

Pacific Halibut Bycatch in the U.S. West Coast Groundfish Fishery, 2002-2010

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EXECUTIVE SUMMARY

Pacific halibut discard mortality estimates are provided for 2002 through 2010 from all fishery sectors observed by the West Coast Groundfish Observer Program. These included:

- Limited Entry (LE) bottom trawl
- Non-nearshore fixed gear
- Nearshore fixed gear
- Pink shrimp trawl
- California halibut trawl

Final estimates are shown in Table ES-1, which is synonymous with Table 18 in the report. The LE bottom trawl sector constituted the largest source of discard mortality of Pacific halibut among the sectors analyzed, followed by the non-nearshore fixed gear sector. Within the non-nearshore fixed gear sector, the majority of estimated discard mortality occurred in the LE sablefish primary component, which consists of federally permitted vessels fishing tier quota during the primary sablefish season from April through October. Specifically, bycatch rates were highest on LE sablefish primary vessels fishing with longline gear in the area north of Point Chehalis, Washington. A smaller amount of halibut mortality also occurred on open access (OA) vessels fishing with hook-and-line and pot gears in non-nearshore areas.

Table ES-1. Pacific halibut discard mortality estimates (metric tons, 2002-2010) for all sectors observed by the West Coast Groundfish Observer Program. Discard mortality rates were only applied in the LE bottom trawl and non-nearshore fixed gear sectors, for which some information regarding survivorship was available.

	LE bottom trawl	Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut*
		LE primary	LE non-primary	OA			
2002	344.8	23.2	0.0	-	-	-	0.0
2003	124.4	32.5	0.0	-	0.0	-	0.0
2004	133.1	40.2	0.0	-	1.0	0.0	0.8
2005	286.5	36.7	0.0	-	2.2	0.1	0.0
2006	242.5	107.2	0.0	-	0.5	-	0.0
2007	208.8	21.0	0.2	3.6	0.1	0.2	0.1
2008	207.8	39.5	0.4	7.1	0.4	0.0	0.3
2009	251.1	49.7	0.0	6.4	1.3	0.0	0.0
2010	181.0	22.4	0.1	5.3	0.1	0.0	0.0
Total	1980.1	372.4	0.8	22.4	5.6	0.3	1.3

* Discard mortality rate not applied

(-) Provided when there were insufficient observer data to estimate discard

Our results indicate that discard mortality of Pacific halibut increased from 2003 through 2006 and then dropped in 2007. Discard mortality increased gradually during the 2007-09 time period, but dropped again in 2010 (Figure ES-1). Note that variance calculations are based on uncertainty in observer data only. Uncertainty in logbook and fish ticket data were not accounted for in this analysis thus variance estimates provided here should be considered as minimum possible values. Pacific halibut discard in the nearshore fixed gear sector, pink shrimp trawl fishery, and California halibut trawl fishery represent a very small component of the overall total Pacific halibut mortality.

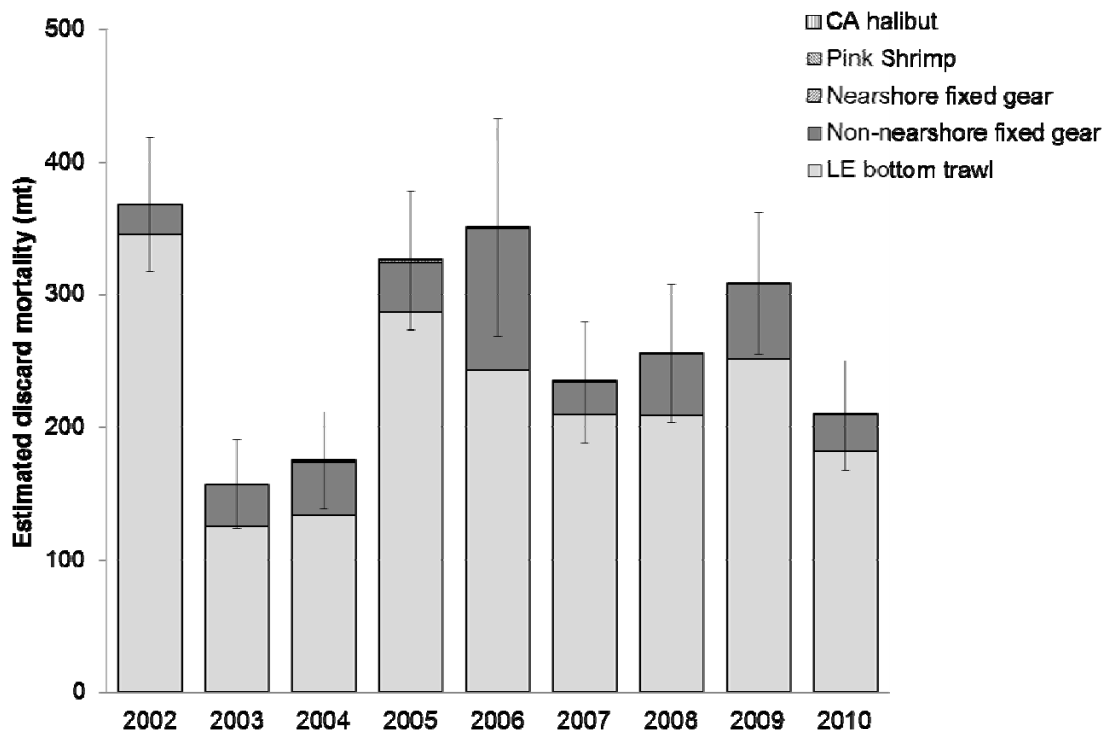


Figure ES-1. Total estimated discard mortality (metric tons) for 2002-2010 from all sectors observed by the West Coast Groundfish Observer Program. Estimates are not included for sectors and years where there were insufficient observer data.

Compared to the previously published report covering 2002-2009, there are two significant updates to the methods used to estimate Pacific halibut discard. The first change involves all years (2002-2010). In the previous report, sablefish was used as the denominator to expand OA Fixed Gear estimates (Heery et al. 2010). Because this fishery has multiple targets, the current report uses all FMP groundfish as the denominator in the expansion calculations. We feel this better reflects targeting behavior in the OA sector of the non-nearshore fixed gear fishery. The result is a slightly smaller discard ratio and slightly lower estimates of Pacific halibut discard relative to the ratios and estimates provided in Heery et al. (2010). The second difference pertains to only two strata in the 2010 Limited Entry trawl estimates. These two strata contained few or no observations in 2010 and therefore observed discard ratios could not be determined. Therefore, we estimated stratum-specific observed discard ratios for these two strata only, by bootstrapping ratios using data from all available years within each strata. The remainder of the 2010 Pacific halibut bycatch estimates were calculated as in the 2009 report.

Pacific halibut discard from the nearshore fixed gear, pink shrimp trawl, and California halibut trawl sectors contributed minimally to the overall estimate of Pacific halibut mortality. Discard mortality rates were not applied to estimates from these sectors because of limited information regarding survivorship. Note that 2010 represents the first year of data available from the Washington component of the pink shrimp trawl fishery.

INTRODUCTION

Pacific halibut (*Hippoglossus stenolepis*) is found in coastal waters throughout the North Pacific Region. Off the west coast of the United States, it inhabits continental shelf areas (< 150 fm) from Washington to central California (Clark and Hare 1998). This species has long supported a directed commercial fishery in the US and Canada, but it is also caught as bycatch in other fisheries that target demersal species inhabiting similar depths and seafloor habitat types. The primary objective of this report is to provide estimates of Pacific halibut bycatch in the U.S. west coast groundfish fishery from 2002-2010.

The west coast groundfish fishery is a multi-species fishery that utilizes a variety of gear types. The fishery harvests species designated in the Pacific Coast Groundfish Fishery Management Plan (FMP; PFMC 2008) and is managed by the Pacific Fishery Management Council (PFMC). There are currently over 90 species listed in the groundfish FMP, including a variety of rockfish, flatfish, roundfish, skates, and sharks (see Appendix B). These species are found in both federal (> 3 Nm) and state waters (0-3 Nm). Groundfish are both targeted and caught incidentally by trawl nets, hook-and-line gears, and fish pots.

Under the FMP, the groundfish fishery consists of four management components:

- Limited Entry (LE) – The LE component includes all commercial fishers who hold a federal limited entry permit. The total number of limited entry permits available is capped and permitted vessels are allotted a larger portion of the total allowable catch for commercially desirable species than non-permitted vessels.
- Open Access (OA) – The OA component includes commercial fishers who are not federally permitted. However, California Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife have instituted permit programs for certain OA sectors.
- Recreational – This component includes recreational anglers who target or incidentally catch groundfish species.
- Tribal – This component includes native tribal commercial fishers in Washington State that have treaty rights to fish groundfish. Estimates of Pacific halibut bycatch from tribal fisheries are not included in this report.

These four components can then be further subdivided into sectors based on gear type, target species, permits and various regulatory factors. Commercial LE and OA sectors have traditionally caught the largest quantities of groundfish and are observed by the West Coast Groundfish Observer Program (WCGOP).

The WCGOP was established in May 2001 by NOAA Fisheries (NMFS) in accordance with the Pacific Fishery Management Plan (50 CFR Part 660) (50 FR 20609). This regulation requires that all vessels that catch groundfish in the US EEZ from 3-200 miles offshore to carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require that vessels fishing in the 0-3 mile state territorial zone can also be required to carry observers. WCGOP observers are stationed along the US west coast from Bellingham, Washington to San Diego, California.

The WCGOP's goal is to improve estimates of total catch and discard by observing shoreside groundfish sectors along the US west coast. Originally, the WCGOP focused observer effort in the LE bottom trawl and LE fixed gear sectors. In 2002, the WCGOP began deploying observers in open access sectors while increasing its coverage of the LE bottom trawl sector. In 2005, the WCGOP increased its coverage of the LE fixed gear sector, and in 2006, the WCGOP improved coverage of the nearshore sector. In 2010, the WCGOP added observation of the Washington pink shrimp trawl fishery. Currently, the WCGOP coverage goal is to maintain, at a minimum, 20% coverage in the LE bottom trawl and LE fixed gear fisheries by landings, while continuing to improve coverage in the open access sectors of the groundfish fishery. An observer coverage plan from the WCGOP is available at: www.nwfsc.noaa.gov/research/divisions/fram/observer/observersamplingplan.pdf.

Pacific halibut is consistently caught as bycatch in two of the fishery sectors observed by the WCGOP: the LE bottom trawl sector and the non-nearshore fixed gear sector. The LE bottom trawl sector operates from the Canadian border to Morro Bay, California. Vessels in this sector must have a federal groundfish permit with a trawl endorsement. LE bottom trawl vessels range in size from 35 to 95 feet and fish throughout the year in a wide range of depths. Bottom trawlers often target species assemblages, which can result in diverse catch. A single groundfish bottom trawl tow often includes fifteen to twenty species. Fish size and weight of the total catch also vary widely. LE bottom trawl vessels deliver the portion of their catch that is marketable and permitted to be landed to shoreside processors. The portion of the catch that is prohibited by regulations or not marketable is discarded at-sea. Pacific halibut is considered a "prohibited species" in the LE bottom trawl sector, and all specimens caught as bycatch must be discarded.

The non-nearshore fixed gear sector consists of 3 major components: the LE sablefish-primary, the LE sablefish non-primary, and the OA components. A federal groundfish permit is required to participate in either LE component. In addition, a tier endorsement is required to participate in the LE sablefish-primary component. Although federal or state permits are not required to participate in the OA fixed gear sector, this portion of the fishery is subject to daily trip limit regulations set forth by PFMC. The same is true for LE non-primary vessels and for tier-endorsed LE vessels that have either reached their quota or are fishing outside of the sablefish primary season, which takes place from April to the end of October. Fixed gear vessels deploy pots and a variety of hook-and-line gears. However, the majority of directed sablefish effort is carried out using longlines. Pacific halibut is a "prohibited species" in the non-nearshore fixed gear sector with one exception. Prior to 2010, tier-endorsed (sablefish primary) vessels that fished with longline gear North of Point Chehalis, Washington (46° 53.30' N. lat.) were allotted some Pacific halibut landings. This regulation was modified in 2010 such that Pacific halibut can no longer be landed by any fixed gear vessels targeting FMP groundfish (75 FR 23615).

The WCGOP also observes the commercial nearshore sectors in Oregon and California, which target FMP groundfish typically in waters shallower than 50 fathoms, the pink shrimp sectors in Washington, Oregon, and California, and the California halibut trawl sector. Pacific halibut bycatch is rare in these fishery sectors, occurring on a maximum of 8% of observed tows/sets annually. We provide estimates of Pacific halibut fishing mortality in nearshore, pink shrimp and California halibut sectors in this report; however, previous WCGOP data reports supply more comprehensive information about each of these sectors and their annual observed catch of Pacific halibut (www.nwfsc.noaa.gov/research/divisions/fram/observer/). For a list of groundfish sectors that are not covered by the program, see the description of observer coverage in the annual report on estimated total mortality of groundfish species (Bellman et al. 2010).

Pacific halibut is managed by the IPHC, a body founded through treaty agreement between the US and Canada. The IPHC oversees the implementation of a directed Pacific halibut fishery on the US west coast using a derby fishery system with 10-hour openings. Many of the vessels that are observed by the WCGOP as part of the LE and OA fixed gear sectors participate in the directed fishery, but are not covered by the WCGOP during the IPHC derby fishery.

This report presents discard estimates from the following fishery sectors: LE bottom trawl, non-nearshore fixed gear, nearshore fixed gear, pink shrimp trawl, and California halibut trawl. Previous estimates of LE bottom trawl and non-nearshore fixed gear sectors can be found in Wallace and Hastie (2009) and Heery and Bellman (2009). The methods employed in these prior reports were reviewed, and when necessary, updated by Heery et al. (2010). All methods and updates employed by Heery et al. (2010) are used in the current analysis. Other than the addition of 2010 data, differences in the 2002-2009 estimates between this report and Heery et al. (2010) only pertain to the Open Access Fixed Gear longline sector and are very minor (compare Figure 5 in Heery et al. 2010 to Table 8 in this report). Otherwise, the 2002-2009 estimates in this report remain unchanged from those reported in Heery et al. (2010).

METHODS

A comprehensive review of the Pacific halibut discard estimation for the 2002-2009 report led to several changes in the methods from prior years (Heery et al. 2010). We maintain these changes in this 2010 report. Specifically, in the LE bottom trawl sector, changes included: (1) The inclusion of observer and logbook data from California; (2) An alternative approach to adjusting logbook tow time to account for less than 100% logbook submission rates; and (3) A broader post-stratification scheme for observer and logbook data. All three factors had a role in increasing discard estimates. Standard errors decreased because of the shift to broader stratification of the data, which eliminated the need for averaging of discard ratios across strata and increased the sample size within each stratum. In addition, there were two changes in the discard estimation method for the non-nearshore fixed gear sector in the 2002-2009 report: (1) A new method was applied to identify and remove directed Pacific halibut fishery landings, (2) The discard mortality rate for pot gear was changed to 18% based on Pacific halibut mortality information from Alaskan groundfish fisheries. The impact of these changes on final estimates was minor. All estimates are presented as round weight

Data sources

Data sources for this analysis include onboard observer data (from the WCGOP), trawl logbook data, and landing receipt data (referred to as fish tickets). The WCGOP coverage plan details program goals, vessel selection, observer coverage, and basic data collection (NWFSC 2006). A list of fisheries, coverage priorities and data collection methods employed in each observed fishery can be found in the WCGOP manual (NWFSC 2010).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. To ensure that the recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch weights recorded by WCGOP observers are adjusted based on trip-level fish ticket records. This process is described in further detail in annual reports produced by the WCGOP (www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/index.cfm) and was conducted prior to the analyses presented in this report.

Fish ticket landing receipts are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are trip-aggregated sales receipts for market categories that may represent single or multiple species. They are issued to fish-buyers by a state agency and must be returned to the agency for processing. Fish ticket and species-composition data are submitted by state agencies to the Pacific Fisheries Information Network (PacFIN) regional database. Annual fish ticket landings data were retrieved from the PacFIN database and subsequently divided into various sectors of the groundfish fishery as indicated in Figure 1.

Logbook record-keeping is a state-mandated requirement for the LE groundfish trawl sector in Washington, Oregon, and California. A common-format logbook is used by all three states and completed logbook information is entered into state agency databases. The electronic data are then submitted by state agencies to the PacFIN regional database. Trawl logbook data (2002-2010) were retrieved from the PacFIN database and processed as indicated in Figure 1.

When Pacific halibut are encountered on an observed vessel, WCGOP observers select a random sample of specimens and record length and viability. Lengths are determined through visual estimation or direct measurement. Although we summarize length frequency data in this report for any subsequent use by the IPHC, it is not incorporated in our analysis. Viabilities are collected according to a protocol from the IPHC, which is utilized by the North Pacific Groundfish Observer Program as well. Viability information was used to compute discard mortality rates (DMR) whenever possible.

Limited entry bottom trawl sector

Stratification

In a previously published Pacific halibut bycatch report (Heery et al. 2010), we describe how strata were evaluated. We refer interested readers to Heery et al. (2010) for a full description of all evaluation methods. The most appropriate strata for the LE trawl fishery according to Heery et al. (2010) are summarized in the following table:

Variable	Stratification
Latitude	north / south of 47.1518° N. latitude
Depth	shallower / deeper than 60.5 fm
Retained catch of other species	greater than / less than 125 kg per tow hour of all species tested (arrowtooth flounder, petrale sole, lingcod, Pacific cod, skates, yellowtail rockfish, and Pacific ocean perch)

To make estimates relevant within a management framework, Point Chehalis, Washington (46° 53.30' N. lat.), the closest geographic coordinate used in groundfish management to the latitudinal break supported by the model, was employed to define latitudinal strata. Tows were stratified by depth as greater than or less than 60 fathoms.

Bycatch estimation

We applied a deterministic approach to estimate bycatch of Pacific halibut in the LE bottom trawl sector. Through this approach, observed bycatch rates for Pacific halibut were directly expanded based on the total fleet effort (hours towed) (Table 1). Fleet effort was derived from trawl vessel logbooks. We refer

interested readers to Heery et al. (2010) for a full explanation of the review and justification of bycatch estimation methods which we summarize below.

Because logbooks are not available from 100% of the fleet, it was necessary to adjust logbook effort based on fish tickets, which are considered a more complete census of fleet-wide data and are legally binding documents. Logbook effort for Washington, Oregon and California was adjusted based on the ratio of the total FMP groundfish catch reported on fish tickets to that reported in logbooks. This ratio was computed separately for each state and month and was then multiplied by the total tow hours from each haul associated with landings in that month and state:

$$r_{ap} = \frac{L_{ap}}{W_{ap}}$$

$$H_{adj_{iap}} = H_{iap} \times r_{ap}$$

where:

r_{ap} = adjustment ratio

L_{ap} = lbs. of FMP groundfish recorded on fish tickets in state a and month p

W_{ap} = lbs. of FMP groundfish recorded in vessel logbooks from state a , in month p

H_{iap} = logbook tow hours from tow t , which landed its catch in state a during month p

$H_{adj_{iap}}$ = adjusted logbook tow hours from tow t , which landed its catch in state a during month p

The adjustment ratio was then applied to logbook tow hours at the tow level to enable subsequent stratification of the data by area, depth, and CPUE of other species. Logbook data were adjusted to account for logbook submission rates of less than 100%. Because the logbook program is implemented at the state level and the data are entered into state databases, we aggregated by state. Logbooks are submitted on a monthly basis (Sampson and Crone 1997) and change over time. We therefore maintained month as a variable used to aggregate data prior to computing adjustment ratios.

LE bottom trawl vessels may 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 groundfish and were identified in logbook and observer data 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 observer and logbook data that met at least one of the above criteria were removed from the LE bottom trawl dataset and included in bycatch estimation for the California halibut trawl fishery (see below). Whether in observer or logbook data, the tow target was typically determined by the vessel captain.

Next, both observer and logbook data were stratified based on the stratification scheme described in the previous section, with 2 area strata, 2 depth strata, and 2 CPUE strata. A discard ratio (R_{ij}) was then computed from all observed tows within stratum i and year j as:

$$R_{ij} = \frac{\sum_t y_{ijt}}{\sum_t x_{ijt}}$$

where:

y_{ijt} = observed discard of Pacific halibut (kg) in stratum i and year j during tow t

x_{ijt} = observed tow hours in stratum i and year j from tow t

The variance of R_{ij} was approximated by using the following equation (Cochran 1977):

$$Var(R_{ij}) = \left(\frac{\bar{y}_{ij}}{\bar{x}_{ij}} \right)^2 \left[\frac{s^2(y_{ijt})}{\bar{y}_{ij}^2} + \frac{s^2(x_{ijt})}{\bar{x}_{ij}^2} - \left(\frac{s^2(y_{ijt})}{\bar{y}_{ij}^2} \cdot \frac{s^2(x_{ijt})}{\bar{x}_{ij}^2} \right) \right]$$

where:

\bar{y}_{ij} and \bar{x}_{ij} = the means of y_{ijt} and x_{ijt}

$s^2(y_{ijt})$ and $s^2(x_{ijt})$ = the variances of y_{ijt} and x_{ijt}

This variance estimator is that which was employed by Pikitch et al. (1998) and is based on methods presented by Cochran (1977). Note that $Var(R_{ij})$ cannot be calculated when $x_{ijt} = 0$ or $y_{ijt} = 0$ for all tows. The lower and upper bounds of a 95% confidence interval were computed as follows:

$$l_{lower} = \frac{\bar{y}_{ij}}{\bar{x}_{ij}} - 1.96(\sqrt{Var(R_{ij})})$$

$$l_{upper} = \frac{\bar{y}_{ij}}{\bar{x}_{ij}} + 1.96(\sqrt{Var(R_{ij})})$$

Variance and confidence intervals were calculated separately for data in each geographic area, depth, and CPUE stratum (Table 2). Variance estimates, therefore, do not relate back directly to the random stratified sampling framework employed by the WCGOP, where vessels within each port group were the sampling unit. This might introduce bias into variance estimates. Although variance computed from the observer data is still provided in the same way it has been in previous reports (Wallace and Hastie 2009), it should be considered with caution.

Discard ratios were then multiplied by the total adjusted tow hours (H_{adj}) within each stratum to produce a series of gross bycatch estimates (B_{ij}):

$$B_{ij} = R_{ij} \times \sum_t H_{adj,t}$$

The product B_{ij} represents the total, or gross estimated bycatch weight within stratum i and year j . This includes all discarded fish, regardless of whether the fish survived after being discarded at sea.

