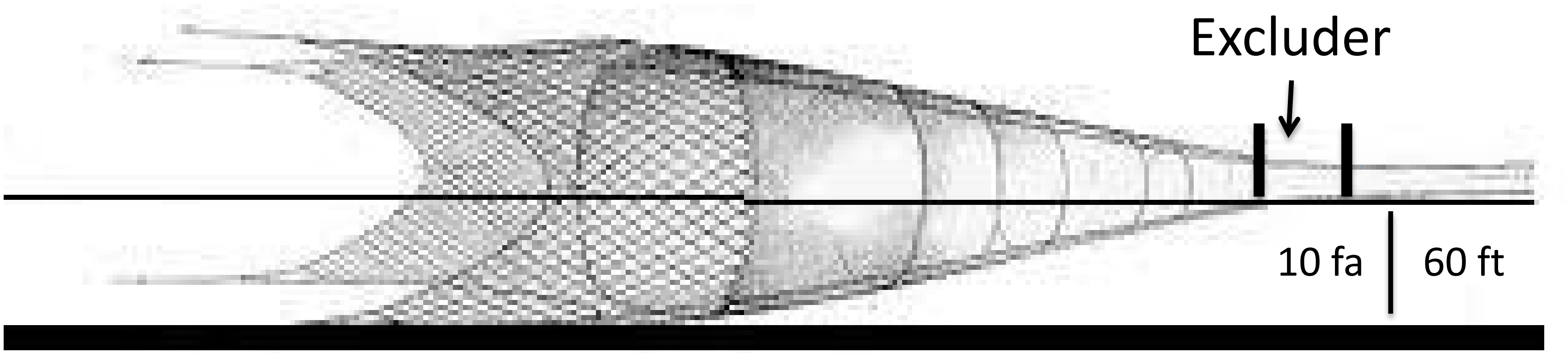
The west coast whiting fishermen were unable to comply with current regs when implemented in 2007. The codend damage from loading and transferring unprotected codends would have been cost prohibitive.

Shoreside whiting, mothership whiting, and catcher processors have used the same codends for over 20 years. The only changes made have been for greater efficiency, and reduced repair costs.

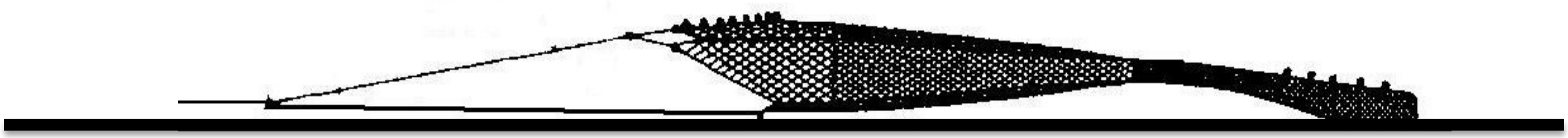
ENFORCEMENT

It's the intent of industry to have chaffing gear regulations that are easily interpreted by those enforcing the regulations. Any alternative that describes chaffer in percentage of coverage such as status quo, Alt 2. a & b makes enforcement more difficult. To enforce chaffer percentage would require multiple mesh counts while separating chaffer to do so. Describing chaffer as panels covered simplifies this process for enforcement and net manufactures.

Pelagic Aleutian Wing Trawl



Bottom Trawl



Shoreside Whiting

Shoreside Whiting140 Ton

Spectra 3.5 BK Body

Bottom and Side Chaffer 6.5 Poly

Shoreside Whiting Codend
Bottom and Partial Side Chaffer

4” BK Polytron High Flotation Body with 7” BK Poly Chaffer

100 Ton Shoreside Whiting Codend

4” BK Polytron High Flotation Body
7” BK Poly Bottom and Partial Side Chaffer

Same As Previous Slide Ramp View

Mothership Codends

MS/CV 40 Ton Codend

3.5” BK Knotless Body
7” BK Poly Bottom and Partial Side Chaffer
With Skirting

MS/CV Codend Same As Previous Slide

MS/CV Codend

MS/CV Codend Same As Previous Slide

Catcher Processor Codends

Catcher Processor 100 Ton Codend

3.5 BK Knotless Body With 6.5BK Poly Bottom and Full Side Chaffer With Skirting

Catcher Processor 100 Ton Codend

3.5 BK Body With 6.5” BK Bottom and Side Chaffer With Skirting

Catcher Processor

Hula Skirt Attached to Bottom and Side Chaffer Panel

Catcher Processor

Chaffer Repair

Codend Excluder

Codend Excluders

Codend Excluders

Codend Excluders