Nearly all observed discard ratios were calculated as described above, with two exceptions. There were two strata in 2010 where discard estimates were either unestimable because of a lack of observations or inaccurate because of a very small sample size: 2010 North of Point Chehalis, ≤ 60 fathoms, and either (a) ≤ 125 lbs. correlating species (no observations) or (b) ≥ 125 lbs. correlating species ($N=2$). We estimated these discard ratios by non-parametric bootstrap resampling each of these two strata separately. We resampled, with replacement, the data within each stratum across all years (i.e., for (a) above = 2002-2009, for (b) = 2002-2010) to create ten thousand data sets per stratum. Discard ratios were calculated for each of the 10,000 data sets within each stratum. A single bootstrapped discard ratio for each stratum was then estimated from the mean and standard error calculated from the 10,000 ratio estimates within each stratum. The two bootstrapped discard ratios were used in stratum-level calculations (in their respective stata) in lieu of an observed discard ratio.

Viability analysis

We used observer field estimates of Pacific halibut viability discarded in the LE bottom trawl fishery (Table 3) to compute the total mortality of discarded Pacific halibut (Table 4). Observations of several condition characteristics are used to assign each fish to one of three viability categories: Excellent, Poor, or Dead (Williams and Chen 2004; Appendix L, WCGOP manual, NWFSC 2010).

To account for the impact of size on survivorship, we computed a weighted average mortality rate for each condition category. Length measurements associated with each viability record were converted to weight based on the IPHC length weight relationship:

$$W = 6.921 \times 10^{-6} \cdot L^{3.24}$$

where:

L = fork length (cm)

W = weight (lbs., head off, eviscerated)

A discard mortality rate for each condition category was then computed as the proportion of sampled weight in that category multiplied by a category-specific mortality rate:

$$DMR_{csj} = m_c \times P_{csj}$$

where:

m_c = mortality rate for condition c (Excellent, Poor, or Dead)

P_{csj} = proportion of sampled weight (W) in condition c , in stratum s in year j

DMR_{csj} = discard mortality rate in condition c , in stratum s in year j

Mortality rates used for each of the condition categories (m_c) are as follows (Clark et al. 1992):

m_c	Rate
m_{exc}	0.20
m_{poor}	0.55
m_{dead}	0.90

These rates are originally based on mortality data collected by Hoag (1975), who found some survivorship among fish in the dead condition category. Discard mortality rates for each condition category c and stratum s were then multiplied by gross discard estimates to compute total estimated discard mortality:

$$F_{ij} = \sum_c B_{ij} \times DMR_{cjs}$$

where:

F_{ij} = total estimated discard mortality in stratum i in year j

The variables used to define strata for discard mortality rates (s) and gross discard estimates (i) differed because of differences in the way viabilities and gross estimates are stratified. Viability data are collected from only a subsample of the Pacific halibut that observers encounter. Very small sample sizes arise when the viability data are stratified by latitude, depth, CPUE strata, and year simultaneously. Based on previous evaluations by Wallace and Hastie (2009), we expect that survivorship of Pacific halibut in the trawl fishery is most directly affected by the length of the tow and the amount of catch that fills the net. These variables are not part of the bycatch ratio stratification process described in previous sections, and their use in

stratifying viability data would make it difficult to then apply discard mortality rates to initial gross estimates of bycatch. We found that tow duration was directly related to depth, one of the variables used to stratify discard ratios and initial gross discard estimates. Because depth and tow duration appeared to covary, we used only depth to stratify viability data from each year (Tables 3 and 4). This essentially assumed that the physical condition of discarded Pacific halibut was not related to tow location.

Viability data are available from 2004 onward. For 2002 and 2003, we applied a discard mortality rate computed by summing the average weights in each condition category across all years. Final estimates of Pacific halibut bycatch and discard mortality are presented in Table 5, which also includes the estimated mortality of legal-sized halibut. This was computed by applying the proportion of sampled weight in each depth stratum that was from legal-sized fish (82 cm or larger) to initial estimates. Viabilities were then applied to gross legal-sized discard estimates in the same manner as described above.

Length frequencies

The length frequency distribution for Pacific halibut in the 2010 trawl fishery is provided in Table 6. Pacific halibut pose unique challenges for observer sampling. When catch from a trawl net is dumped on deck, crew members often presort the catch, removing Pacific halibut and immediately return them to sea. Vessels presort Pacific halibut to increase the likelihood of survival of the discarded fish. In addition, halibut are often too heavy and/or awkward to weigh in observer baskets. Therefore, in most circumstances observers visually estimate the length of the halibut in ten-centimeter units (40cm, 50cm, 60cm, etc.), which are later converted to weight using the IPHC length/weight conversion table. Observers also have the option of directly measuring a Pacific halibut and then converting the measurement to weight using the IPHC length/weight conversion table or actually weighing the individual fish, but this rarely occurs. Observers are trained in visually estimating lengths, including (when possible), pairing visual length estimates with actual length estimates to develop better visual estimates. In addition, visual estimates are nearly always calibrated against known lengths either measured or marked on areas of the vessel or gear where Pacific halibut are frequently observed but not available for sampling. For example, portions of the trawl deck might be constructed of uniform boards of a known width. These boards could be used as a visual gauge to quickly estimate the length of a Pacific halibut that was landed but unable to be physically measured. Even though visual length estimates are likely to be slightly more variable than actual length estimates, visual estimates often represent the best available length measurements and comprise the largest amount of length data obtained by the WCGOP.

Table 1 of Appendix A provides the observed length frequency distributions of discarded Pacific halibut for 2004 through 2010 that have been weighted based on the ratio of total estimated halibut discard weight to the weight of halibut that was measured in each stratum (see Appendix A for further details). Because size-specific mortality rates are not available, we were not able to compute the length frequency distribution of discarded fish that died. However, we have summarized the proportion of length measurements in each condition category (Excellent, Poor, and Dead) in Table 2 of Appendix A to inform size-specific modeling of mortality. The frequency of sampled fish within each condition category was weighted in the same manner as length frequency distributions and then summarized for each 2 cm length bin.

Non-nearshore fixed gear sector

Stratification

Testing of alternative stratification schemes (Heery et al. 2010) indicated that latitude and gear type were the most important variables with respect to Pacific halibut bycatch in the fixed gear fishery. The WCGOP samples each fixed gear sector through a separate random selection process, with LE primary permits receiving the highest level of coverage and OA fixed gear the lowest. Given this sampling structure and anticipated differences in variance from one sector to the next, we chose to maintain sector as a stratification variable in our analysis. Bycatch estimates were produced separately for each sector and gear combination. Two latitudinal strata were applied to the LE sablefish primary longline sector (north and south of Point Chehalis, Washington = 46° 53.30' N. lat.) because previous modeling demonstrated that these strata significantly improved the fit of predicted bycatch amounts to the amounts observed (Heery et al. 2010). Evaluations of latitudinal strata for the other fixed gear sectors did not improve the fit of our models to an extent that justified their use. Thus, we maintained the same stratification for the other fixed gear sectors that was used previously by Heery and Bellman (2009) and Heery et al. (2010).

Bycatch estimation

A deterministic approach was used to estimate Pacific halibut bycatch for all sectors of the non-nearshore fixed gear fishery. Bycatch ratios (Table 9) were computed from observer data as the discarded weight of Pacific halibut divided by the retained weight of either sablefish or all FMP groundfish (except Pacific hake), depending on the sector (Table 8). A complete listing of FMP groundfish species used to compute and expand ratios is provided in Appendices B and C. Bycatch ratio denominators were identified for each sector of the non-nearshore fixed gear fishery based on the targeting behavior of that sector. Bycatch ratios were then multiplied by the total sector landed weight of either sablefish or FMP groundfish (except Pacific hake), corresponding to the denominator used to compute the observed discard ratio for each sector. This provided an expanded gross estimate of Pacific halibut bycatch for each sector (Table 11). A discard mortality rate (discussed below) was then applied to compute estimated discard mortality (Table 11).

Fish tickets with landings of sablefish using fixed gear were partitioned into the three commercial fixed-gear sectors (LE sablefish primary, LE sablefish non-primary, and OA fixed gear) through the following process. Commercial fixed-gear fish tickets were first divided out by whether the vessel had a federal groundfish permit (limited entry) or no federal groundfish permit (open access). OA fish tickets were placed in the OA fixed gear sablefish sector. 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 if it was not endorsed (also referred to as 'zero' tier). Fish tickets for all LE sablefish vessels with tier endorsements that were operating within this period and within their allotted tier quota were placed in the LE sablefish-endorsed primary sector. If LE sablefish-endorsed vessels fished outside of the primary season (November through March) or made trips within the season after they had reached their tier quota, the fish tickets were placed in the LE sablefish non-primary sector. In addition, fish tickets from non-endorsed LE vessels were also placed in the LE sablefish non-primary sector.

Further processing of fish tickets identified and removed the directed Pacific halibut fishery landings from the non-nearshore fixed gear analysis. The directed Pacific halibut fishery occurs for only a few days each

year, during 10-hour openings that are designated by the IPHC. In 2010, there was a single opening on June 30th. To ensure directed halibut fishery landings were not attributed to either the LE or OA sectors, fish tickets that included Pacific halibut landings within 2 days of a directed fishery opening were considered to be part of the directed fishery. These fish tickets were removed prior to our analysis.

The WCGOP observes the non-nearshore groundfish fixed gear sectors in the following order of priority: LE sablefish-endorsed primary season, the LE non-sablefish-endorsed ('0' tier) sector, and the OA fixed-gear sector. LE sablefish-endorsed vessels that fish outside of the primary season or that have reached their tier quota in the primary season are not observed. For more information see the most recent WCGOP non-nearshore fixed gear report (NWFSC 2010).

WCGOP observer data were stratified according to sector and gear type (longline and pot/trap). As discussed earlier, one additional latitudinal stratum at Point Chehalis, Washington (46° 53.30' N lat.) was used for the LE sablefish primary longline sector. Discard amounts provided for the other two fixed gear sectors represent coastwide estimates.

The number of observed trips, sets, and vessels are summarized for each sector, gear type and area (where applicable) in Table 7. Table 9 provides the landed weight of sablefish and FMP groundfish (excluding Pacific hake) used as a measure for expanding discard from observed trips to the entire fleet. Observed discard ratios (also in Table 9) were calculated by sector, gear group and area based on the following equation:

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

where:

s: strata (sector / gear group / area)

t: observed sets

d: observed discard (kg) of Pacific halibut

r: observed retained weight (mt) of sablefish or all FMP groundfish except Pacific hake

F: weight (mt) of retained sablefish or all FMP groundfish excluding Pacific hake recorded on fish tickets in strata *s*

\hat{D}_s : Discard estimate for strata *s*

Discard ratios were calculated for the LE sablefish primary fishery (longline and pot) by dividing the stratum discard weight of Pacific halibut by the retained catch weight of sablefish. Retained groundfish was used as the ratio denominator for the LE non-primary longline and the OA sectors because these sectors target a wider range of groundfish species. A broader denominator was therefore necessary to effectively capture the level of fishing effort in these sectors. Values provided in the tables (Tables 7, 9-12) for this report are identical to those provided in Heery et al. 2010, but with updated information for 2010 and updated numbers for the OA sector using groundfish as the ratio denominator. Please refer to earlier reports for further details of data pooling and discard ratios in prior years of observer coverage.

Where FMP groundfish (excluding Pacific hake) 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 by the processor under a grouped species code such as NUSP - northern unspecified slope rockfish. In some cases, this difference in species coding prevents observer and fish ticket weights from being matched and adjusted properly. Species coding on fish tickets varies considerably between processors and over time, and it is not possible to make assumptions regarding which individual observer-recorded species likely coincide with species grouping codes on fish tickets. By using only the retained groundfish weight from fish tickets in discard ratio denominators, we prevent double-counting of retained weights. This is not a factor when using a single species in the denominator, such as sablefish, as any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

In each stratum, the observed discard ratio (Table 9) was multiplied by the fish ticket retained weight of sablefish or all FMP groundfish species (excluding Pacific hake). Table 8 demonstrates how the expansion factor was calculated to obtain a discard rate for each fishery sector and gear type. The discard rate applied yielded an expanded gross discard estimate for each stratum. If landings were made by a fixed gear sector for which there were no or very few WCGOP observations, the most appropriate observed discard ratio was selected and applied to those landings based on similarities in the fishery management structure, fishing and discard behavior, and the gear fished. The LE sablefish non-primary sector landed 18 mt of FMP groundfish with pot gear in 2009, but this portion of the fleet was not observed by the WCGOP program. Given similarities in gear type and catch composition, OA fixed gear pot observations were selected as the most appropriate source of information for an observed discard rate to apply to those landings by vessels fishing with pots in the LE sablefish non-primary sector (Table 8).

Discard mortality rates

Once an initial gross estimate of discard had been produced, this value was multiplied by a discard mortality rate to generate a final discard mortality estimate (Table 12 and Figure 3). Ideally, discard mortality would have been approximated based on viabilities in a manner similar to the approach used for the LE bottom trawl sector. WCGOP observers do record viability as Pacific halibut are discarded from longline vessels. However, much of the time, Pacific halibut are removed from the line before being brought onboard. This is to ensure safety, as longline vessels are often small, and to have the least possible impact on Pacific halibut survivorship. Because these fish are not typically brought onboard, the observer is not able to effectively assess viability or gain a random sample from Pacific halibut catch. Although viabilities from pot gear would be appropriate to use in estimating discard mortality, bycatch of Pacific halibut in pot gear is infrequent and the sample size of viability data from this gear type was too small to utilize in this analysis.

Observer collected Pacific halibut viabilities from the non-nearshore fixed gear fishery were not used in our analysis. Discard mortality rates therefore had to be identified through other means. Review of the literature on Pacific halibut bycatch revealed little that could be applied to the entire discard estimate. Several studies have examined the survivorship of Pacific halibut in various conditions (Kaimmer and Trumble 1998, Trumble et al. 2000). However, without any information on the state of Pacific halibut that were being discarded, the findings from these examinations could not be put to use.

Instead, we relied on discard mortality rates computed for groundfish fisheries off Alaska (Williams 2008). An 18% discard mortality rate was applied to estimates for pot gear, coinciding with the discard mortality rate (DMR) used for the sablefish pot CDQ fishery in Alaska. For longline gear, we used a discard mortality rate of 16%, an average of DMRs over all years for the Bering Sea/Aleutian region longline fishery (Williams 2008).

For additional context, Table 13 provides the length frequency distribution of Pacific halibut from visual estimates and actual lengths measured in the LE sablefish primary sector. Table 14 presents the proportion of sampled Pacific halibut discard in the non-nearshore fixed gear sector that was of legal (≥ 81 cm) and sublegal (< 81 cm) size. The majority of Pacific halibut lengths recorded in this fishery have been collected through visual length estimation, during which observers round to the nearest 10 cm. In other words, specimens that are 76 cm and 82 cm are both visually estimated to be 80 cm. With this level of resolution, it was not possible to compute the exact proportion of sublegal versus legal Pacific halibut from visually estimated lengths. Visual estimates were instead summarized in the manner in which they are recorded; with sublegal and legal sized halibut falling within the 75-84 cm length bin. Actual length measurements are available for 169 Pacific halibut from September 2003 through December 2010. Although sublegal versus legal percentages were computed from this data, actual length measurements do appear to contain a higher frequency of smaller individuals than visual estimates (Figure 4).

Other fishery sectors

Pacific halibut was also observed in the nearshore fixed gear, pink shrimp and California halibut trawl fisheries. Bycatch estimates for these three fishery sectors were computed based on the following equation:

$$\hat{B} = \frac{\sum_t b_t}{\sum_t r_t} \times F$$

where:

b : observed discard (kg) of Pacific halibut on set/tow t

r : observed retained weight (mt) of target species on set/tow t

F : weight (mt) of retained target species

\hat{B} : Bycatch estimate

The nearshore fishery targets a variety of groundfish species that inhabit areas shallower than 50 fathoms. All species included in the nearshore target group as listed in Appendix D were included in the denominator when calculating bycatch ratios for the nearshore fixed gear sector. Pink shrimp and California halibut were considered the target species in their respective fisheries.

Tables 15, 16 and 17 present the resulting bycatch estimates for the nearshore fixed gear sector, pink shrimp trawl fishery, and California halibut trawl fishery. Discard mortality rates were not applied to bycatch estimates for these fishery sectors due to a lack of information regarding survivorship. Note that the California halibut trawl fishery consists of 2 components: a limited entry sector and an open access sector. For more information regarding the differences between these 2 components, see annual data reports published by the WCGOP (www.nwfsc.noaa.gov/research/divisions/fram/observer/). In 2010, WCGOP

began coverage of the Washington pink shrimp fishery in addition to on-going coverage of the Oregon and California pink shrimp fisheries.

RESULTS

Limited entry bottom trawl sector

Table 1 summarizes annual observer coverage within each area and depth strata for the LE bottom trawl sector.

Gross bycatch estimates and total discard mortality estimates for the 2002-2010 LE bottom trawl sector are provided in Table 5. Estimated Pacific halibut discard mortality was highest in 2002 and then peaked again in 2005. Discard mortality decreased after 2005, increased in 2009 and decreased again in 2010, to 110 mt. Fluctuations have occurred while trawl effort in recent years has gradually increased, from 56,016 tow hours in 2004 to 85,047 tow hours in 2009. However, in 2010, tow hours decreased to 68,604 hours, which likely contributed to the very low 2010 mortality (kg) per tow hour of 1.6 (Table 5). To compute discard mortality estimates prior to 2004, all observer collected viability data from 2004 through 2009 were used. Confidence intervals are derived from uncertainty in observer data only. The stratified random sampling design employed by the WCGOP selects vessels for coverage within each port group and bimonthly period. This approach provides the best logistical scenario for the implementation of the program and appears to achieve good spatial and temporal coverage of the fleet (Figure 2). However, the sampling framework differs from the post-stratification scheme used in this analysis. Uncertainty estimated from post-stratified data can be biased, and should be used with caution. For this reason, and because of uncertainty that has not been accounted for in fish ticket or logbook data, the confidence intervals we provide should be considered as minimum values.

Non-nearshore fixed gear sector

Estimated discard mortality of Pacific halibut in the LE sablefish primary longline sector decreased from 2009 to 2010 north of Point Chehalis but increased from 2009 to 2010 south of Point Chehalis (Table 11). Both the decrease (north) and the increase (south) appear to be associated with fishing effort. For example, north of Point Chehalis both the total amount of sablefish retained and the discard ratio decreased relative to 2009 (Table 9). In other words, effort decreased and less Pacific halibut was discarded in relation to the amount of sablefish landed. Both factors likely contribute to lower estimates of Pacific halibut discard mortality in this area (Table 11). South of Point Chehalis, slightly more sablefish were landed and the discard ratio was slightly higher in 2010 compared to 2009 (Table 9), both of which likely contribute to a slightly higher estimate of Pacific halibut discard mortality in 2010 (Table 11). On a coastwide basis, it appears that the significant decrease in Pacific halibut discard estimates north of Point Chehalis drove a coastwide decrease in the estimate from 2009 to 2010.

While the annual change (from 2009 to 2010) in estimated discard of Pacific halibut in the LE sablefish primary longline sector might be associated with fishing effort, it is also important to note that observer coverage in this sector was considerably higher in 2010 compared to 2009. The 2009 sablefish primary season coincided with the end of a WCGOP selection cycle resulting in very low coverage of vessels in 2009 relative to 2010. Low observer coverage in 2009 introduces a considerable degree of uncertainty into our discard estimates for that year.

Discard of Pacific halibut in other non-nearshore fixed gear sectors during 2010 was mostly consistent with estimated discard amounts in previous years. Gross estimated discard in the LE primary pot sector increased from 2009 to 2010, but remained within a range comparable to earlier years. Among the non-primary fixed gear sectors (LE and OA), OA fixed gear vessels fishing with hook-and-line gears had the largest amount of Pacific halibut mortality. Discard mortality in this sector was 5.2 mt, down slightly from 6.3 mt in 2009. Estimates of effort in the OA fixed gear sector are slightly greater in all years compared to landings reported in the 2009 report (Heery et al. 2010). This is caused by using all FMP groundfish landings compared with only sablefish landings in the 2009 report. Even so, groundfish landings in 2010 were ~100 mt greater than in 2009 for OA hook-&-line gears. This did not affect discard estimates (Table 11) however, as the observed discard rate for Pacific halibut in this sector during 2010 was lower than in previous years (Table 9).

A large source of uncertainty in our estimates of Pacific halibut discard mortality on non-nearshore fixed gear vessels is the actual discard mortality rate applied to initial gross estimates that are computed from observer data. A small sample size of observed viability data are available from sablefish vessels fishing with pots, but not enough to be used in discard mortality estimation. Instead, we relied on findings from observed pot vessels in Alaska that assign specimens to the same condition codes used for trawl gear and then apply the discard mortality rates assumed by Williams (2008). This informed our decision to increase the discard mortality rate applied to pot estimates to 18% from 16%. As more viability information is collected by WCGOP observers from pot vessels, we intend to apply this directly to compute discard mortality in a manner consistent with methods of Williams (2008).

Just as for trawl gear, discard mortality rates have been determined experimentally for Pacific halibut caught with longline gear (Kaimmer and Trumble 1998, Trumble et al. 2000). To apply these rates, Pacific halibut caught on longlines are assigned to one of four condition categories (minor, moderate, severe, and dead.) based on the extent of their injuries at the time of release. Kaimmer and Trumble (1998) used mark-recapture data to derive discard mortality rates for each of these categories. Their rates were later updated by Trumble et al. (2000) to account for hook sizes that are more consistent with gear used on the West Coast for commercial purposes.

For reasons described earlier, Pacific halibut were infrequently brought onboard observed fixed gear vessels from 2002 to 2010, resulting in a small and potentially biased sample of viability data. Mortality rates specified by Trumble et al. (2000) cannot therefore be used in conjunction with these data to assess overall discard mortality. However, changes are being implemented in the WCGOP data collection protocol that will allow observers on fixed gear vessels to collect a random sample of Pacific halibut from which to gather viability data. These will be employed to evaluate discard mortality as soon as they become available. In the meantime, discard mortality rates of 16% for longline gear and 18% for pot gear (Williams 2008) are thought to be the best option currently available.

Other fishery sectors

Observed bycatch amounts of Pacific halibut in other fishery sectors continue to remain very small. Even without the application of discard mortality rates, bycatch estimates for the nearshore fixed gear sector, pink shrimp trawl fishery, and California halibut trawl fishery made up a minor portion of our total mortality estimate for Pacific halibut. Bycatch estimates provided in Tables 15, 16, and 17 are not intended to represent mortality values, as rates of discard mortality for these sectors are not available.

SUMMARY & CONCLUSIONS

- With a few minor exceptions, methods follow the methods tested and used in Heery et al. 2010.
- Estimates of Pacific halibut mortality in 2010 are well within the range observed in previous years, for all sectors observed.
- Estimated discard mortality in the LE bottom trawl sector fluctuated over the study period, with peaks in 2002, 2005, and 2009.
- Estimated mortality per tow hour of Pacific halibut in the LE bottom trawl sector has declined steadily since 2005.
- Estimated discard mortality in the LE and OA sablefish fixed gear sector fluctuated over the study period, with the largest peak of 107 mt in 2006, and smaller peak in 2009, at 56 mt.
- Within the sablefish fixed gear sector, LE sablefish primary vessels had the largest amount of Pacific halibut discard.
- Pacific halibut bycatch in the nearshore fixed gear, pink shrimp trawl, and California halibut trawl fisheries continues to remain very low.

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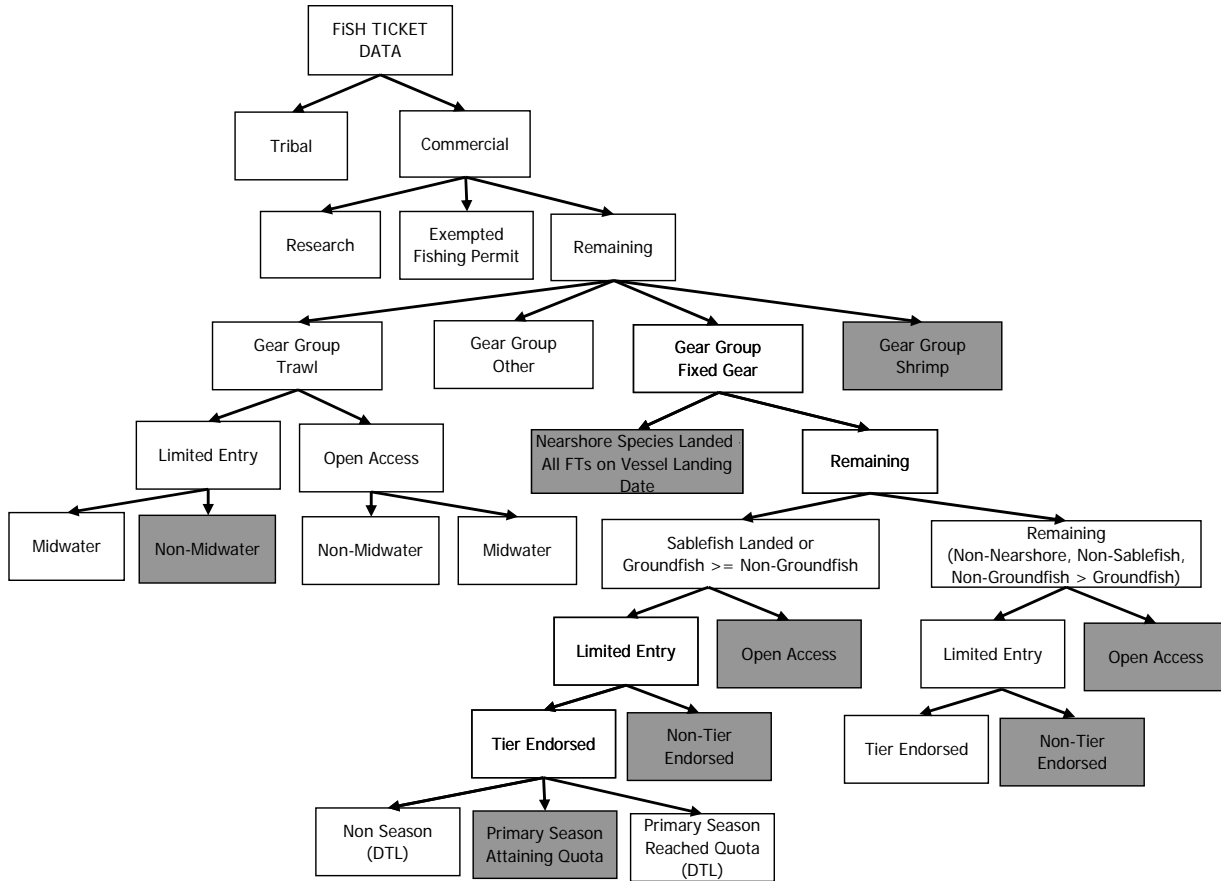
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FIGURES

Figure 1. Fish ticket and logbook data processing for division into groundfish fishery sectors after retrieval of a full calendar year data set from the Pacific Fisheries Information Network (PacFIN) database. Grey highlight indicates sectors for which federal observer data is available. Fish ticket processing methods are updated regularly, thus this figure might differ from similar figures in previous reports.

Fish Ticket Processing



Logbook Processing

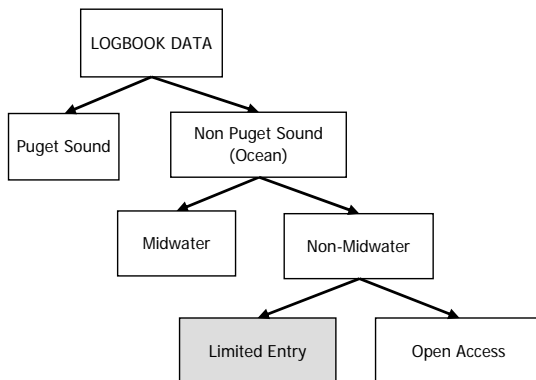


Figure 2a. Locations of 2010 observed and fleet logbook limited entry trawl tows, north of Coos Bay, Oregon. A trawl towline model (i.e., line connecting start and end point locations of a trawl event) was used to allocate effort data to 10 x 10 kilometer grid cells.

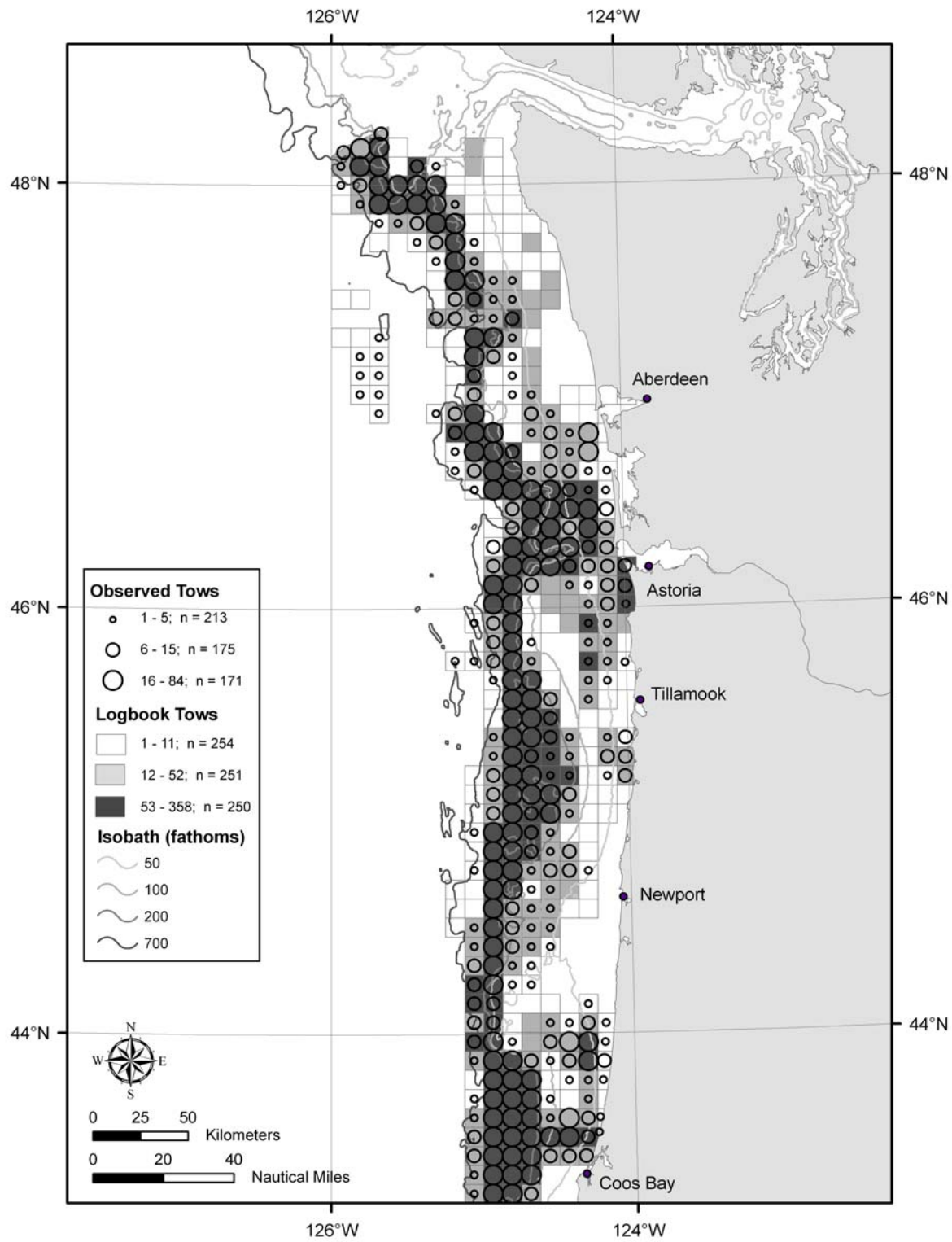


Figure 2b. Locations of 2010 observed and fleet logbook limited entry trawl tows, south of Coos Bay, Oregon and north of San Francisco, California. A trawl towline model (i.e., line connecting start and end point locations of a trawl event) was used to allocate effort data to 10 x 10 kilometer grid cells.

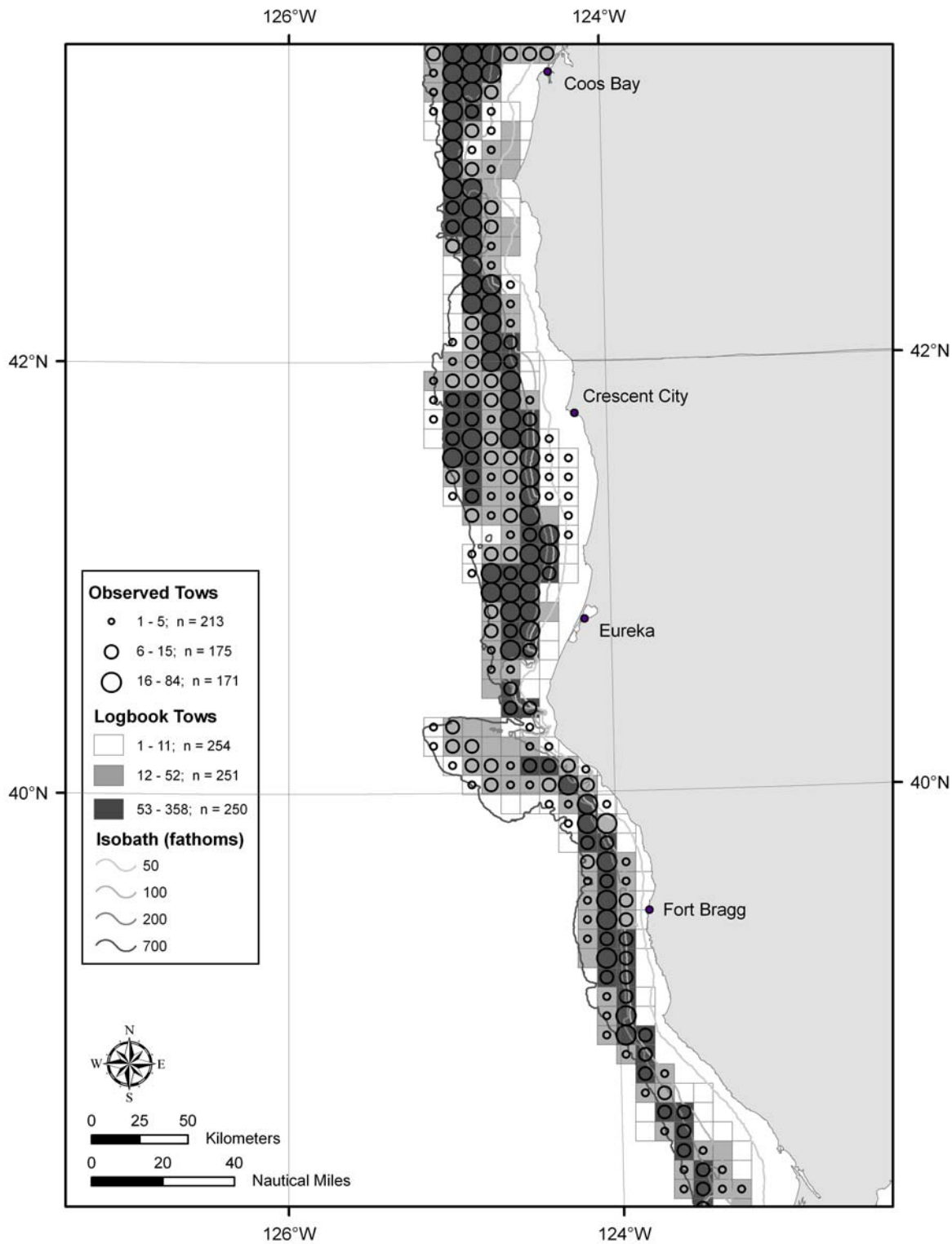


Figure 2c. Locations of 2010 observed and fleet logbook limited entry trawl tows, south of San Francisco, California. A trawl towline model (i.e., line connecting start and end point locations of a trawl event) was used to allocate effort data to 10 x 10 kilometer grid cells.

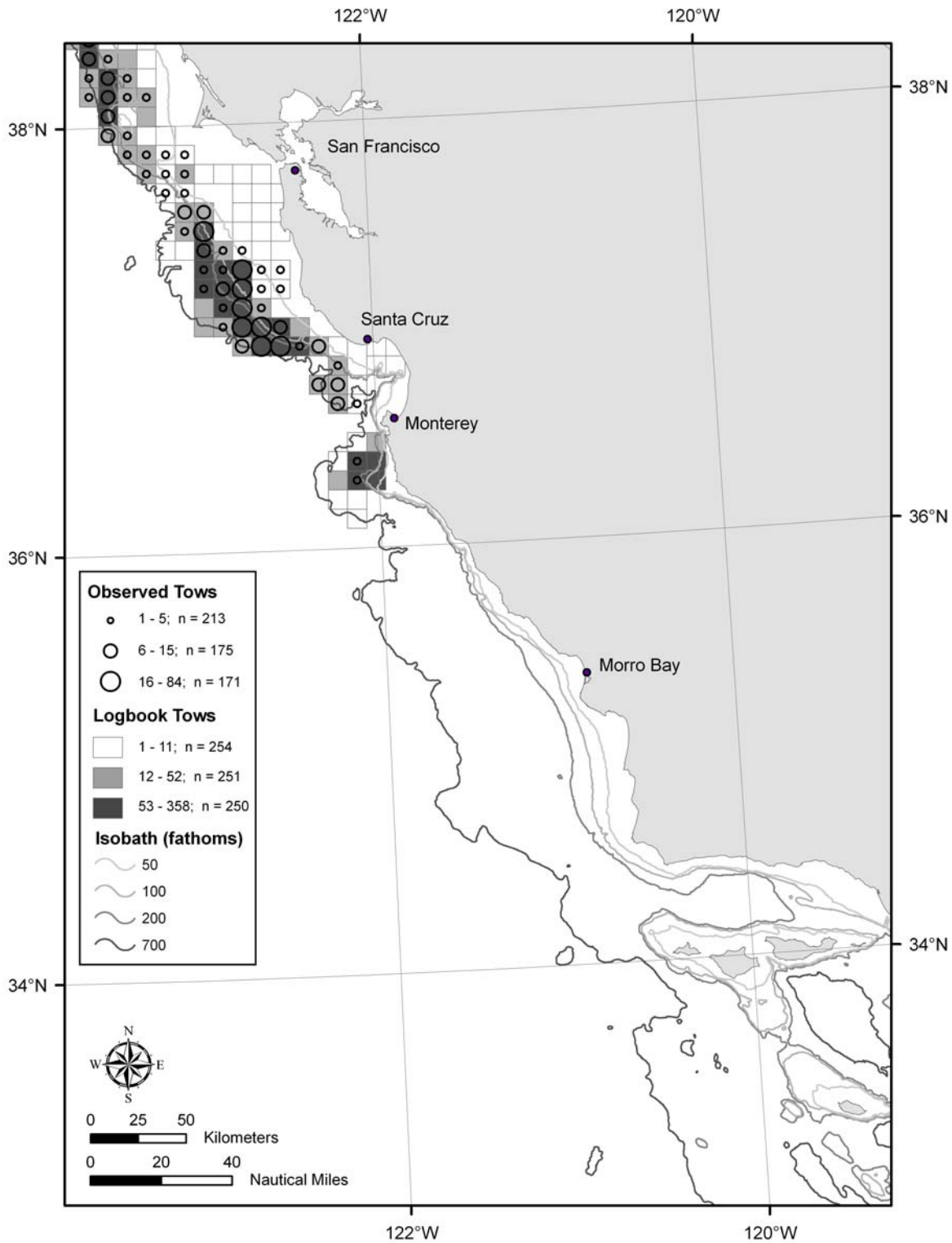


Figure 3. Estimated discard mortality of Pacific halibut in the non-nearshore groundfish fixed gear fishery. Estimates are presented for fixed gear sectors with annual discard estimates exceeding 1 mt, which included all components of the limited entry (LE) sablefish primary sector (longline gear (LL) by area and pot gear (POT) coastwide) and the open access (OA) sector using hook-and-line gears. The OA fixed gear sector was only observed in California from 2003-2006 and was not covered in 2002. A fixed average discard rate from 2007 and 2008 data was applied to generate 2002-2006 discard estimates for the OA sector. Although OA 2002-2006 discard estimates are not included in final total mortality summaries, they are shown here for comparison purposes.

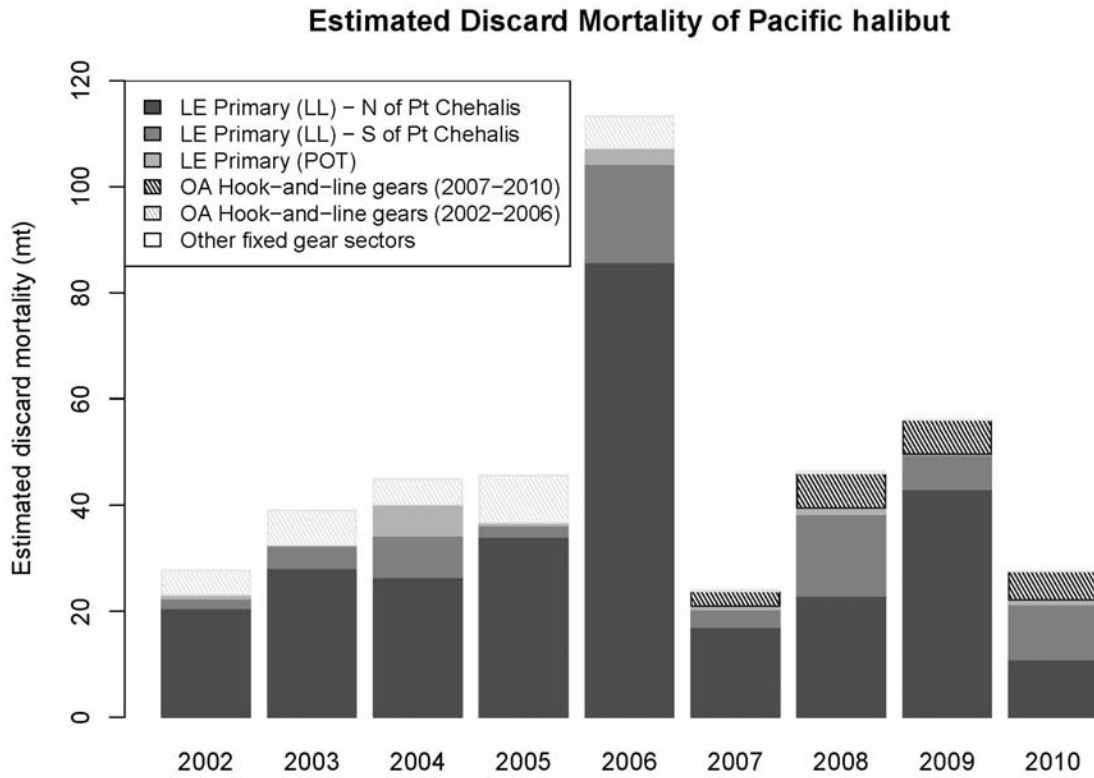
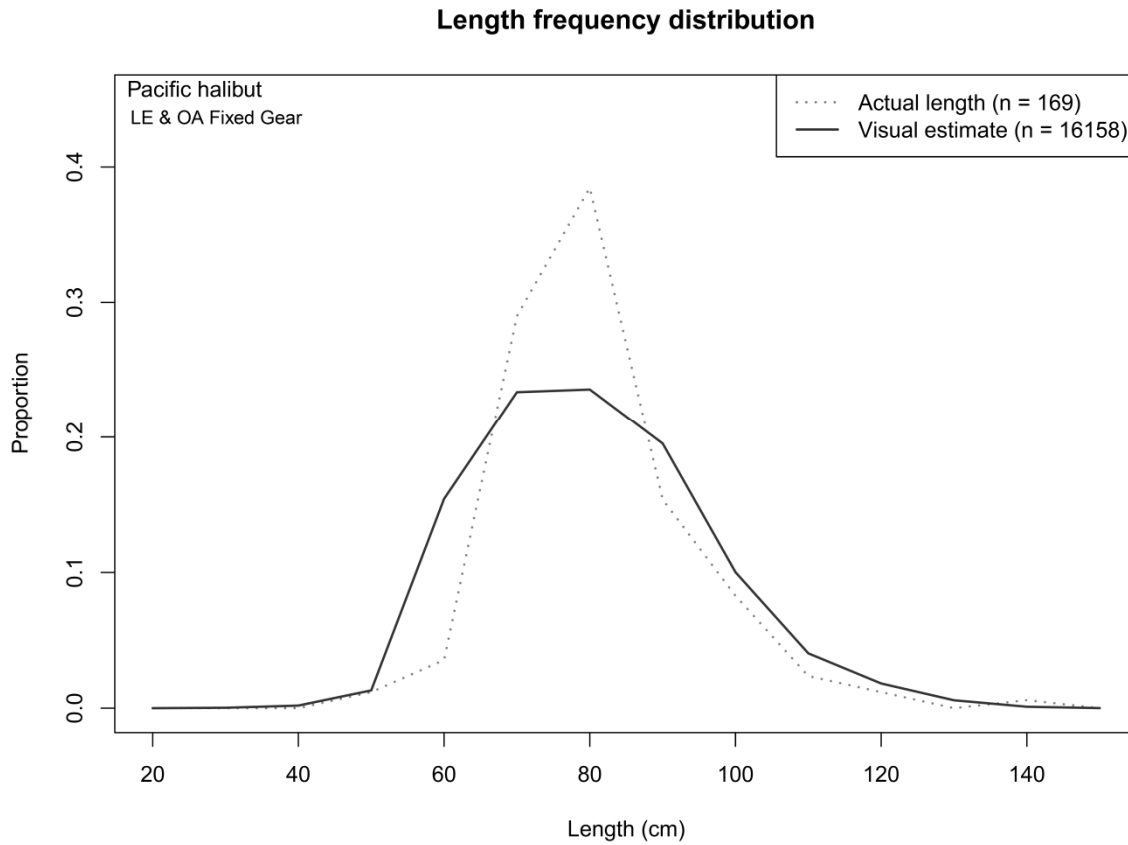


Figure 4. Length frequency distribution of discarded Pacific halibut on WCGOP observed limited entry (LE) and open access (OA) groundfish fixed gear vessels from September 2003 through December 2010. The majority of Pacific halibut lengths collected in this fishery were visual estimates (solid dark line). Actual length measurements (dashed gray line) were only available for 169 fish.



TABLES

Table 1. Observed trips, tows, vessels, Pacific halibut discard (kg), and tow hours in the LE bottom trawl sector. Data are provided for each area, depth, and year strata used in our analysis. Total fleet tow hours and the percentage of tow hours that were observed are presented on the far right, based on trawl logbook data from the PacFIN regional database. Note that Point Chehalis is located at 46° 53.30' N. lat.

	Num. of observed trips	Num. of observed tows	Num. of observed vessels	Observed Pacific halibut discard (kg)	Observed tow hours	Vessel logbook total tow hours ¹	% of tow hours observed
North of Pt Chehalis							
0 to 60 fm							
2002	102	341	15	5,818	592	2,934	20%
2003	20	80	7	412	199	1,527	13%
2004	98	307	13	6,969	604	3,539	17%
2005	62	234	16	5,380	451	2,559	18%
2006	73	197	14	4,400	411	3,044	14%
2007	26	114	6	3,261	254	1,965	13%
2008	12	124	3	2,320	373	1,345	28%
2009	19	138	10	4,931	271	967	28%
2010	*	11	*	*	*	*	*
> 60 fm							
2002	110	443	25	41,165	1,623	13,766	12%
2003	59	299	23	11,188	1,318	10,521	13%
2004	94	397	21	22,851	1,256	5,862	21%
2005	134	778	31	64,433	2,157	9,465	23%
2006	96	417	21	36,897	1,330	7,177	19%
2007	42	281	15	14,872	1,223	7,446	16%
2008	54	459	24	35,271	2,328	10,962	21%
2009	68	526	25	42,739	2,475	11,055	22%
2010	81	374	37	14,209	1,727	8,616	20%
South of Pt Chehalis							
0 to 60 fm							
2002	110	609	34	4,226	1,208	8,394	14%
2003	91	279	25	575	566	6,615	9%
2004	125	812	28	3,286	1,536	7,417	21%
2005	132	622	35	8,141	1,603	8,590	19%
2006	118	678	28	12,902	1,640	9,568	17%
2007	72	406	21	8,934	1,131	7,678	15%
2008	61	321	15	1,798	726	4,278	17%
2009	88	616	21	11,412	1,511	5,152	29%
2010	55	231	18	1,851	506	2,737	18%
> 60 fm							
2002	378	1734	118	7,753	9,988	70,012	14%
2003	334	1625	104	8,293	9,388	58,480	16%
2004	390	1914	90	10,909	10,394	39,198	27%
2005	354	1808	89	24,016	8,297	39,770	21%
2006	330	1680	73	18,225	8,054	40,687	20%
2007	297	1707	81	18,017	8,758	46,857	19%
2008	376	2281	92	25,351	11,577	58,751	20%
2009	517	3098	95	32,303	15,285	67,873	23%
2010	473	1998	142	18,115	10,790	56,982	19%

¹Vessel logbook total tow hours have been adjusted based on the total fish ticket landings of groundfish in each state and bimonthly period.

Table 2. Annual observed discard ratios (kg/hr) and estimated gross discard (kg) for Pacific halibut in each of the depth, area, and CPUE strata used in our analysis for the LE bottom trawl sector. “Correlating species” includes arrowtooth flounder, petrale sole, lingcod, Pacific cod, skates, yellowtail rockfish, and Pacific Ocean perch. Observed discard ratios for two strata (») were estimated using bootstrap methods because observed samples were either too small to estimate ratios accurately (≤ 3 vessels; ≥ 125 lbs/hr) or not observed (≤ 125 lbs/hr) and therefore no ratio estimation was possible. Confidence intervals were estimated based on uncertainty in observer data only.

0 to 60 fathoms						> 60 fathoms				
Observed			Estimated			Observed		Estimated		
Discard ratio (kg/hr)	SE		Gross discard estimate (kg)	95% CI lower	95% CI upper	Discard ratio (kg/hr)	SE	Gross discard estimate (kg)	95% CI lower	95% CI upper
North of Pt Chehalis										
≤ 125 lbs/hr correlating species										
2002	6.85	0.99	6,261	4,483	8,040	5.62	0.89	32,795	22,586	43,004
2003	1.04	0.40	364	87	640	1.40	0.56	7,354	1,608	13,100
2004	6.49	1.61	5,235	2,682	7,788	1.34	0.29	3,457	1,979	4,935
2005	9.75	2.90	5,566	2,325	8,808	12.59	6.94	42,483	0	88,428
2006	7.84	1.64	9,254	5,453	13,054	5.16	1.06	17,259	10,327	24,190
2007	11.72	3.56	10,868	4,401	17,335	3.35	1.47	14,420	2,041	26,799
2008	2.35	0.66	953	428	1,478	1.18	0.20	8,139	5,432	10,846
2009	7.42	1.50	2,222	1,340	3,104	3.31	0.62	21,963	13,846	30,079
2010	» 7.05	0.76	626	494	759	0.86	0.26	5,189	2,107	8,271
> 125 lbs/hr correlating species										
2002	10.88	1.05	21,973	17,808	26,138	46.28	5.97	367,146	274,388	459,904
2003	2.55	0.70	3,003	1,388	4,617	20.65	3.40	109,201	73,947	144,455
2004	12.54	1.55	34,254	25,944	42,564	32.46	4.75	106,598	76,023	137,173
2005	12.48	1.64	24,818	18,433	31,204	38.88	3.39	236,715	196,312	277,117
2006	12.34	1.49	23,006	17,566	28,447	45.08	6.66	172,672	122,674	222,669
2007	14.33	5.30	14,865	4,090	25,641	28.03	6.33	88,142	49,137	127,147
2008	7.92	1.52	7,428	4,628	10,229	35.53	5.33	145,011	102,366	187,656
2009	22.15	3.94	14,796	9,634	19,958	38.71	4.42	171,175	132,907	209,443
2010	» 11.95	0.68	3,208	2,847	3,569	22.16	4.87	57,367	32,681	82,053
South of Pt Chehalis										
≤ 125 lbs/hr correlating species										
2002	3.91	0.77	22,477	13,751	31,203	0.44	0.08	26,125	17,061	35,190
2003	0.32	0.16	1,378	14	2,741	0.20	0.04	9,287	6,016	12,558
2004	1.10	0.20	4,205	2,743	5,668	0.28	0.04	8,411	5,942	10,881
2005	2.78	0.39	8,645	6,240	11,049	0.35	0.06	9,438	6,333	12,543
2006	1.34	0.22	5,333	3,641	7,024	0.27	0.04	7,483	5,384	9,583
2007	3.70	0.72	14,082	8,728	19,436	0.47	0.06	15,392	11,234	19,550
2008	1.21	0.27	2,318	1,303	3,334	0.92	0.20	39,272	22,436	56,108
2009	2.63	0.32	7,680	5,828	9,532	0.84	0.11	46,433	34,095	58,770
2010	2.66	0.57	4,159	2,425	5,893	0.52	0.08	25,225	17,631	32,819
> 125 lbs/hr correlating species										
2002	2.95	0.39	7,799	5,770	9,828	4.00	0.52	39,837	29,604	50,070
2003	1.91	0.51	4,477	2,122	6,833	4.59	0.48	51,592	41,072	62,112
2004	3.28	0.54	11,841	8,005	15,678	4.16	0.51	38,425	29,266	47,584
2005	6.18	0.74	33,875	25,937	41,814	7.58	0.78	98,808	78,787	118,829
2006	13.50	1.97	75,235	53,665	96,804	6.13	0.70	80,668	62,579	98,756
2007	11.77	1.37	45,573	35,200	55,947	6.56	0.60	91,034	74,717	107,350
2008	3.83	0.63	9,030	6,120	11,941	5.80	0.78	93,055	68,584	117,526
2009	11.83	1.34	26,412	20,557	32,267	7.43	0.89	94,555	72,439	116,672
2010	5.04	1.09	5,932	3,417	8,446	7.58	0.89	60,770	46,700	74,840

» These observed discard ratios were estimated by bootstrapping the means across all previous years (10,000x, with replacement). This was done because the number of observations in these strata were too small (≤ 3 vessels) or not observed, and therefore, direct estimation of discard ratios were either not accurate or not possible.

Table 3. Pacific halibut viability data collected by observers in each year and depth stratum in the LE bottom trawl sector. The condition of sampled Pacific halibut was identified as Excellent (Exc), Poor, or Dead based on the injury key presented in Appendix L of the WCGOP training manual (NWFSC 2010), which is consistent with IPHC protocol. The number in each category was weighted based on the length weight relationship as described in the Methods.

	Number				Weighted average percentages in each category		
	Exc	Poor	Dead	Total	Exc	Poor	Dead
2004							
0 to 60 fm	397	208	229	834	52%	25%	23%
> 60 fm	168	181	641	990	20%	20%	60%
2005							
0 to 60 fm	267	208	405	880	35%	21%	44%
> 60 fm	777	808	1647	3232	27%	23%	50%
2006							
0 to 60 fm	424	189	333	946	54%	18%	28%
> 60 fm	237	157	609	1003	23%	15%	62%
2007							
0 to 60 fm	251	89	444	784	38%	12%	50%
> 60 fm	154	125	862	1141	15%	11%	74%
2008							
0 to 60 fm	32	61	179	272	12%	22%	65%
> 60 fm	490	343	1433	2266	24%	16%	60%
2009							
0 to 60 fm	446	221	367	1034	44%	20%	36%
> 60 fm	594	394	1635	2623	25%	15%	60%
2010							
0 to 60 fm	931	508	501	1940	48%	26%	26%
> 60 fm	4675	5081	15411	25167	19%	20%	61%
All years							
0 to 60 fm	2748	1484	2458	6690	41%	22%	37%
> 60 fm	7095	7089	22238	36422	19%	19%	61%

Table 4. Gross discard (kg), and discard mortality (kg) of Pacific halibut estimated for each depth stratum and year in the LE bottom trawl sector. Estimates were allocated to the three condition categories based on information presented in Table 3.

	Estimated Gross Discard (kg)				Estimated Discard Mortality (kg)				DMR
	Exc	Poor	Dead	Total	<i>m(Exc)</i>	<i>m(Poor)</i>	<i>m(Dead)</i>	<i>m(Total)</i>	
0 to 60 fm									
2002	25,270	11,727	21,513	58,510	5,054	6,450	19,362	30,866	53%
2003	3,982	1,848	3,390	9,221	796	1,017	3,051	4,864	53%
2004	29,022	13,904	12,609	55,535	5,804	7,647	11,348	24,800	45%
2005	25,230	15,585	32,090	72,905	5,046	8,572	28,881	42,499	58%
2006	60,767	20,850	31,210	112,827	12,153	11,467	28,089	51,710	46%
2007	32,090	10,211	43,087	85,388	6,418	5,616	38,778	50,812	60%
2008	2,383	4,434	12,913	19,730	477	2,439	11,621	14,537	74%
2009	22,334	10,463	18,313	51,110	4,467	5,755	16,482	26,704	52%
2010	6,382	3,481	3,436	13,299	1,276	1,914	3,092	6,283	47%
> 60 fm									
2002	109,897	81,222	274,785	465,903	21,979	44,672	247,306	313,958	67%
2003	41,853	30,932	104,648	177,434	8,371	17,013	94,184	119,567	67%
2004	31,665	30,616	94,610	156,891	6,333	16,839	85,149	108,321	69%
2005	104,172	90,731	192,541	387,443	20,834	49,902	173,286	244,023	63%
2006	64,401	41,243	172,437	278,081	12,880	22,684	155,194	190,757	69%
2007	31,333	23,298	154,355	208,987	6,267	12,814	138,920	158,000	76%
2008	67,929	46,002	171,546	285,476	13,586	25,301	154,391	193,278	68%
2009	84,101	49,849	200,175	334,126	16,820	27,417	180,158	224,395	67%
2010	27,592	29,992	90,967	148,551	5,518	16,496	81,870	103,884	70%

Table 5. Total fleet-wide trawl effort (hours), estimated Pacific halibut bycatch (mt), estimated Pacific halibut discard mortality (mt), mortality (kg) per tow hour, estimated weight of legal-sized halibut discarded, and estimated percent of legal-sized discarded halibut (by weight) in the LE bottom trawl sector from 2002 to 2010.

Trawl effort (hours)	Total bycatch (mt)		Total discard mortality (mt)		Mortality (kg) per tow hour	Estimated legal-sized halibut mortality (mt)	Estimated % legal-sized discarded halibut, by weight		
	Estimate	95% confidence interval		Estimate				95% confidence interval	
		lower	upper					lower	upper
2002	95,106	524	(385, 663)	345	(254, 436)	3.6	206	60%	
2003	77,143	187	(126, 247)	124	(85, 164)	1.6	76	61%	
2004	56,016	212	(153, 272)	133	(96, 170)	2.4	88	66%	
2005	60,384	460	(334, 590)	287	(208, 367)	4.7	150	52%	
2006	60,476	391	(281, 501)	242	(175, 310)	4.0	132	55%	
2007	63,946	294	(190, 399)	209	(135, 283)	3.3	117	56%	
2008	75,336	305	(211, 399)	208	(144, 272)	2.8	125	60%	
2009	85,047	385	(291, 480)	251	(190, 313)	3.0	157	63%	
2010	68,604	162	(108, 216)	110	(73, 147)	1.6	74	68%	

Table 6. Pacific halibut length frequencies collected by WCGOP observers during 2010 in the LE bottom trawl sector. (a) Actual measurements of Pacific halibut lengths (cm). The upper limits on the length intervals are inclusive, while the lower limits are not. (b) Visual estimates of Pacific halibut lengths (cm).

(a) Actual length measurements.

Length interval (cm)	Length freq.	Percent length freq.
25 - 29	0	0.00
30 - 34	0	0.00
35 - 39	0	0.00
40 - 44	0	0.00
45 - 49	0	0.00
50 - 54	0	0.00
55 - 59	1	0.00
60 - 64	15	0.02
65 - 69	45	0.07
70 - 74	79	0.13
75 - 79	119	0.19
80 - 84	118	0.19
85 - 89	82	0.13
90 - 94	60	0.10
95 - 99	50	0.08
100 - 104	26	0.04
105 - 109	13	0.02
110 - 114	10	0.02
115 - 119	4	0.01
120 - 124	3	0.00
125 - 129	2	0.00
130 - 134	0	0.00
135 - 139	1	0.00
140 - 144	0	0.00
145 - 149	0	0.00
150 - 154	1	0.00
155 - 159	0	0.00
160 - 164	0	0.00
165 - 169	0	0.00
170 - 174	0	0.00
175 - 179	0	0.00
180 - 184	0	0.00
185 - 189	0	0.00

(b) Visual length measurements.

Length interval (cm)	Length freq.	Percent length freq.
10	0	0.00
20	0	0.00
30	0	0.00
40	0	0.00
50	11	0.01
60	86	0.07
70	290	0.23
80	362	0.28
90	334	0.26
100	151	0.12
110	25	0.02
120	7	0.01
130	2	0.00
140	3	0.00
150	3	0.00
160	1	0.00
170	0	0.00
180	0	0.00
190	0	0.00

Table 7. Number of annually observed trips, sets, and vessels in the limited-entry (LE) sablefish primary, LE sablefish non-primary, and open-access (OA) fixed gear sectors by the West Coast Groundfish Observer Program.

	LE Sablefish Primary			LE Sablefish	OA Fixed Gear	
	Longline		Pot	Longline	Hook-and-line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis				
	Number of observed trips					
2002	23	47	23	11	0	0
2003	25	25	35	130	41	16
2004	13	35	13	62	43	96
2005	31	73	39	35	34	43
2006	31	34	39	121	11	38
2007	36	40	30	158	50	45
2008	17	60	24	122	58	55
2009	13	34	27	138	68	30
2010	18	126	43	226	69	40
	Number of observed sets					
2002	207	181	247	22	0	0
2003	191	158	362	219	49	50
2004	115	205	139	130	53	182
2005	388	275	491	60	37	50
2006	291	159	288	196	12	39
2007	381	136	154	303	66	72
2008	194	345	329	220	68	74
2009	178	109	67	271	101	45
2010	251	503	314	470	104	69
	Number of observed vessels					
2002	9	18	6	4	0	0
2003	8	8	6	17	13	7
2004	6	13	3	14	15	17
2005	10	18	7	11	10	14
2006	9	10	7	21	8	15
2007	9	14	4	36	25	20
2008	6	13	6	32	33	20
2009	4	6	3	34	33	18
2010	5	20	7	38	37	26

Table 8. Expansion factors and WCGOP observed discard rate by gear type for limited-entry (LE) and open-access (OA) non-nearshore fixed gear sectors used to expand discard estimates of Pacific halibut to the fleet-wide level. The OA fixed gear sector expansion factor changed from sablefish (Heery et al. 2010) to all FMP groundfish (results presented here).

Fishery		Expansion Factor	Observed Discard Rate Applied	
LE Sablefish Primary	Longline Pot	Retained Sablefish	LE Sablefish Primary	Longline Pot
LE Sablefish Non-Primary	Longline Pot	Retained Groundfish Retained Sablefish	LE Sablefish Non-Primary OA Fixed Gear *	Longline Pot
OA Fixed Gear	Hook-and-line Pot	Retained Groundfish	OA Fixed Gear *	Hook-and-line Pot

* No discard ratio or discard estimate was computed in the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time.

Table 9. Total sablefish and FMP groundfish landings (except Pacific hake) (mt) and observed Pacific halibut discard ratios for each sector and gear type in the non-nearshore fixed gear fishery. Sablefish landings were used as the discard ratio denominator and expansion factor in all cases except for the limited-entry (LE) sablefish non-primary longline and the OA fixed gear sectors, where target species include a variety of groundfish species.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
Expansion factor				<i>Groundfish</i>	<i>Sablefish</i>	<i>Groundfish landings</i>	
Total fleet landings (Based on fish tickets)	<i>Sablefish landings (mt)</i>			<i>landings (mt)</i>	<i>landings (mt)</i>	<i>(mt)</i>	
2002	390	407	354	452	6	387	108
2003	499	569	604	485	7	547	186
2004	698	654	626	377	6	474	184
2005	641	676	615	519	7	625	376
2006	684	708	611	441	4	487	439
2007	489	607	426	462	9	270	249
2008	385	663	421	652	18	430	238
2009	418	984	487	695	18	671	364
2010	259	1030	503	1021	34	769	302
Observed Pacific halibut discard ratios							
2002	0.3297	0.0283	0.0114	0.0000	*	*	*
2003	0.3532	0.0467	0.0005	0.0003	*	*	*
2004	0.2369	0.0746	0.0526	0.0000	*	*	*
2005	0.3318	0.0204	0.0043	0.0000	*	*	*
2006	0.7827	0.1636	0.0271	0.0000	*	*	*
2007	0.2184	0.0334	0.0092	0.0032	(0.0035)	0.0785	0.0035
2008	0.3715	0.1453	0.0151	0.0041	(0.0010)	0.0986	0.0010
2009	0.6436	0.0413	0.0017	0.0003	(0.0007)	0.0545	0.0007
2010	0.2642	0.0632	0.0088	0.0004	(0.0016)	0.0424	0.0016

* No discard ratio is provided for the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time. Since 2007-2008 OA pot discard rates were used to estimate LE non-endorsed discard, discard ratios for this sector were also excluded.

Table 10. Summary of the percent of observed trips that caught Pacific halibut in the non-nearshore fixed gear sectors, by gear and area (where applicable). Observed average, minimum and maximum annual catch and annual discard weights of Pacific halibut are also provided, along with the percent of Pacific halibut catch weight that was discarded by year.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
% of observed trips that caught Pacific halibut							
2002	95.7%	46.8%	17.4%	0.0%	--	--	--
2003	100.0%	52.0%	8.6%	0.8%	--	0.0%	0.0%
2004	100.0%	71.4%	38.5%	0.0%	--	0.0%	0.0%
2005	96.8%	58.9%	33.3%	0.0%	--	0.0%	0.0%
2006	100.0%	76.5%	56.4%	0.0%	--	9.1%	0.0%
2007	94.4%	47.5%	33.3%	1.9%	--	26.0%	6.7%
2008	100.0%	78.3%	83.3%	3.3%	--	34.5%	5.5%
2009	84.6%	35.3%	33.3%	7.0%	--	38.2%	10.0%
2010	83.3%	46.8%	51.2%	1.3%	--	21.7%	2.5%
Observed annual catch (mt) of Pacific halibut							
Mean	47.4	12.4	2.0	0.1	--	0.9	0.0
Min	12.1	2.2	0.1	0.0	--	0.1	0.0
Max	117.2	36.6	5.4	0.1	--	1.6	0.0
Observed annual discard (mt) of Pacific halibut							
Mean	41.6	12.3	2.0	0.1	--	0.9	0.0
Min	9.5	2.2	0.1	0.0	--	0.1	0.0
Max	109.6	36.6	5.4	0.1	--	1.6	0.0
% of Pacific halibut catch that was discarded							
2002	80.1%	95.5%	100.0%	n.o.c.	--	--	--
2003	82.5%	99.5%	100.0%	100.0%	--	n.o.c.	n.o.c.
2004	79.0%	97.7%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2005	84.8%	100.0%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2006	93.5%	97.9%	100.0%	n.o.c.	--	100.0%	n.o.c.
2007	80.6%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2008	87.4%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2009	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2010	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%

n.o.c. No observed catch of Pacific halibut and thus a % discarded calculation is not possible.

-- No WCGOP observers were deployed for the sector/year/gear type combination.

Table 11. Estimated gross discard (mt) and discard mortality (mt) of Pacific halibut in the limited entry (LE) sablefish primary, LE sablefish non-primary, and open access (OA) fixed gear sectors. Estimated discard mortality was computed by applying a 16% discard mortality rate to gross discard estimates for hook-and-line gears. An 18% discard mortality rate was applied to pot gear estimates. Discard estimates were not initially computed for the 2002-2006 OA fixed gear sector because the WCGOP only observed OA fixed gear vessels off of California during that time. Potential values for these years were produced by applying a combined discard rate from 2007-2008 to 2002-2006 landings data (shown in brackets).

	2002	2003	2004	2005	2006	2007	2008	2009	2010
LE Sablefish Primary (mt)									
<i>Longline</i>									
<u>North of Pt Chehalis</u>									
Gross discard estimate	128.7	176.2	165.3	212.6	535.5	106.8	143.2	268.8	70.8
Estimated discard mortality (16%)	20.6	28.2	26.5	34.0	85.7	17.1	22.9	43.0	11.3
<u>South of Pt Chehalis</u>									
Gross discard estimate	11.5	26.6	48.7	13.8	115.9	20.3	96.3	40.7	65.0
Estimated discard mortality (16%)	1.8	4.3	7.8	2.2	18.5	3.2	15.4	6.5	10.4
<u>Coastwide</u>									
Gross discard estimate	140.2	202.7	214.1	226.4	651.4	127.1	239.5	309.4	135.9
Estimated discard mortality (16%)	22.4	32.4	34.3	36.2	104.2	20.3	38.3	49.5	21.7
<i>Pot</i>									
<u>Coastwide</u>									
Gross discard estimate	4.1	0.3	33.0	2.6	16.5	3.9	6.4	0.8	4.5
Estimated discard mortality (16%)	0.6	0.0	5.3	0.4	2.6	0.6	1.0	0.1	0.7
LE Sablefish Non-Primary (mt)									
<i>Longline</i>									
<u>Coastwide</u>									
Gross discard estimate	0.0	0.1	0.0	0.0	0.0	1.5	2.6	0.2	0.4
Estimated discard mortality (16%)	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1
<i>Pot</i>									
<u>Coastwide</u>									
Gross discard estimate	*	*	*	*	*	0.03	0.02	0.01	0.05
<i>Assuming OA fixed gear 07-08 pot discard rate for 2002 - 2006 *</i>	[0.0]	[0.0]	[0.0]	[0.0]	[0.0]				
Estimated discard mortality (16%)	*	*	*	*	*	0.0	0.0	0.0	0.0
OA Fixed Gear (mt)									
<i>Hook-and-line Gears</i>									
<u>Coastwide</u>									
Gross discard estimate	*	*	*	*	*	21.8	44.1	39.6	32.6
<i>Assuming 07-08 discard rate for 2002 - 2006</i>	[28.7]	[40.3]	[29.3]	[55.8]	[37.4]				
Estimated discard mortality (16%)	*	*	*	*	*	3.5	7.1	6.3	5.2
<i>Pot</i>									
<u>Coastwide</u>									
Gross discard estimate	*	*	*	*	*	0.9	0.2	0.3	0.5
<i>Assuming 07-08 discard rate for 2002 - 2006</i>	[0.2]	[0.4]	[0.4]	[0.8]	[0.9]				
Estimated discard mortality (16%)	*	*	*	*	*	0.1	0.0	0.0	0.1

* The LE sablefish non-primary pot sector has not been observed by the WCGOP and therefore estimates are based on discard rates from observed OA fixed gear pot vessels. Because the OA fixed gear pot sector was only observed on a coastwide basis in 2007 and 2008, estimates for LE sablefish non-primary pot are only available in these years as well.

Table 12. Estimated total discard mortality (mt) of Pacific halibut from each observed sector of the non-nearshore fixed gear groundfish fishery, 2002-2010.

Estimated discard mortality (mt)				
	LE Sablefish Primary	LE Sablefish Non-Primary	OA Fixed Gear	All Sectors
2002	23.1	0.0	0.0	23.1
2003	32.5	0.0	0.0	32.5
2004	39.5	0.0	0.0	39.5
2005	36.6	0.0	0.0	36.6
2006	106.9	0.0	0.0	106.9
2007	21.0	0.2	3.6	24.8
2008	39.3	0.4	7.1	46.9
2009	49.7	0.0	6.4	56.1
2010	22.4	0.1	5.3	27.8

Table 13. Pacific halibut length frequencies collected by WCGOP observers in the LE sablefish primary fixed gear sector from 2002-2010. Two tables are presented: (a) length frequency based on actual length measurements (cm), and (b) length frequency based on visually estimated lengths (cm). Visual estimates are approximated by rounding to the nearest 10 cm.

(a) Actual length measurements

Length interval (cm)	Length freq.	Percent length freq.
25 - 29	0	0.00
30 - 34	0	0.00
35 - 39	0	0.00
40 - 44	0	0.00
45 - 49	0	0.00
50 - 54	0	0.00
55 - 59	2	0.02
60 - 64	2	0.02
65 - 69	6	0.05
70 - 74	12	0.11
75 - 79	30	0.32
80 - 84	19	0.29
85 - 89	17	0.37
90 - 94	9	0.31
95 - 99	6	0.30
100 - 104	6	0.43
105 - 109	3	0.38
110 - 114	1	0.20
115 - 119	2	0.50
120 - 124	0	0.00
125 - 129	2	1.00
130 - 134	0	0.00
135 - 139	0	0.00
140 - 144	0	0.00
145 - 149	0	0.00
150 - 154	0	0.00
155 - 159	0	0.00
160 - 164	0	0.00
165 - 169	0	0.00
170 - 174	0	0.00
175 - 179	0	0.00
180 - 184	0	0.00
185 - 189	0	0.00

(b) Visual length estimates

Length interval (cm)	Length freq.	Percent length freq.
10	0	0.00
20	0	0.00
30	5	0.00
40	31	0.00
50	212	0.01
60	2494	0.15
70	3775	0.23
80	3807	0.24
90	3155	0.20
100	1620	0.10
110	653	0.04
120	294	0.02
130	94	0.01
140	17	0.00
150	1	0.00
160	0	0.00
170	0	0.00
180	0	0.00
190	0	0.00

Table 14. Pacific halibut length data collected in the LE sablefish primary sector by the WCGOP approximating legal (≥ 80 cm) versus sublegal (< 80 cm) definitions by the IPHC. Both actual length measurements and visual length estimates are presented.

	Pacific halibut lengths	
	Number	Percentage
Actual length		
< 80 cm	97	57%
≥ 80 cm	72	43%
Visual estimate		
0 - 74 cm	6517	40%
75 - 84 cm	3807	24%
85 - 150 cm	5834	36%

Table 15. Coverage information, bycatch ratios, and bycatch estimates for Pacific halibut in the nearshore fixed gear groundfish sectors. The WCGOP began observing the California nearshore sector in 2003 and the Oregon nearshore sector in 2004. Bycatch estimates in this table are not intended to represent mortality values, as rates of discard mortality for this sector are not available.

		Observed						Total fleet catch of nearshore species (mt)	Estimated		
Fleet observer coverage rate *	Number of observed sets	% of sets with Pacific halibut	Pacific halibut bycatch (kg)	Nearshore species retained (kg)	Pacific halibut bycatch rate	SE	Pacific halibut bycatch (mt)		Lower bound (mt)	Upper bound (mt)	

Nearshore fixed gear groundfish fishery sector

Oregon

2002	<i>not observed</i>	-	-	-	-	-	-	279	-	-	-
2003	<i>not observed</i>	-	-	-	-	-	-	208	-	-	-
2004	4.9%	207	1.9%	48.9	10,210	0.0048	0.0027	210	1.005	0.002	2.123
2005	6.3%	167	0.6%	32.5	11,419	0.0028	0.0028	180	0.513	0.002	1.520
2006	11.6%	379	1.3%	62.8	19,396	0.0032	0.0016	168	0.543	0.005	1.081
2007	8.9%	242	0.4%	7.8	16,103	0.0005	0.0005	180	0.087	0.002	0.257
2008	7.6%	183	0.5%	27.2	14,285	0.0019	0.0019	189	0.360	0.002	1.066
2009	6.2%	219	2.3%	80.1	13,852	0.0058	0.0028	224	1.298	0.060	2.536
2010	7.6%	210	0.5%	6.1	13,209	0.0005	0.0005	173	0.080	0.002	0.237

California

2002	<i>not observed</i>	-	-	-	-	-	-	380	-	-	-
2003	3.2%	205	0.0%	0.0	8,085	0.0000	0.0000	255	0.000	0.000	0.000
2004	8.0%	422	0.0%	0.0	23,126	0.0000	0.0000	288	0.000	0.000	0.000
2005	4.7%	217	0.9%	79.5	13,108	0.0061	0.0054	280	1.695	0.003	4.665
2006	3.2%	158	0.0%	0.0	8,367	0.0000	0.0000	258	0.000	0.000	0.000
2007	4.5%	224	0.0%	0.0	12,138	0.0000	0.0000	271	0.000	0.000	0.000
2008	2.2%	87	0.0%	0.0	6,543	0.0000	0.0000	293	0.000	0.000	0.000
2009	2.6%	122	0.0%	0.0	6,723	0.0000	0.0000	260	0.000	0.000	0.000
2010	3.2%	117	0.0%	0.0	7,083	0.0000	0.0000	219	0.000	0.000	0.000

* Coverage rate in the nearshore sector is defined as the proportion of nearshore target species landings that were observed. Nearshore target species are listed in Appendix D.

Table 16. Coverage information, bycatch ratios, and bycatch estimates for Pacific halibut in the pink shrimp trawl fishery. The WCGOP began observing the pink shrimp fishery in 2004, but was not able to observe the fishery in 2006. Bycatch estimates in this table are not intended to represent mortality values, as rates of discard mortality for this fishery are not available.

	Observed							Total fleet catch of pink shrimp (mt)	Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	Pink shrimp retained (kg)	Pacific halibut bycatch rate	SE		Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
Pink shrimp trawl fishery											
2002	<i>not observed</i>		-	-	-	-	-	25,375	-	-	-
2003	<i>not observed</i>		-	-	-	-	-	13,887	-	-	-
2004	6.5%	1026	0.0%	0.0	583,266	0.000000	0.000000	8,974	0.000	0.000	0.000
2005	3.9%	509	0.2%	2.3	424,683	0.000005	0.000005	10,862	0.058	0.109	0.172
2006	<i>not observed</i>		-	-	-	-	-	8,400	-	-	-
2007	6.2%	951	0.2%	15.3	672,663	0.000023	0.000019	10,935	0.248	0.109	0.649
2008	5.2%	840	0.0%	0.0	805,763	0.000000	0.000000	15,375	0.000	0.000	0.000
2009	6.0%	695	0.0%	0.0	866,905	0.000000	0.000000	14,412	0.000	0.000	0.000
2010	11.6%	1654	0.0%	0.0	2,365,275	0.000000	0.000000	20,327	0.000	0.000	0.000

* Coverage rate in the pink shrimp trawl fishery is defined as the proportion of pink shrimp landings that were observed.

Table 17. Coverage information, bycatch ratios, and bycatch estimates for Pacific halibut in the California halibut trawl fishery. This fishery is comprised of two components: a limited entry sector that operates primarily off of San Francisco, and an open access fishery that operates further south. Bycatch estimates in this table are not intended to represent mortality values, as rates of discard mortality for this fishery are not available.

	Observed							Total fleet catch of California halibut (mt)	Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	California halibut retained (kg)	Pacific halibut bycatch rate	SE		Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
California halibut trawl fishery											
Limited Entry Sector											
2002	3.2%	52	0.0%	0.0	3,590	0.0000	0.0000	112	0.000	0.000	0.000
2003	17.0%	206	0.0%	0.0	19,104	0.0000	0.0000	112	0.000	0.000	0.000
2004	16.7%	141	0.7%	3.5	23,447	0.0001	0.0001	140	0.021	0.001	0.062
2005	14.1%	221	0.5%	4.7	27,342	0.0002	0.0002	194	0.033	0.002	0.099
2006	11.7%	224	0.9%	2.9	14,286	0.0002	0.0002	123	0.025	0.001	0.063
2007	12.8%	80	1.3%	8.1	5,419	0.0015	0.0015	42	0.063	0.000	0.188
2008	24.6%	118	8.5%	82.6	9,637	0.0086	0.0030	39	0.336	0.108	0.563
2009	6.0%	29	0.0%	0.0	2,898	0.0000	0.0000	48	0.000	0.000	0.000
2010	11.7%	41	0.0%	0.0	6,396	0.0000	0.0000	55	0.000	0.000	0.000
Open Access Sector											
2002	<i>not observed</i>		-	-	-	-	-	90	-	-	-
2003	4.3%	110	0.0%	0.0	1,977	0.0000	0.0000	46	0.000	0.000	0.000
2004	6.4%	244	1.6%	49.4	5,100	0.0097	0.0058	80	0.776	0.001	1.691
2005	9.7%	360	0.0%	0.0	7,489	0.0000	0.0000	77	0.000	0.000	0.000
2006	<i>not observed</i>		-	-	-	-	-	61	-	-	-
2007	6.9%	226	0.0%	0.0	2,694	0.0000	0.0000	39	0.000	0.000	0.000
2008	5.2%	197	0.0%	0.0	2,631	0.0000	0.0000	50	0.000	0.000	0.000
2009	0.7%	30	0.0%	0.0	634	0.0000	0.0000	85	0.000	0.000	0.000
2010	3.5%	111	0.0%	0.0	2,349	0.0000	0.0000	67	0.000	0.000	0.000

* Coverage rate in the California halibut trawl fishery is defined as the proportion of California halibut landings that were observed.

Table 18. Bycatch estimates for all fishery sectors observed by the West Coast Groundfish Observer Program (WCGOP), 2002- 2010. Total mortality estimates are also provided in cases when discard mortality rates were available.

	LE bottom trawl	Non-nearshore fixed gear			Nearshore fixed gear	Pink shrimp	CA halibut	Total
		LE primary	LE non-primary	OA				
Gross discard estimates (mt)								
2002	524	144	0.0	-	-	-	0.0	669
2003	187	203	0.1	-	0.0	-	0.0	390
2004	212	247	0.0	-	1.0	0.0	0.8	461
2005	460	229	0.0	-	2.2	0.1	0.0	692
2006	391	668	0.0	-	0.5	-	0.0	1059
2007	294	131	1.5	22.7	0.1	0.2	0.1	450
2008	305	246	2.7	44.3	0.4	0.0	0.3	599
2009	385	310	0.2	39.9	1.3	0.0	0.0	737
2010	265	140	0.4	33.1	0.1	0.0	0.0	439
Total discard mortality (mt)								
2002	345	23	0.0	0.0	<i>no discard mortality rate available</i>			
2003	124	32	0.0	0.0	""			157
2004	133	40	0.0	0.0	""			173
2005	287	37	0.0	0.0	""			323
2006	242	107	0.0	0.0	""			350
2007	209	21	0.2	3.6	""			234
2008	208	39	0.4	7.1	""			255
2009	251	50	0.0	6.4	""			307
2010	181	22	0.1	5.3	""			209

" - " Indicates years of incomplete or no observer coverage for which estimates are not available

APPENDIX A

Weighted catch composition data from the limited entry bottom trawl fishery. The frequency within each length bin was weighted based on the following equation:

$$n_{\text{wghtd}_l} = n_l \times \frac{W_{st}}{\sum_l W_{stl}} \times \frac{\sum_t W_{st}}{W_{st}} \times \frac{\hat{W}_s}{\sum_t \hat{W}_{st}} = n_l \times \frac{\hat{W}_s}{\sum_l W_{stl}}$$

where:

n_l : number of measured fish in length bin l

w_{stl} : total weight of length l fish measured, as determined through the IPHC length-weight relationship

W_{st} : total observed discard weight of Pacific halibut on tow t , in stratum s

\hat{W}_s : estimated total discard weight of Pacific halibut in stratum s

Table 1. Weighted length frequency distributions for Pacific halibut in the limited entry bottom trawl fishery, 2004- 2010.

Length bin (cm)	Weighted length frequency distribution						
	2004	2005	2006	2007	2008	2009	2010
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	0.0000	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0048	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	0.0000	0.0044	0.0000	0.0000	0.0000	0.0000	0.0000
44	0.0025	0.0012	0.0057	0.0000	0.0000	0.0010	0.0000
46	0.0037	0.0000	0.0094	0.0000	0.0000	0.0009	0.0000
48	0.0000	0.0034	0.0046	0.0000	0.0000	0.0000	0.0000
50	0.0027	0.0068	0.0092	0.0000	0.0007	0.0010	0.0000
52	0.0021	0.0069	0.0080	0.0041	0.0001	0.0053	0.0000
54	0.0156	0.0076	0.0164	0.0042	0.0025	0.0004	0.0000
56	0.0138	0.0211	0.0242	0.0071	0.0022	0.0019	0.0000
58	0.0187	0.0331	0.0322	0.0293	0.0027	0.0091	0.0022
60	0.0400	0.0431	0.0670	0.0593	0.0169	0.0175	0.0056
62	0.0329	0.0719	0.0751	0.0638	0.0285	0.0275	0.0121
64	0.0428	0.0783	0.1001	0.0932	0.0614	0.0545	0.0155
66	0.0532	0.0807	0.0979	0.1150	0.0705	0.0606	0.0185
68	0.0757	0.0845	0.0870	0.0000	0.0599	0.0835	0.0256
70	0.0672	0.0851	0.0986	0.1022	0.0871	0.0971	0.0154
72	0.0774	0.0882	0.0478	0.1029	0.0973	0.0972	0.0314
74	0.0998	0.0746	0.0588	0.0840	0.1023	0.0941	0.0383
76	0.0890	0.0538	0.0461	0.0710	0.0743	0.0697	0.0284
78	0.0658	0.0506	0.0423	0.0539	0.0688	0.0744	0.0349
80	0.0586	0.0427	0.0372	0.0460	0.0599	0.0527	0.0298
82	0.0486	0.0320	0.0258	0.0325	0.0443	0.0434	0.0239
84	0.0337	0.0255	0.0186	0.0316	0.0428	0.0335	0.0227
86	0.0221	0.0166	0.0130	0.0000	0.0300	0.0290	0.0141
88	0.0235	0.0115	0.0120	0.0154	0.0263	0.0290	0.0122
90	0.0193	0.0127	0.0115	0.0168	0.0225	0.0263	0.0100
92	0.0157	0.0092	0.0101	0.0122	0.0179	0.0204	0.0094

Length bin (cm)	Weighted length frequency distribution						
	2004	2005	2006	2007	2008	2009	2010
94	0.0169	0.0108	0.0099	0.0148	0.0164	0.0151	0.0053
96	0.0062	0.0052	0.0066	0.0089	0.0143	0.0087	0.0066
98	0.0034	0.0058	0.0066	0.0091	0.0110	0.0103	0.0067
100	0.0089	0.0045	0.0025	0.0053	0.0080	0.0088	0.0023
102	0.0060	0.0034	0.0029	0.0036	0.0061	0.0069	0.0018
104	0.0065	0.0023	0.0027	0.0041	0.0083	0.0062	0.0021
106	0.0043	0.0029	0.0032	0.0031	0.0059	0.0028	0.0013
108	0.0016	0.0014	0.0019	0.0018	0.0027	0.0025	0.0014
110	0.0048	0.0015	0.0004	0.0017	0.0018	0.0021	0.0009
112	0.0015	0.0007	0.0020	0.0010	0.0016	0.0024	0.0013
114	0.0020	0.0010	0.0007	0.0007	0.0020	0.0017	0.0001
116	0.0026	0.0006	0.0002	0.0000	0.0010	0.0005	0.0005
118	0.0007	0.0004	0.0003	0.0002	0.0004	0.0002	0.0002
120	0.0013	0.0005	0.0002	0.0002	0.0005	0.0003	0.0002
122	0.0008	0.0003	0.0000	0.0004	0.0003	0.0003	0.0002
124	0.0010	0.0002	0.0001	0.0000	0.0003	0.0002	0.0003
126	0.0000	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002
128	0.0002	0.0000	0.0002	0.0000	0.0000	0.0002	0.0000
130	0.0003	0.0002	0.0001	0.0002	0.0000	0.0002	0.0000
132	0.0005	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
134	0.0006	0.0000	0.0001	0.0000	0.0001	0.0001	0.0000
136	0.0001	0.0001	0.0002	0.0000	0.0000	0.0001	0.0000
138	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000
140	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000
142	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000
144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
146	0.0001	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
152	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
154	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 2. Percentage of weighted length measurements in each condition category.

Length bin (cm)	2004			2005			2006		
	Exc	Poor	Dead	Exc	Poor	Dead	Exc	Poor	Dead
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
26	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
28	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
36	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
38	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
40	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
42	0.0%	0.0%	0.0%	0.0%	88.4%	11.6%	0.0%	0.0%	0.0%
44	0.0%	0.0%	100.0%	0.0%	70.8%	29.2%	0.0%	0.0%	100.0%
46	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
48	0.0%	0.0%	0.0%	22.4%	0.0%	77.6%	0.0%	0.0%	100.0%
50	0.0%	0.0%	100.0%	61.1%	9.9%	29.0%	0.0%	0.0%	100.0%
52	100.0%	0.0%	0.0%	23.6%	31.3%	45.2%	0.0%	0.0%	100.0%
54	75.5%	11.9%	12.6%	10.0%	20.8%	69.2%	16.9%	0.0%	83.1%
56	12.6%	37.9%	49.5%	25.1%	12.7%	62.2%	22.0%	15.2%	62.8%
58	21.4%	25.6%	53.0%	15.1%	29.5%	55.4%	4.1%	20.2%	75.7%
60	58.6%	14.4%	27.0%	18.2%	21.0%	60.8%	12.9%	25.5%	61.6%
62	40.0%	21.6%	38.4%	18.5%	23.7%	57.8%	27.3%	22.3%	50.4%
64	33.4%	18.4%	48.2%	25.2%	28.4%	46.4%	31.5%	21.0%	47.5%
66	23.9%	24.7%	51.4%	20.9%	26.7%	52.3%	29.6%	17.3%	53.0%
68	38.2%	21.9%	39.9%	17.0%	27.5%	55.5%	35.5%	18.8%	45.7%
70	29.5%	18.9%	51.6%	20.1%	30.3%	49.5%	30.2%	16.6%	53.2%
72	22.9%	17.9%	59.2%	20.3%	27.1%	52.6%	37.2%	21.1%	41.8%
74	23.8%	25.5%	50.7%	24.5%	23.4%	52.1%	39.6%	13.9%	46.5%
76	24.0%	23.2%	52.8%	26.8%	29.1%	44.1%	31.2%	19.2%	49.6%
78	18.8%	18.4%	62.9%	18.1%	23.5%	58.4%	35.0%	21.2%	43.8%
80	19.1%	19.6%	61.3%	23.1%	27.9%	49.0%	34.3%	15.4%	50.2%
82	14.4%	26.1%	59.5%	30.4%	25.1%	44.6%	31.7%	27.8%	40.5%
84	21.7%	9.5%	68.9%	27.0%	18.9%	54.0%	30.1%	13.2%	56.7%
86	32.4%	24.0%	43.6%	35.5%	24.7%	39.8%	31.3%	15.0%	53.7%
88	27.8%	14.8%	57.5%	31.2%	27.8%	41.0%	22.9%	12.4%	64.7%
90	30.2%	34.6%	35.2%	28.0%	16.6%	55.4%	23.8%	18.7%	57.5%
92	40.2%	28.1%	31.7%	42.5%	21.7%	35.9%	43.7%	10.7%	45.6%
94	26.1%	33.3%	40.6%	33.4%	16.3%	50.3%	35.3%	7.1%	57.6%
96	19.9%	30.0%	50.1%	34.6%	19.2%	46.2%	16.5%	13.9%	69.6%
98	33.8%	28.4%	37.8%	32.3%	22.8%	44.9%	16.8%	13.0%	70.2%
100	14.6%	26.9%	58.5%	28.1%	17.4%	54.5%	48.5%	9.6%	41.9%
102	16.0%	49.3%	34.7%	43.1%	6.9%	50.0%	13.7%	0.0%	86.3%
104	19.0%	47.5%	33.5%	36.4%	16.2%	47.4%	49.6%	6.4%	44.0%
106	23.6%	22.6%	53.9%	58.4%	11.9%	29.7%	10.4%	22.8%	66.8%
108	27.6%	3.0%	69.4%	28.6%	22.6%	48.8%	42.2%	15.1%	42.6%
110	25.4%	12.6%	62.0%	22.7%	28.1%	49.2%	32.0%	3.1%	64.9%
112	95.8%	1.2%	3.0%	16.2%	0.0%	83.8%	7.2%	14.1%	78.7%
114	0.0%	26.2%	73.8%	24.4%	4.9%	70.7%	38.9%	0.0%	61.1%
116	58.7%	6.9%	34.4%	69.4%	0.0%	30.6%	77.8%	0.0%	22.2%
118	2.7%	7.5%	89.9%	44.9%	35.0%	20.1%	33.8%	31.5%	34.7%
120	5.7%	26.2%	68.0%	9.5%	28.7%	61.8%	0.0%	0.0%	100.0%
122	40.8%	40.3%	18.9%	1.5%	15.2%	83.4%	50.0%	50.0%	0.0%
124	70.3%	14.8%	14.8%	79.9%	0.0%	20.1%	15.6%	0.0%	84.4%
126	0.0%	100.0%	0.0%	89.0%	11.0%	0.0%	47.1%	0.0%	52.9%
128	82.0%	9.0%	9.0%	18.7%	0.0%	81.3%	89.8%	0.0%	10.2%
130	13.5%	0.0%	86.5%	4.9%	47.6%	47.6%	0.0%	0.0%	100.0%
132	100.0%	0.0%	0.0%	20.2%	63.3%	16.5%	0.0%	100.0%	0.0%
134	80.0%	0.0%	20.0%	100.0%	0.0%	0.0%	22.2%	0.0%	77.8%
136	0.0%	0.0%	100.0%	10.5%	16.1%	73.4%	0.0%	0.0%	100.0%
138	0.0%	0.0%	0.0%	15.2%	0.0%	84.8%	0.0%	0.0%	0.0%
140	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%
142	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
144	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
146	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
148	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
150	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
152	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
154	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
156	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
158	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
160	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
162	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
164	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Length bin (cm)	2007			2008			2009		
	Exc	Poor	Dead	Exc	Poor	Dead	Exc	Poor	Dead
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
26	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
28	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
34	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
36	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
38	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
40	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
42	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
44	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
46	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
48	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
50	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%
52	33.4%	0.0%	66.6%	100.0%	0.0%	0.0%	99.5%	0.5%	0.0%
54	35.6%	0.0%	64.4%	0.0%	4.4%	95.6%	42.3%	57.7%	0.0%
56	33.9%	0.0%	66.1%	0.0%	0.0%	100.0%	15.7%	65.3%	19.0%
58	9.4%	6.8%	83.8%	3.3%	3.3%	93.3%	51.0%	4.4%	44.6%
60	5.3%	7.4%	87.2%	9.0%	14.3%	76.8%	28.7%	21.9%	49.4%
62	20.8%	9.5%	69.7%	6.1%	15.7%	78.2%	19.3%	19.5%	61.2%
64	18.9%	5.3%	75.8%	17.3%	7.5%	75.2%	38.0%	9.4%	52.6%
66	9.1%	12.5%	78.4%	25.8%	8.9%	65.4%	26.7%	19.7%	53.6%
68	54.5%	45.5%	0.0%	17.4%	13.2%	69.4%	30.1%	17.5%	52.4%
70	16.0%	7.6%	76.4%	13.1%	14.0%	73.0%	27.4%	17.5%	55.1%
72	14.8%	9.1%	76.0%	19.1%	13.7%	67.2%	22.9%	18.3%	58.8%
74	17.6%	16.9%	65.5%	24.8%	13.8%	61.3%	27.7%	14.8%	57.5%
76	14.0%	9.9%	76.1%	21.9%	11.5%	66.6%	26.2%	16.6%	57.2%
78	15.5%	13.4%	71.2%	24.7%	10.4%	64.9%	18.5%	12.1%	69.4%
80	14.7%	11.6%	73.6%	21.2%	11.4%	67.4%	20.5%	14.1%	65.3%
82	14.6%	3.0%	82.4%	21.5%	16.1%	62.4%	16.3%	18.5%	65.2%
84	17.9%	7.0%	75.1%	15.9%	22.8%	61.3%	17.0%	12.0%	71.0%
86	56.6%	43.4%	0.0%	17.6%	22.5%	59.8%	18.6%	15.5%	65.9%
88	12.3%	10.5%	77.1%	18.1%	18.8%	63.1%	20.1%	17.2%	62.8%
90	6.3%	3.7%	90.0%	23.9%	17.1%	59.0%	18.6%	13.6%	67.8%
92	20.7%	8.4%	70.9%	20.9%	25.1%	54.0%	25.3%	11.8%	62.9%
94	17.0%	18.4%	64.6%	18.8%	13.3%	67.9%	15.2%	18.4%	66.4%
96	16.7%	3.6%	79.7%	15.4%	21.3%	63.4%	27.6%	19.6%	52.8%
98	10.4%	8.2%	81.4%	28.4%	29.4%	42.3%	20.2%	16.9%	62.9%
100	15.4%	23.2%	61.4%	15.0%	19.4%	65.6%	13.4%	25.5%	61.1%
102	40.3%	9.2%	50.6%	27.6%	28.4%	44.1%	24.8%	23.8%	51.4%
104	16.7%	15.8%	67.5%	36.6%	11.7%	51.7%	28.0%	8.4%	63.7%
106	30.7%	20.1%	49.2%	34.8%	7.7%	57.6%	24.0%	13.5%	62.5%
108	29.0%	2.3%	68.7%	19.4%	14.2%	66.4%	18.2%	27.7%	54.1%
110	11.7%	45.1%	43.2%	40.2%	8.0%	51.9%	29.6%	10.4%	60.0%
112	26.9%	23.3%	49.8%	25.1%	9.2%	65.7%	14.7%	17.4%	67.9%
114	20.1%	0.0%	79.9%	22.4%	22.7%	54.9%	31.2%	7.4%	61.5%
116	0.0%	0.0%	100.0%	41.6%	4.8%	53.6%	79.5%	0.5%	20.0%
118	0.0%	0.0%	100.0%	25.5%	38.6%	35.9%	40.9%	4.4%	54.6%
120	85.1%	0.0%	14.9%	65.5%	34.5%	0.0%	48.0%	0.7%	51.2%
122	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	34.7%	0.0%	65.3%
124	0.0%	0.0%	0.0%	0.0%	70.9%	29.1%	26.1%	37.0%	37.0%
126	49.4%	0.0%	50.6%	0.0%	0.0%	100.0%	59.2%	40.8%	0.0%
128	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	55.7%	1.0%	43.3%
130	13.8%	0.0%	86.2%	0.0%	0.0%	0.0%	35.0%	65.0%	0.0%
132	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
134	0.0%	0.0%	0.0%	94.7%	0.0%	5.3%	100.0%	0.0%	0.0%
136	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%
138	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
140	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
142	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
144	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
146	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
148	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
150	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
152	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
154	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
156	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
158	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
160	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
162	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
164	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Length bin (cm)	2010		
	Exc	Poor	Dead
10	0.0%	100.0%	0.0%
12	0.0%	0.0%	0.0%
14	0.0%	0.0%	0.0%
16	0.0%	0.0%	0.0%
18	0.0%	0.0%	0.0%
20	0.0%	0.0%	0.0%
22	0.0%	0.0%	0.0%
24	0.0%	0.0%	0.0%
26	0.0%	0.0%	0.0%
28	0.0%	0.0%	0.0%
30	0.0%	0.0%	0.0%
32	0.0%	0.0%	0.0%
34	0.0%	0.0%	0.0%
36	0.0%	0.0%	0.0%
38	0.0%	0.0%	0.0%
40	0.0%	0.0%	0.0%
42	0.0%	0.0%	0.0%
44	0.0%	0.0%	0.0%
46	0.0%	0.0%	0.0%
48	0.0%	0.0%	0.0%
50	0.0%	0.0%	0.0%
52	0.0%	0.0%	0.0%
54	0.0%	0.0%	0.0%
56	0.0%	0.0%	0.0%
58	100.0%	0.0%	0.0%
60	33.4%	0.0%	66.6%
62	15.7%	29.4%	54.9%
64	30.1%	21.2%	48.7%
66	17.8%	15.4%	66.8%
68	15.0%	10.3%	74.8%
70	22.2%	7.4%	70.4%
72	23.6%	17.4%	59.0%
74	13.5%	24.8%	61.7%
76	20.1%	16.9%	63.0%
78	17.0%	17.4%	65.7%
80	10.6%	22.8%	66.6%
82	18.9%	19.9%	61.2%
84	21.9%	25.3%	52.8%
86	14.9%	16.4%	68.7%
88	24.8%	17.8%	57.4%
90	25.8%	24.2%	50.1%
92	5.0%	9.9%	85.1%
94	26.1%	29.2%	44.7%
96	17.4%	39.9%	42.7%
98	14.3%	23.3%	62.4%
100	2.2%	31.0%	66.8%
102	21.7%	20.6%	57.8%
104	18.3%	37.2%	44.6%
106	2.4%	0.0%	97.6%
108	0.0%	20.1%	79.9%
110	14.2%	58.8%	27.0%
112	39.9%	0.0%	60.1%
114	0.0%	0.0%	100.0%
116	50.0%	0.0%	50.0%
118	0.0%	100.0%	0.0%
120	0.0%	0.0%	100.0%
122	0.0%	0.0%	100.0%
124	100.0%	0.0%	0.0%
126	0.0%	100.0%	0.0%
128	0.0%	0.0%	0.0%
130	0.0%	0.0%	0.0%
132	0.0%	0.0%	0.0%
134	0.0%	0.0%	0.0%
136	100.0%	0.0%	0.0%
138	0.0%	0.0%	0.0%
140	0.0%	0.0%	0.0%
142	0.0%	0.0%	0.0%
144	0.0%	0.0%	0.0%
146	0.0%	0.0%	0.0%
148	0.0%	0.0%	0.0%
150	0.0%	0.0%	0.0%
152	0.0%	100.0%	0.0%
154	0.0%	0.0%	0.0%

APPENDIX B

Common and scientific names of species included in the Pacific Coast Groundfish Fishery Management Plan, as amended through Amendment 19 (PFMC 2008).

SHARKS

Big skate, *Raja binoculata*
California skate, *R. inornata*
Leopard shark, *Triakis semifasciata*
Longnose skate, *R. rhina*
Soupfin shark, *Galeorhinus zyopterus*
Spiny dogfish, *Squalus acanthias*

RATFISH

Ratfish, *Hydrolagus colliei*

MORIDS

Finescale codling, *Antimora microlepis*

GRENADIERS

Pacific rattail, *Coryphaenoides acrolepis*

ROUND FISH

Cabazon, *Scorpaenichthys marmoratus*
Kelp greenling, *Hexagrammos decagrammus*
Lingcod, *Ophiodon elongatus*
Pacific cod, *Gadus macrocephalus*
Pacific whiting, (hake) *Merluccius productus*
Sablefish, *Anoplopoma fimbria*

FLATFISH

Arrowtooth flounder, (turbot) *Atheresthes stomias*
Butter sole, *Isopsetta isolepis*
Curlfin sole, *Pleuronichthys decurrens*
Dover sole, *Microstomus pacificus*
English sole, *Parophrys vetulus*
Flathead sole, *Hippoglossoides elassodon*
Pacific sanddab, *Citharichthys sordidus*
Petrale sole, *Eopsetta jordani*
Rex sole, *Glyptocephalus zachirus*
Rock sole, *Lepidopsetta bilineata*
Sand sole, *Psettichthys melanostictus*
Starry flounder, *Platichthys stellatus*

ROCKFISH

Includes all genera and species of the family Scopaenidae, even if not listed, that occur in the Washington, Oregon, and California area. The Scopaenidae genera are *Sebastes*, *Scorpaena*, *Sebastolobus*, and *Scorpaenodes*.

Aurora, *Sebastes. aurora*
Bank, *S. rufus*
Black, *S. melanops*
Black-and-yellow, *S. chrysomelas*.
Blackgill, *S. melanostomus*
Blue, *S. mystinus*
Bocaccio, *S. paucispinis*
Bronzespotted, *S. gilli*
Brown, *S. auriculatus*
Calico, *S. dalli*
California scorpionfish, *Scorpaena guttata*
Canary, *Sebastes pinniger*
Chameleon, *S. phillipsi*
Chilipepper, *S. goodei*
China, *S. nebulosus*
Copper, *S. caurinus*
Cowcod, *S. levis*
Darkblotched, *S. crameri*
Dusky, *S. ciliatus*
Dwarf-red, *S. rufianus*
Flag, *S. rubrivinctus*
Freckled, *S. lentiginosus*
Gopher, *S. carnatus*
Grass, *S. rastrelliger*
Greenblotched, *S. rosenblatti*
Greenspotted, *S. chlorostictus*
Greenstriped, *S. elongatus*
Halfbanded, *S. semicinctus*
Harlequin, *S. variegatus*
Honeycomb, *S. umbrosus*
Kelp, *S. atrovirens*
Longspine thornyhead, *Sebastolobus altivelis*
Mexican, *Sebastes. macdonaldi*
Olive, *S. serranooides*
Pink, *S. eos*
Pinkrose, *S. simulator*
Pygmy, *S. wilsoni*
Pacific ocean perch, *S. alutus*
Quillback, *S. maliger*
Redbanded, *S. babcocki*
Redstripe, *S. proriger*
Rosethorn, *S. helvomaculatus*
Rosy, *S. rosaceus*
Rougheye, *S. aleutianus*
Sharpchin, *S. zacentrus*
Shortbelly, *S. jordani*

Shortraker, *S. borealis*
Shortspine thornyhead, *Sebastolobus alascanus*
Silvergray, *Sebastes. brevispinus*
Speckled, *S. ovalis*
Splitnose rockfish, *S. diploproa*
Squarespot, *S. hopkinsi*
Starry, *S. constellatus*
Stripetail, *S. saxicola*
Swordspine, *S. ensifer*
Tiger, *S. nigorcinctus*
Treefish, *S. serriceps*
Vermilion, *S. miniatus*
Widow, *S. entomelas*
Yelloweye, *S. ruberrimus*
Yellowmouth, *S. reedi*
Yellowtail, *S. flavidus*

APPENDIX C

Species identification codes used in the Pacific Fisheries Information Network (PacFIN) database and assigned to WCGOP observer data, with aggregated species groups used in this report for the non-nearshore sectors of the groundfish fishery.

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
AKSK	ALASKA SKATE	Other non-FMP skate	Other non-FMP skate	
ALBC	ALBACORE	Other nongroundfish	Other nongroundfish	
AMCK	ATKA MACKEREL	Other nongroundfish	Other nongroundfish	
APLC	ALASKA PLAICE	Other non-FMP flatfish	Other non-FMP flatfish	
ARR1	NOM. AURORA ROCKFISH	Other slope rockfish	Other slope rockfish	yes
ARRA	AURORA ROCKFISH	Other slope rockfish	Other slope rockfish	yes
ART1	NOM. ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder	yes
ARTH	ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder	yes
ASKT	ALEUTIAN SKATE	Other non-FMP skate	Other non-FMP skate	
ASRK	PACIFIC ANGEL SHARK	Other nongroundfish	Other nongroundfish	
BABL	BLACK ABALONE	Other nongroundfish	Other nongroundfish	
BANK	BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)	yes
BCAC	BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio	yes
BCC1	NOM. BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio	yes
BCLM	BUTTER CLAM	Other nongroundfish	Other nongroundfish	
BGL1	NOM. BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)	yes
BHAG	BLACK HAGFISH	Other nongroundfish	Other nongroundfish	
BISC	BROWN IRISH LORD	Other nongroundfish	Other nongroundfish	
BKCR	BLUE KING CRAB	Other nongroundfish	Other nongroundfish	
BLCK	BLACK ROCKFISH	Black rockfish	Black rockfish	yes
BLGL	BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)	yes
BLK1	NOM. BLACK ROCKFISH	Black rockfish	Black rockfish	yes
BLPT	BLACK EELPOUT	Other nongroundfish	Other nongroundfish	
BLSK	BLACK SKATE	Other non-FMP skate	Other non-FMP skate	
BLU1	NOM. BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BLUR	BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BMCK	BULLET MACKEREL	Other nongroundfish	Other nongroundfish	
BMRL	BLUE MARLIN	Other nongroundfish	Other nongroundfish	
BMSL	BLUE OR BAY MUSSEL	Other nongroundfish	Other nongroundfish	
BNK1	NOM. BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)	yes
BRNZ	BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
BRW1	NOM. BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BRWN	BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BRZ1	NOM. BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
BSCL	BUFFALO SCULPIN	Other nongroundfish	Other nongroundfish	
BSJK	BLACK SKIPJACK	Other nongroundfish	Other nongroundfish	
BSKT	BIG SKATE	Big skate	Big skate	yes
BSOL	BUTTER SOLE	Other flatfish	Other flatfish	yes
BSPR	BLACKSPOTTED ROCKFISH	Other slope rockfish	Other slope rockfish	yes
BSRK	BLUE SHARK	Other nongroundfish	Other nongroundfish	
BSRM	UNSP. BAIT SHRIMP	Other nongroundfish	Other nongroundfish	
BTCR	BAIRDI TANNER CRAB	Tanner crab	Tanner crab	
BTNA	BLUEFIN TUNA	Other nongroundfish	Other nongroundfish	
BTRY	BAT RAY	Other nongroundfish	Other nongroundfish	
BYEL	BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CBZ1	NOM. CABEZON	Other groundfish	Cabezon	yes
CBZN	CABEZON	Other groundfish	Cabezon	yes
CEEL	SPOTTED CUSK-EEL	Other nongroundfish	Other nongroundfish	
CHL1	NOM. CALIFORNIA HALIBUT	California halibut	California halibut	
CHLB	CALIFORNIA HALIBUT	California halibut	California halibut	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
CHN1	NOM. CHINA ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CHNA	CHINA ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CHNK	CHINOOK SALMON	Other nongroundfish	Other nongroundfish	
CHUM	CHUM SALMON	Other nongroundfish	Other nongroundfish	
CKLE	BASKET COCKLE	Other nongroundfish	Other nongroundfish	
CLC1	NOM. CALICO ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CLCO	CALICO ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CLP1	NOM. CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper	yes
CLPR	CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper	yes
CMCK	CHUB MACKEREL	Other nongroundfish	Other nongroundfish	
CMEL	CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
CML1	NOM. CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
CMSL	CALIFORNIA MUSSEL	Other nongroundfish	Other nongroundfish	
CNR1	NOM. CANARY ROCKFISH	Canary rockfish	Canary rockfish	yes
CNRY	CANARY ROCKFISH	Canary rockfish	Canary rockfish	yes
COHO	COHO SALMON	Other nongroundfish	Other nongroundfish	
COP1	NOM. COPPER ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
COPP	COPPER ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
CPLN	CAPELIN	Other nongroundfish	Other nongroundfish	
CSKT	CALIFORNIA SKATE	California skate	California skate	yes
CSL1	NOM. CURLFIN SOLE	Other flatfish	Other flatfish	yes
CSLK	CALIFORNIA SLICKHEAD	Other nongroundfish	Other nongroundfish	
CSOL	CURLFIN SOLE	Other flatfish	Other flatfish	yes
CSRK	BROWN CAT SHARK	Other nongroundfish	Other nongroundfish	
CTRB	C-O SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
CUDA	PACIFIC BARRACUDA	Other nongroundfish	Other nongroundfish	
CWC1	NOM. COWCOD ROCKFISH	Other shelf rockfish	Cowcod	yes
CWCD	COWCOD ROCKFISH	Other shelf rockfish	Cowcod	yes
DARK	DARK ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
DBR1	NOM. DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish	yes
DBRK	DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish	yes
DCRB	DUNGENESS CRAB	Dungeness crab	Dungeness crab	
DFLT	UNSP. DEEP FLOUNDERS	Other flatfish	Other flatfish	yes
DOVR	DOVER SOLE	Dover sole	Dover sole	yes
DRDO	DORADO	Other nongroundfish	Other nongroundfish	
DSOL	DEEPSEA SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
DSRK	SPINY DOGFISH	Spiny dogfish	Spiny dogfish	yes
DTRB	DIAMOND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
DUSK	DUSKY ROCKFISH	Other groundfish	Other groundfish	yes
DVR1	NOM. DOVER SOLE	Dover sole	Dover sole	yes
DWRF	DWARF-RED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
EELS	UNSPECIFIED EELS	Other nongroundfish	Other nongroundfish	
EGL1	NOM. ENGLISH SOLE	English sole	English sole	yes
EGLS	ENGLISH SOLE	English sole	English sole	yes
ESTR	EASTERN OYSTER	Other nongroundfish	Other nongroundfish	
ETNA	BIGEYE TUNA	Other nongroundfish	Other nongroundfish	
EULC	EULACHON	Eulachon	Eulachon	
EURO	EUROPEAN OYSTER	Other nongroundfish	Other nongroundfish	
FLAG	FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
FLG1	NOM. FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
FNTS	FANTAIL SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
FRCK	FRECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
FSOL	FLATHEAD SOLE	Other flatfish	Other flatfish	yes
GABL	GREEN ABALONE	Other nongroundfish	Other nongroundfish	
GBAS	GIANT SEA BASS	Other nongroundfish	Other nongroundfish	
GBL1	NOM. GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
GBLC	GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
GCLM	GAPER CLAM	Other nongroundfish	Other nongroundfish	
GDUK	GEODUCK	Other nongroundfish	Other nongroundfish	
GGRD	GIANT GRENADIER	Other nongroundfish	Other nongroundfish	
GKCR	GOLDEN KING CRAB	Other nongroundfish	Other nongroundfish	
GPH1	NOM. GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)	yes
GPHR	GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)	yes

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
			rockfish)	
GPRW	GOLDEN PRAWN	Other nongroundfish	Other nongroundfish	
GRAS	GRASS ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
GRDR	UNSP. GRENADIERS	Grenadiers	Grenadiers	yes
GREN	PACIFIC GRENADIER	Grenadiers	Grenadiers	yes
GRS1	NOM. GRASS ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
GSP1	NOM. GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish	yes
GSPT	GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish	yes
GSQD	GIANT SQUID	Other nongroundfish	Other nongroundfish	
GSR1	NOM. GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish	yes
GSRK	GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish	yes
GSRM	GHOST SHRIMP	Other nongroundfish	Other nongroundfish	
GSTG	GREEN STURGEON	Other nongroundfish	Other nongroundfish	
GTRB	GREENLAND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
HBRK	HALFBANDED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
HCLM	HORSE CLAMS	Other nongroundfish	Other nongroundfish	
HLQN	HARLEQUIN ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
HNY1	NOM. HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
HNYC	HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
HTRB	HORNHEAD TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
ISRK	BIGEYE THRESHER SHARK	Other nongroundfish	Other nongroundfish	
JCLM	CALIFORNIA JACKKNIFE CLAM	Other nongroundfish	Other nongroundfish	
JMCK	JACK MACKEREL	Other nongroundfish	Other nongroundfish	
KFSH	GIANT KELPFISH	Other nongroundfish	Other nongroundfish	
KGL1	NOM. KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLP1	NOM. KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
KLPG	KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLPR	KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
KMKA	KAMCHATKA FLOUNDER	Other non-FMP flatfish	Other non-FMP flatfish	
KSTR	KUMAMOTO OYSTER	Other nongroundfish	Other nongroundfish	
LCD1	NOM. LINGCOD	Lingcod	Lingcod	yes
LCLM	NATIVE LITTLENECK	Other nongroundfish	Other nongroundfish	
LCOD	LINGCOD	Lingcod	Lingcod	yes
LDAB	LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
LDB1	NOM. LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
LOBS	CALIF. SPINY LOBSTER	Other nongroundfish	Other nongroundfish	
LSKT	LONGNOSE SKATE	Longnose skate	Longnose skate	yes
LSP1	NOM. LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead	yes
LSPN	LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead	yes
LSRK	LEOPARD SHARK	Other groundfish	Other groundfish	yes
LSTR	OLYMPIA OYSTER	Other nongroundfish	Other nongroundfish	
LUVR	LOUVAR	Other nongroundfish	Other nongroundfish	
MACL	MUD CLAMS	Other nongroundfish	Other nongroundfish	
MAKO	SHORTFIN MAKO SHARK	Other nongroundfish	Other nongroundfish	
MCLM	MANILA CLAM	Other nongroundfish	Other nongroundfish	
MEEL	MONKEYFACE EEL	Other nongroundfish	Other nongroundfish	
MISC	MISC. FISH/ANIMALS	Other nongroundfish	Other nongroundfish	
MOLA	COMMON MOLA	Other nongroundfish	Other nongroundfish	
MRLN	STRIPED MARLIN	Other nongroundfish	Other nongroundfish	
MSC2	MISCELLANEOUS FISH	Other nongroundfish	Other nongroundfish	
MSHP	PLAINFIN MIDSHIPMAN	Other nongroundfish	Other nongroundfish	
MSQD	MARKET SQUID	Other nongroundfish	Other nongroundfish	
MSRM	MUD SHRIMP	Other nongroundfish	Other nongroundfish	
MXR1	NOM. MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
MXRF	MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
NANC	NORTHERN ANCHOVY	Other nongroundfish	Other nongroundfish	
NRCK	NORTHERN ROCKFISH	Other groundfish	Other groundfish	yes
NSHR	NORTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
NSLF	NORTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
NSLP	NORTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
NUSF	NOR. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
NUSP	NOR. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
NUSR	NOR. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
OABL	OTHER ABALONE	Other nongroundfish	Other nongroundfish	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
OANC	OTHER ANCHOVY	Other nongroundfish	Other nongroundfish	
OBAS	OTHER BASS	Other nongroundfish	Other nongroundfish	
OCLM	OTHER CLAM	Other nongroundfish	Other nongroundfish	
OCRB	OTHER CRAB	Other nongroundfish	Other nongroundfish	
OCRK	OTHER CROAKER	Other nongroundfish	Other nongroundfish	
OCTP	UNSP. OCTOPUS	Other nongroundfish	Other nongroundfish	
ODSR	OTHER DEMERSAL RKFSH	Other groundfish	Other groundfish	yes
OECH	OTHER ECHINODERM	Other nongroundfish	Other nongroundfish	
OFLT	OTHER FLATFISH	Other flatfish	Other flatfish	yes
OGRN	OTHER GROUND FISH	Other groundfish	Other groundfish	yes
OLV1	NOM. OLIVE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
OLVE	OLIVE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
OMSK	OTHER MOLLUSKS	Other nongroundfish	Other nongroundfish	
OPLG	OTHER PELAGIC RKFSH	Other groundfish	Other groundfish	yes
ORCK	OTHER ROCKFISH	Other shelf rockfish (<150 fm)	Other shelf rockfish (<150 fm)	yes
ORCK	OTHER ROCKFISH	Other slope rockfish (>150 fm)	Other slope rockfish (>150 fm)	yes
ORND	OTHER ROUND FISH	Other groundfish	Other groundfish	yes
OSCL	OTHER SCALLOP	Other nongroundfish	Other nongroundfish	
OSKT	OTHER SKATES	Unspecified skate	Unspecified skate	yes
OSLR	OTHER SLOPE RKFSH	Other slope rockfish	Other slope rockfish	yes
OSRK	OTHER SHARK	Other nongroundfish	Other nongroundfish	
OSRM	OTHER SHRIMP	Other nongroundfish	Other nongroundfish	
OSTR	OTHER OYSTER	Other nongroundfish	Other nongroundfish	
OTCR	OPILIO TANNER CRAB	Tanner crab	Tanner crab	
OTNA	OTHER TUNA	Other nongroundfish	Other nongroundfish	
OURC	OTHER SEA URCHINS	Other nongroundfish	Other nongroundfish	
OWFS	OCEAN WHITEFISH	Other nongroundfish	Other nongroundfish	
PABL	PINK ABALONE	Other nongroundfish	Other nongroundfish	
PBNT	PACIFIC BONITO	Other nongroundfish	Other nongroundfish	
PBTR	PACIFIC BUTTERFISH	Other nongroundfish	Other nongroundfish	
PCLM	PISMO CLAM	Other nongroundfish	Other nongroundfish	
PCOD	PACIFIC COD	Pacific cod	Other groundfish	yes
PDAB	PACIFIC SANDDAB	Other flatfish	Other flatfish	yes
PDB1	NOM. PACIFIC SANDDAB	Other flatfish	Other flatfish	yes
PFNS	PACIFIC FLATNOSE	Other groundfish	Other groundfish	yes
PGMY	PYGMY ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
PHAG	PACIFIC HAGFISH	Other nongroundfish	Other nongroundfish	
PHLB	PACIFIC HALIBUT	Other nongroundfish	Other nongroundfish	
PHRG	PACIFIC HERRING	Other nongroundfish	Other nongroundfish	
PINK	PINK SALMON	Other nongroundfish	Other nongroundfish	
PLCK	WALLEYE POLLOCK	Other groundfish	Other groundfish	yes
PNK1	NOM. PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
PNKR	PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
POMF	PACIFIC POMFRET	Other nongroundfish	Other nongroundfish	
POP	PACIFIC OCEAN PERCH	Pacific ocean perch	Other slope rockfish	yes
POP1	GEN. SHELF/SLOPE RF	Other slope rockfish	Other slope rockfish	yes
POP2	NOMINAL POP	Pacific ocean perch	Other slope rockfish	yes
PRCL	PURPLE CLAM	Other nongroundfish	Other nongroundfish	
PROW	PROWFISH	Other nongroundfish	Other nongroundfish	
PRR1	NOM. PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
PRRK	PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
PSDN	PACIFIC SARDINE	Other nongroundfish	Other nongroundfish	
PSHP	PINK SHRIMP	Other nongroundfish	Other nongroundfish	
PSRK	PELAGIC THRESHER SHARK	Other nongroundfish	Other nongroundfish	
PSTR	PACIFIC OYSTER	Other nongroundfish	Other nongroundfish	
PTR1	NOM. PETRALE SOLE	Petrale sole	Petrale sole	yes
PTRL	PETRALE SOLE	Petrale sole	Petrale sole	yes
PUGT	PUGET SOUND ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
PWHT	PACIFIC WHITING	Pacific hake	Pacific hake	yes
QCLM	NORTHERN QUAHOG CLAM	Other nongroundfish	Other nongroundfish	
QFSH	QUEENFISH	Other nongroundfish	Other nongroundfish	
QLB1	NOM. QUILLBACK ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
QLBK	QUILLBACK ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
RABL	RED ABALONE	Other nongroundfish	Other nongroundfish	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
RATF	SPOTTED RATFISH	Other groundfish	Other groundfish	yes
RCK1	BOCACCIO+CHILIPEPPER RCKFSH	Other shelf rockfish	Other shelf rockfish	yes
RCK2	UNSP. BOLINA RCKFSH	Other nearshore rockfish	Other nearshore rockfish	yes
RCK3	UNSP. DPWTR REDS RCKFSH	Other slope rockfish	Other slope rockfish	yes
RCK4	UNSP. REDS RCKFSH	Other groundfish	Other groundfish	yes
RCK5	UNSP. SMALL REDS RCKFSH	Other groundfish	Other groundfish	yes
RCK6	UNSP. ROSEFISH RCKFSH	Other groundfish	Other groundfish	yes
RCK7	UNSP. GOPHER RCKFSH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)	yes
RCK8	CANARY+VERMILION RCKFSH	Canary rockfish	Canary rockfish	yes
RCK9	BLACK+BLUE ROCKFISH	Black rockfish	Black rockfish	yes
RCKG	ROCK GREENLING	Other nongroundfish	Other nongroundfish	
RCLM	RAZOR CLAM	Other nongroundfish	Other nongroundfish	
RCRB	ROCK CRAB	Other nongroundfish	Other nongroundfish	
RDB1	NOM. REDBANDED ROCKFISH	Other slope rockfish	Other slope rockfish	yes
RDBD	REDBANDED ROCKFISH	Other slope rockfish	Other slope rockfish	yes
REDS	REDSTRIPE ROCKFISH	Redstripe rockfish (Remaining rockfish)	Other shelf rockfish	yes
REX	REX SOLE	Other flatfish	Other flatfish	yes
REX1	NOM. REX SOLE	Other flatfish	Other flatfish	yes
REYE	ROUGHEYE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
RFLT	REMAINING FLATFISH	Other flatfish	Other flatfish	yes
RGL1	NOM. ROCK GREENLING	Other nongroundfish	Other nongroundfish	
RGRN	REMAINING GROUND FISH	Other groundfish	Other groundfish	yes
RHRG	ROUND HERRING	Other nongroundfish	Other nongroundfish	
RKCR	RED KING CRAB	Other nongroundfish	Other nongroundfish	
ROS1	NOM. ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
ROSY	ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
RPRW	RIDGEBACK PRAWN	Other nongroundfish	Other nongroundfish	
RRCK	REMAINING ROCKFISH	Other groundfish	Other groundfish	yes
RRND	REMAINING ROUND FISH	Other groundfish	Other groundfish	yes
RSCL	RED IRISH LORD	Other nongroundfish	Other nongroundfish	
RSL1	NOM. ROCK SOLE	Other flatfish	Other flatfish	yes
RSOL	ROCK SOLE	Other flatfish	Other flatfish	yes
RSRM	GRASS SHRIMP	Other nongroundfish	Other nongroundfish	
RST1	NOM. ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
RSTN	ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
RURC	RED SEA URCHIN	Other nongroundfish	Other nongroundfish	
RZCL	ROSY RAZOR CLAM	Other nongroundfish	Other nongroundfish	
SABL	SABLEFISH	Sablefish	Sablefish	yes
SAIL	SAILFISH	Other nongroundfish	Other nongroundfish	
SARY	PACIFIC SAURY	Other nongroundfish	Other nongroundfish	
SBL1	NOM. SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish	yes
SBLY	SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish	yes
SCLM	SOFT-SHELLED CLAM	Other nongroundfish	Other nongroundfish	
SCLP	UNSP. SCULPIN	Other nongroundfish	Other nongroundfish	
SCOR	CALIFORNIA SCORPIONFISH	Other groundfish	Other groundfish	yes
SCR1	NOM. CALIF. SCORPIONFISH	Other groundfish	Other groundfish	yes
SDB1	NOM. SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
SFL1	NOM. STARRY FLOUNDER	Starry flounder	Starry flounder	yes
SFLT	UNSP. SHALLOW FLOUNDERS	Other flatfish	Other flatfish	yes
SHAD	UNSPECIFIED SHAD	Other nongroundfish	Other nongroundfish	
SHP1	NOM. CALIFORNIA SHEEPHEAD	Other nongroundfish	Other nongroundfish	
SHPD	CALIFORNIA SHEEPHEAD	Other nongroundfish	Other nongroundfish	
SHRP	SHARPCHIN ROCKFISH	Sharpchin rockfish	Sharpchin rockfish	yes
SKCR	SCARLET KING CRAB	Other nongroundfish	Other nongroundfish	
SKIL	SKILFISH	Other nongroundfish	Other nongroundfish	
SLGR	SILVERGREY ROCKFISH	Silvergrey rockfish (Remaining rockfish)	Other shelf rockfish	yes
SLNS	SLENDER SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
SMLT	UNSP. SMELT	Other nongroundfish	Other nongroundfish	
SNOS	SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish	yes
SNS1	NOM. SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish	yes
SOCK	SOCKEYE SALMON	Other nongroundfish	Other nongroundfish	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
SPK1	NOM. SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SPKL	SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SPRW	SPOTTED PRAWN	Other nongroundfish	Other nongroundfish	
SPSK	SANDPAPER SKATE	Other non-FMP skate	Other non-FMP skate	
SQID	UNSP. SQUID	Other nongroundfish	Other nongroundfish	
SQR1	NOM. SQUARESPOT	Other shelf rockfish	Other shelf rockfish	yes
SQRS	SQUARESPOT ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SRFP	SURFPERCH SPP.	Other nongroundfish	Other nongroundfish	
SRKR	SHORTRAKER ROCKFISH	Other slope rockfish	Other slope rockfish	yes
SSCL	SHARPNOSE SCULPIN	Other nongroundfish	Other nongroundfish	
SSDB	SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
SSKT	STARRY SKATE	Other non-FMP skate	Other non-FMP skate	
SSLF	SOUTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SSLP	SOUTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
SSO1	NOM. SAND SOLE	Other flatfish	Other flatfish	yes
SSOL	SAND SOLE	Other flatfish	Other flatfish	yes
SSP1	NOM. SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead	yes
SSPF	SHORTBILL SPEARFISH	Other nongroundfish	Other nongroundfish	
SSPN	SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead	yes
SSRD	Deep So. Near-shore RF	Other nearshore rockfish	Other nearshore rockfish	yes
SSRK	SOUPFIN SHARK	Other groundfish	Other groundfish	yes
SSRS	Shallow So. Near-shore RF	Other nearshore rockfish	Other nearshore rockfish	yes
STAR	STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
STL1	NOM. STRIPETAIL ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
STLH	STEELHEAD	Other nongroundfish	Other nongroundfish	
STNA	SKIPJACK TUNA	Other nongroundfish	Other nongroundfish	
STR1	NOM. STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
STRK	STRIPETAIL ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
STRY	STARRY FLOUNDER	Starry flounder	Starry flounder	yes
SUSF	SOU. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SUSP	SOU. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
SWRD	SWORDFISH	Other nongroundfish	Other nongroundfish	
SWS1	NOM. SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
SWSP	SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
TCOD	PACIFIC TOMCOD	Other nongroundfish	Other nongroundfish	
TGR1	NOM. TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
THD1	NOM. THORNYHEADS	Mixed thornyheads	Mixed thornyheads	yes
THDS	THORNYHEADS (MIXED)	Mixed thornyheads	Mixed thornyheads	yes
TIGR	TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
TRE1	NOM. TREEFISH	Other nearshore rockfish	Other nearshore rockfish	yes
TREE	TREEFISH	Other nearshore rockfish	Other nearshore rockfish	yes
TSRK	COMMON THRESHER SHARK	Other nongroundfish	Other nongroundfish	
UABL	UNSPECIFIED ABALONE	Other nongroundfish	Other nongroundfish	
UCLM	UNSPECIFIED CLAM	Other nongroundfish	Other nongroundfish	
UCRB	UNSPECIFIED CRAB	Other nongroundfish	Other nongroundfish	
UDAB	UNSP. SANDDABS	Other flatfish	Other flatfish	yes
UDF1	UNSP. DEEP-91 FLOUNDERS	Other flatfish	Other flatfish	yes
UDF2	UNSP. DEEP-95 FLOUNDERS	Other flatfish	Other flatfish	yes
UDM1	UNSP. DEMERSAL-91	Other groundfish	Other groundfish	yes
UDNR	UNSP. DEEP NEAR-SHORE RF	Other nearshore rockfish	Other nearshore rockfish	yes
UDSR	UNSP. DEMERSAL RKFSH	Other groundfish	Other groundfish	yes
UDW1	SHORTRAKER+ROUGHEYE	Other slope rockfish	Other slope rockfish	yes
UECH	UNSPECIFIED ECHINODERM	Other nongroundfish	Other nongroundfish	
UFL1	FLOUNDERS (NO FSOL)	Other flatfish	Other flatfish	yes
UFLT	UNSP. FLATFISH	Other flatfish	Other flatfish	yes
UGLG	UNSP. GREENLING	Other nongroundfish	Other nongroundfish	
UGRN	UNSP. GROUND FISH	Other groundfish	Other groundfish	yes
UHAG	UNSPECIFIED HAGFISH	Other nongroundfish	Other nongroundfish	
UHLB	UNSPECIFIED HALIBUT	Other nongroundfish	Other nongroundfish	
UJEL	UNSP. JELLYFISH	Other nongroundfish	Other nongroundfish	
UKCR	UNSP. KING CRAB	Other nongroundfish	Other nongroundfish	
UMCK	UNSP. MACKEREL	Other nongroundfish	Other nongroundfish	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	FMP
UMSK	UNSPECIFIED MOLLUSKS	Other nongroundfish	Other nongroundfish	
UPLG	UNSP. PELAGIC RKFSH	Other groundfish	Other groundfish	yes
UPOP	UNSP. POP GROUP	Pacific ocean perch	Other slope rockfish	yes
URCK	UNSP. ROCKFISH	Other shelf rockfish (<150 fm)	Other shelf rockfish (<150 fm)	yes
URCK	UNSP. ROCKFISH	Other slope rockfish (>150 fm)	Other slope rockfish (>150 fm)	yes
URK1	SRKR+REYE+NRCK+SHRP	Other slope rockfish	Other slope rockfish	yes
URND	UNSP. ROUNDFISH	Other groundfish	Other groundfish	yes
USCL	UNSPECIFIED SCALLOP	Other nongroundfish	Other nongroundfish	
USCU	UNSP. SEA CUCUMBERS	Other nongroundfish	Other nongroundfish	
USF1	UNSP. SHALLOW-91 FLOUNDERS	Other flatfish	Other flatfish	yes
USHR	UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
USKT	UNSP. SKATE	Unspecified skate	Unspecified skate	yes
USLF	UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
USLP	UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	yes
USLR	UNSP. SLOPE RKFSH	Other slope rockfish	Other slope rockfish	yes
USMN	UNSP. SALMON	Other nongroundfish	Other nongroundfish	
USR1	UNSP. SLOPE-91	Other groundfish	Other groundfish	yes
USR2	UNSP. SLOPE-93	Other groundfish	Other groundfish	yes
USRK	UNSP. SHARK	Other nongroundfish	Other nongroundfish	
USRM	UNSP. OCEAN SHRIMP	Other nongroundfish	Other nongroundfish	
USTG	UNSP. STURGEON	Other nongroundfish	Other nongroundfish	
USTR	UNSPECIFIED OYSTER	Other nongroundfish	Other nongroundfish	
UTCR	UNSP. TANNER CRAB	Tanner crab	Tanner crab	
UTNA	UNSPECIFIED TUNA	Other nongroundfish	Other nongroundfish	
UTRB	UNSP. TURBOTS	Other flatfish	Other flatfish	yes
UURC	UNSP. SEA URCHINS	Other nongroundfish	Other nongroundfish	
VCLM	VARNISH CLAM	Other nongroundfish	Other nongroundfish	
VRM1	NOM. VERMILLION ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
VRML	VERMILION ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
WABL	WHITE ABALONE	Other nongroundfish	Other nongroundfish	
WBAS	WHITE SEABASS	Other nongroundfish	Other nongroundfish	
WCLM	WASHINGTON CLAM	Other nongroundfish	Other nongroundfish	
WCRK	WHITE CROAKER	Other nongroundfish	Other nongroundfish	
WDOW	WIDOW ROCKFISH	Widow rockfish	Widow rockfish	yes
WDW1	NOM. WIDOW ROCKFISH	Widow rockfish	Widow rockfish	yes
WEEL	WOLF EEL	Other nongroundfish	Other nongroundfish	
WHOO	WAHOO	Other nongroundfish	Other nongroundfish	
WSTG	WHITE STURGEON	Other nongroundfish	Other nongroundfish	
YEY1	NOM. YELLOWEYE ROCKFISH	Yelloweye rockfish	Yelloweye rockfish	yes
YEYE	YELLOWEYE ROCKFISH	Yelloweye rockfish	Yelloweye rockfish	yes
YLTL	YELLOWTAIL	Other nongroundfish	Other nongroundfish	
YMTH	YELLOWMOUTH ROCKFISH	Yellowtail rockfish (Remaining rockfish)	Other slope rockfish	yes
YSOL	YELLOWFIN SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
YTNA	YELLOWFIN TUNA	Other nongroundfish	Other nongroundfish	
YTR1	NOM. YELLOWTAIL ROCKFISH	Yellowtail rockfish	Yellowtail rockfish (Remaining rockfish)	yes
YTRK	YELLOWTAIL ROCKFISH	Yellowtail rockfish	Yellowtail rockfish (Remaining rockfish)	yes

APPENDIX D

Species identification codes used in the Pacific Coast Fisheries Information Network (PacFIN) database and assigned to WCGOP observer data, with aggregated species groups used in this report for the nearshore fixed gear sector of the groundfish fishery.

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	NS Species
AKSK	ALASKA SKATE	Other non-FMP skate	Other non-FMP skate	
ALBC	ALBACORE	Other nongroundfish	Other nongroundfish	
AMCK	ATKA MACKEREL	Other nongroundfish	Other nongroundfish	
APLC	ALASKA PLAICE	Other non-FMP flatfish	Other non-FMP flatfish	
ARR1	NOM. AURORA ROCKFISH	Other slope rockfish	Other slope rockfish	
ARRA	AURORA ROCKFISH	Other slope rockfish	Other slope rockfish	
ART1	NOM. ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder	
ARTH	ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder	
ASKT	ALEUTIAN SKATE	Other nongroundfish	Other nongroundfish	
ASRK	PACIFIC ANGEL SHARK	Other nongroundfish	Other nongroundfish	
BABL	BLACK ABALONE	Other nongroundfish	Other nongroundfish	
BANK	BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)	
BCAC	BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio	
BCC1	NOM. BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio	
BCLM	BUTTER CLAM	Other nongroundfish	Other nongroundfish	
BGL1	NOM. BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)	
BHAG	BLACK HAGFISH	Other nongroundfish	Other nongroundfish	
BISC	BROWN IRISH LORD	Brown Irish lord	Brown Irish lord	yes
BKCR	BLUE KING CRAB	Other nongroundfish	Other nongroundfish	
BLCK	BLACK ROCKFISH	Black rockfish	Black rockfish	yes
BLGL	BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)	
BLK1	NOM. BLACK ROCKFISH	Black rockfish	Black rockfish	yes
BLPT	BLACK EELPOUT	Other nongroundfish	Other nongroundfish	
BLSK	BLACK SKATE	Other non-FMP skate	Other non-FMP skate	
BLU1	NOM. BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BLUR	BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BMCK	BULLET MACKEREL	Other nongroundfish	Other nongroundfish	
BMRL	BLUE MARLIN	Other nongroundfish	Other nongroundfish	
BMSL	BLUE OR BAY MUSSEL	Other nongroundfish	Other nongroundfish	
BNK1	NOM. BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)	
BRNZ	BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
BRW1	NOM. BROWN ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
BRWN	BROWN ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
BRZ1	NOM. BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
BSC1	BUFFALO SCULPIN	Buffalo sculpin	Buffalo sculpin	yes
BSJK	BLACK SKIPJACK	Other nongroundfish	Other nongroundfish	
BSKT	BIG SKATE	Big skate	Big skate	
BSOL	BUTTER SOLE	Other flatfish	Other flatfish	
BSPR	BLACKSPOTTED ROCKFISH	Other slope rockfish	Other slope rockfish	
BSRK	BLUE SHARK	Other nongroundfish	Other nongroundfish	
BSRM	UNSP. BAIT SHRIMP	Other nongroundfish	Other nongroundfish	
BTCR	BAIRDI TANNER CRAB	Tanner crab	Tanner crab	
BTNA	BLUEFIN TUNA	Other nongroundfish	Other nongroundfish	
BTRY	BAT RAY	Other nongroundfish	Other nongroundfish	
BYEL	BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
CBZ1	NOM. CABEZON	Cabezon	Cabezon	yes
CBZN	CABEZON	Cabezon	Cabezon	yes
CEEL	SPOTTED CUSK-EEL	Other nongroundfish	Other nongroundfish	
CHL1	NOM. CALIFORNIA HALIBUT	California halibut	California halibut	
CHLB	CALIFORNIA HALIBUT	California halibut	California halibut	
CHN1	NOM. CHINA ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
CHNA	CHINA ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	NS Species
CHNK	CHINOOK SALMON	Other nongroundfish	Other nongroundfish	
CHUM	CHUM SALMON	Other nongroundfish	Other nongroundfish	
CKLE	BASKET COCKLE	Other nongroundfish	Other nongroundfish	
CLC1	NOM. CALICO ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
CLCO	CALICO ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
CLP1	NOM. CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper	
CLPR	CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper	
CMCK	CHUB MACKEREL	Other nongroundfish	Other nongroundfish	
CMEL	CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish	
CML1	NOM. CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish	
CMSL	CALIFORNIA MUSSEL	Other nongroundfish	Other nongroundfish	
CNR1	NOM. CANARY ROCKFISH	Canary rockfish	Canary rockfish	
CNRY	CANARY ROCKFISH	Canary rockfish	Canary rockfish	
COHO	COHO SALMON	Other nongroundfish	Other nongroundfish	
COP1	NOM. COPPER ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
COPP	COPPER ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
CPLN	CAPELIN	Other nongroundfish	Other nongroundfish	
CSKT	CALIFORNIA SKATE	California skate	California skate	
CSL1	NOM. CURLFIN SOLE	Other flatfish	Other flatfish	
CSLK	CALIFORNIA SLICKHEAD	Other nongroundfish	Other nongroundfish	
CSOL	CURLFIN SOLE	Other flatfish	Other flatfish	
CSRK	BROWN CAT SHARK	Other nongroundfish	Other nongroundfish	
CTRB	C-O SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
CUDA	PACIFIC BARRACUDA	Other nongroundfish	Other nongroundfish	
CWC1	NOM. COWCOD ROCKFISH	Other shelf rockfish	Cowcod	
CWCD	COWCOD ROCKFISH	Other shelf rockfish	Cowcod	
DARK	DARK ROCKFISH	Other shelf rockfish	Other shelf rockfish	
DBR1	NOM. DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish	
DBRK	DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish	
DCRB	DUNGENESS CRAB	Dungeness crab	Dungeness crab	
DFLT	UNSP. DEEP FLOUNDERS	Other flatfish	Other flatfish	
DOVR	DOVER SOLE	Dover sole	Dover sole	
DRDO	DORADO	Other nongroundfish	Other nongroundfish	
DSOL	DEEPSEA SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
DSRK	SPINY DOGFISH	Spiny dogfish	Spiny dogfish	
DTRB	DIAMOND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
DUSK	DUSKY ROCKFISH	Other groundfish	Other groundfish	
DVR1	NOM. DOVER SOLE	Dover sole	Dover sole	
DWRF	DWARF-RED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
EELS	UNSPECIFIED EELS	Other nongroundfish	Other nongroundfish	
EGL1	NOM. ENGLISH SOLE	English sole	English sole	
EGLS	ENGLISH SOLE	English sole	English sole	
ESTR	EASTERN OYSTER	Other nongroundfish	Other nongroundfish	
ETNA	BIGEYE TUNA	Other nongroundfish	Other nongroundfish	
EULC	EULACHON	Eulachon	Eulachon	
EURO	EUROPEAN OYSTER	Other nongroundfish	Other nongroundfish	
FLAG	FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish	
FLG1	NOM. FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish	
FNTS	FANTAIL SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
FRCK	FRECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
FSOL	FLATHEAD SOLE	Other flatfish	Other flatfish	
GABL	GREEN ABALONE	Other nongroundfish	Other nongroundfish	
GBAS	GIANT SEA BASS	Other nongroundfish	Other nongroundfish	
GBL1	NOM. GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
GBLC	GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
GCLM	GAPER CLAM	Other nongroundfish	Other nongroundfish	
GDUK	GEODUCK	Other nongroundfish	Other nongroundfish	
GGRD	GIANT GRENADIER	Other nongroundfish	Other nongroundfish	
GKCR	GOLDEN KING CRAB	Other nongroundfish	Other nongroundfish	
GPH1	NOM. GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)	yes
GPHR	GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining	yes

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	NS Species
			rockfish)	
GPRW	GOLDEN PRAWN	Other nongroundfish	Other nongroundfish	
GRAS	GRASS ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
GRDR	UNSP. GRENADIERS	Grenadiers	Grenadiers	
GREN	PACIFIC GRENADIER	Grenadiers	Grenadiers	
GRS1	NOM. GRASS ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
GSP1	NOM. GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish	
GSPT	GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish	
GSQD	GIANT SQUID	Other nongroundfish	Other nongroundfish	
GSR1	NOM. GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish	
GSRK	GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish	
GSRM	GHOST SHRIMP	Other nongroundfish	Other nongroundfish	
GSTG	GREEN STURGEON	Other nongroundfish	Other nongroundfish	
GTRB	GREENLAND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
HBRK	HALFBANDED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
HCLM	HORSE CLAMS	Other nongroundfish	Other nongroundfish	
HLQN	HARLEQUIN ROCKFISH	Other shelf rockfish	Other shelf rockfish	
HNY1	NOM. HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish	
HNYC	HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish	
HTRB	HORNHEAD TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
ISRK	BIGEYE THRESHER SHARK	Other nongroundfish	Other nongroundfish	
JCLM	CALIFORNIA JACKKNIFE CLAM	Other nongroundfish	Other nongroundfish	
JMCK	JACK MACKEREL	Other nongroundfish	Other nongroundfish	
KFSH	GIANT KELPFISH	Other nongroundfish	Other nongroundfish	
KGL1	NOM. KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLP1	NOM. KELP ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
KLPG	KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLPR	KELP ROCKFISH	Other nearshore rockfish	Shallow nearshore rockfish	yes
KMKA	KAMCHATKA FLOUNDER	Other non-FMP flatfish	Other non-FMP flatfish	
KSTR	KUMAMOTO OYSTER	Other nongroundfish	Other nongroundfish	
LCD1	NOM. LINGCOD	Lingcod	Lingcod	yes
LCLM	NATIVE LITTLENECK	Other nongroundfish	Other nongroundfish	
LCOD	LINGCOD	Lingcod	Lingcod	yes
LDAB	LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
LDB1	NOM. LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
LOBS	CALIF. SPINY LOBSTER	Other nongroundfish	Other nongroundfish	
LSKT	LONGNOSE SKATE	Longnose skate	Longnose skate	
LSP1	NOM. LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead	
LSPN	LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead	
LSRK	LEOPARD SHARK	Other groundfish	Other groundfish	
LSTR	OLYMPIA OYSTER	Other nongroundfish	Other nongroundfish	
LUVR	LOUVAR	Other nongroundfish	Other nongroundfish	
MACL	MUD CLAMS	Other nongroundfish	Other nongroundfish	
MAKO	SHORTFIN MAKO SHARK	Other nongroundfish	Other nongroundfish	
MCLM	MANILA CLAM	Other nongroundfish	Other nongroundfish	
MEEL	MONKEYFACE EEL	Other nongroundfish	Other nongroundfish	
MISC	MISC. FISH/ANIMALS	Other nongroundfish	Other nongroundfish	
MOLA	COMMON MOLA	Other nongroundfish	Other nongroundfish	
MRLN	STRIPED MARLIN	Other nongroundfish	Other nongroundfish	
MSC2	MISCELLANEOUS FISH	Other nongroundfish	Other nongroundfish	
MSHP	PLAINFIN MIDSHIPMAN	Other nongroundfish	Other nongroundfish	
MSQD	MARKET SQUID	Other nongroundfish	Other nongroundfish	
MSRM	MUD SHRIMP	Other nongroundfish	Other nongroundfish	
MXR1	NOM. MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish	
MXRF	MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish	
NANC	NORTHERN ANCHOVY	Other nongroundfish	Other nongroundfish	
NRCK	NORTHERN ROCKFISH	Other groundfish	Other groundfish	
NSHR	NORTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish	Northern nearshore rockfish	yes
NSLF	NORTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	
NSLP	NORTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	
NUSF	NOR. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	
NUSP	NOR. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	
NUSR	NOR. UNSP. NEAR-SHORE	Other nearshore rockfish	Northern nearshore rockfish	yes

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' latitude	Species Group - South of 40° 10' latitude	NS Species
	ROCKFISH			
OABL	OTHER ABALONE	Other nongroundfish	Other nongroundfish	
OANC	OTHER ANCHOVY	Other nongroundfish	Other nongroundfish	
OBAS	OTHER BASS	Other nongroundfish	Other nongroundfish	
OCLM	OTHER CLAM	Other nongroundfish	Other nongroundfish	
OCRB	OTHER CRAB	Other nongroundfish	Other nongroundfish	
OCRK	OTHER CROAKER	Other nongroundfish	Other nongroundfish	
OCTP	UNSP. OCTOPUS	Other nongroundfish	Other nongroundfish	
ODSR	OTHER DEMERSAL RKFSH	Other groundfish	Other groundfish	
OECH	OTHER ECHINODERM	Other nongroundfish	Other nongroundfish	
OFLT	OTHER FLATFISH	Other flatfish	Other flatfish	
OGRN	OTHER GROUND FISH	Other groundfish	Other groundfish	
OLV1	NOM. OLIVE ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
OLVE	OLIVE ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
OMSK	OTHER MOLLUSKS	Other nongroundfish	Other nongroundfish	
OPLG	OTHER PELAGIC RKFSH	Other groundfish	Other groundfish	
ORCK	OTHER ROCKFISH	Other shelf rockfish (<150 fm)	Other shelf rockfish (<150 fm)	
ORCK	OTHER ROCKFISH	Other slope rockfish (>150 fm)	Other slope rockfish (>150 fm)	
ORND	OTHER ROUND FISH	Other groundfish	Other groundfish	
OSCL	OTHER SCALLOP	Other nongroundfish	Other nongroundfish	
OSKT	OTHER SKATES	Unspecified skate	Unspecified skate	
OSLR	OTHER SLOPE RKFSH	Other slope rockfish	Other slope rockfish	
OSRK	OTHER SHARK	Other nongroundfish	Other nongroundfish	
OSRM	OTHER SHRIMP	Other nongroundfish	Other nongroundfish	
OSTR	OTHER OYSTER	Other nongroundfish	Other nongroundfish	
OTCR	OPILIO TANNER CRAB	Tanner crab	Tanner crab	
OTNA	OTHER TUNA	Other nongroundfish	Other nongroundfish	
OURC	OTHER SEA URCHINS	Other nongroundfish	Other nongroundfish	
OWFS	OCEAN WHITEFISH	Other nongroundfish	Other nongroundfish	
PABL	PINK ABALONE	Other nongroundfish	Other nongroundfish	
PBNT	PACIFIC BONITO	Other nongroundfish	Other nongroundfish	
PBTR	PACIFIC BUTTERFISH	Other nongroundfish	Other nongroundfish	
PCLM	PISMO CLAM	Other nongroundfish	Other nongroundfish	
PCOD	PACIFIC COD	Pacific cod	Other groundfish	
PDAB	PACIFIC SANDDAB	Other flatfish	Other flatfish	
PDB1	NOM. PACIFIC SANDDAB	Other flatfish	Other flatfish	
PFNS	PACIFIC FLATNOSE	Other groundfish	Other groundfish	
PGMY	PYGMY ROCKFISH	Other shelf rockfish	Other shelf rockfish	
PHAG	PACIFIC HAGFISH	Other nongroundfish	Other nongroundfish	
PHLB	PACIFIC HALIBUT	Other nongroundfish	Other nongroundfish	
PHRG	PACIFIC HERRING	Other nongroundfish	Other nongroundfish	
PINK	PINK SALMON	Other nongroundfish	Other nongroundfish	
PLCK	WALLEYE POLLOCK	Other groundfish	Other groundfish	
PNK1	NOM. PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish	
PNKR	PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish	
POMF	PACIFIC POMFRET	Other nongroundfish	Other nongroundfish	
POP	PACIFIC OCEAN PERCH	Pacific ocean perch	Other slope rockfish	
POP1	GEN. SHELF/SLOPE RF	Other slope rockfish	Other slope rockfish	
POP2	NOMINAL POP	Pacific ocean perch	Other slope rockfish	
PRCL	PURPLE CLAM	Other nongroundfish	Other nongroundfish	
PROW	PROWFISH	Other nongroundfish	Other nongroundfish	
PRR1	NOM. PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish	
PRRK	PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish	
PSDN	PACIFIC SARDINE	Other nongroundfish	Other nongroundfish	
PSHP	PINK SHRIMP	Other nongroundfish	Other nongroundfish	
PSRK	PELAGIC THRESHER SHARK	Other nongroundfish	Other nongroundfish	
PSTR	PACIFIC OYSTER	Other nongroundfish	Other nongroundfish	
PTR1	NOM. PETRALE SOLE	Petrале sole	Petrале sole	
PTRL	PETRALE SOLE	Petrале sole	Petrале sole	
PUGT	PUGET SOUND ROCKFISH	Other shelf rockfish	Other shelf rockfish	
PWHT	PACIFIC WHITING	Pacific hake	Pacific hake	
QCLM	NORTHERN QUAHOG CLAM	Other nongroundfish	Other nongroundfish	
QFSH	QUEENFISH	Other nongroundfish	Other nongroundfish	
QLB1	NOM. QUILLBACK ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes

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QLBK	QUILLBACK ROCKFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
RABL	RED ABALONE	Other nongroundfish	Other nongroundfish	
RATF	SPOTTED RATFISH	Other groundfish	Other groundfish	
RCK1	BOCACCI+CHILIPEPPER RCKFSH	Other shelf rockfish	Other shelf rockfish	
RCK2	UNSP. BOLINA RCKFSH	Other nearshore rockfish	Deeper nearshore rockfish	yes
RCK3	UNSP. DPWTR REDS RCKFSH	Other slope rockfish	Other slope rockfish	
RCK4	UNSP. REDS RCKFSH	Other groundfish	Other groundfish	
RCK5	UNSP. SMALL REDS RCKFSH	Other groundfish	Other groundfish	
RCK6	UNSP. ROSEFISH RCKFSH	Other groundfish	Other groundfish	
RCK7	UNSP. GOPHER RCKFSH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)	yes
RCK8	CANARY+VERMILION RCKFSH	Canary rockfish	Canary rockfish	
RCK9	BLACK+BLUE ROCKFISH	Black rockfish	Black rockfish	yes
RCKG	ROCK GREENLING	Other greenling	Other greenling	
RCLM	RAZOR CLAM	Other nongroundfish	Other nongroundfish	
RCRB	ROCK CRAB	Other nongroundfish	Other nongroundfish	
RDB1	NOM. REDBANDED ROCKFISH	Other slope rockfish	Other slope rockfish	
RDBD	REDBANDED ROCKFISH	Other slope rockfish	Other slope rockfish	
REDS	REDSTRIPE ROCKFISH	Redstripe rockfish (Remaining rockfish)	Other slope rockfish	
REX	REX SOLE	Other flatfish	Other flatfish	
REX1	NOM. REX SOLE	Other flatfish	Other flatfish	
REYE	ROUGHEYE ROCKFISH	Other slope rockfish	Other slope rockfish	
RFLT	REMAINING FLATFISH	Other flatfish	Other flatfish	
RGL1	NOM. ROCK GREENLING	Other greenling	Other greenling	
RGRN	REMAINING GROUND FISH	Other groundfish	Other groundfish	
RHRG	ROUND HERRING	Other nongroundfish	Other nongroundfish	
RKCR	RED KING CRAB	Other nongroundfish	Other nongroundfish	
ROS1	NOM. ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish	
ROSY	ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish	
RPRW	RIDGEBACK PRAWN	Other nongroundfish	Other nongroundfish	
RRCK	REMAINING ROCKFISH	Other groundfish	Other groundfish	
RRND	REMAINING ROUND FISH	Other groundfish	Other groundfish	
RSCL	RED IRISH LORD	Red Irish lord	Red Irish lord	yes
RSL1	NOM. ROCK SOLE	Other flatfish	Other flatfish	
RSOL	ROCK SOLE	Other flatfish	Other flatfish	
RSRM	GRASS SHRIMP	Other nongroundfish	Other nongroundfish	
RST1	NOM. ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish	
RSTN	ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish	
RURC	RED SEA URCHIN	Other nongroundfish	Other nongroundfish	
RZCL	ROSY RAZOR CLAM	Other nongroundfish	Other nongroundfish	
SABL	SABLEFISH	Sablefish	Sablefish	
SAIL	SAILFISH	Other nongroundfish	Other nongroundfish	
SARY	PACIFIC SAURY	Other nongroundfish	Other nongroundfish	
SBL1	NOM. SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish	
SBLY	SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish	
SCLM	SOFT-SHELLED CLAM	Other nongroundfish	Other nongroundfish	
SCLP	UNSP. SCULPIN	Other nongroundfish	Other nongroundfish	
SCOR	CALIFORNIA SCORPIONFISH	Other groundfish	Other groundfish	yes
SCR1	NOM. CALIF. SCORPIONFISH	Other groundfish	Other groundfish	yes
SDB1	NOM. SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
SFL1	NOM. STARRY FLOUNDER	Starry flounder	Starry flounder	
SFLT	UNSP. SHALLOW FLOUNDERS	Other flatfish	Other flatfish	
SHAD	UNSPECIFIED SHAD	Other nongroundfish	Other nongroundfish	
SHP1	NOM. CALIFORNIA SHEEPHEAD	California sheephead	California sheephead	yes
SHPD	CALIFORNIA SHEEPHEAD	California sheephead	California sheephead	yes
SHRP	SHARPCHIN ROCKFISH	Sharpchin rockfish	Sharpchin rockfish	
SKCR	SCARLET KING CRAB	Other nongroundfish	Other nongroundfish	
SKIL	SKILFISH	Other nongroundfish	Other nongroundfish	
SLGR	SILVERGREY ROCKFISH	Silvergrey rockfish (Remaining rockfish)	Other shelf rockfish	
SLNS	SLENDER SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
SMLT	UNSP. SMELT	Other nongroundfish	Other nongroundfish	
SNOS	SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish	

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SNS1	NOM. SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish	
SOCK	SOCKEYE SALMON	Other nongroundfish	Other nongroundfish	
SPK1	NOM. SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SPKL	SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SPRW	SPOTTED PRAWN	Other nongroundfish	Other nongroundfish	
SPSK	SANDPAPER SKATE	Other non-FMP skate	Other non-FMP skate	
SQID	UNSP. SQUID	Other nongroundfish	Other nongroundfish	
SQR1	NOM. SQUARESPOT	Other shelf rockfish	Other shelf rockfish	
SQRS	SQUARESPOT ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SRFP	SURFPERCH SPP.	Other nongroundfish	Other nongroundfish	
SRKR	SHORTRAKER ROCKFISH	Other slope rockfish	Other slope rockfish	
SSCL	SHARPNOSE SCULPIN	Other nongroundfish	Other nongroundfish	
SSDB	SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish	
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	Southern nearshore rockfish	Deeper nearshore rockfish	yes
SSKT	STARRY SKATE	Other non-FMP skate	Other non-FMP skate	
SSLF	SOUTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SSLP	SOUTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	
SSO1	NOM. SAND SOLE	Other flatfish	Other flatfish	
SSOL	SAND SOLE	Other flatfish	Other flatfish	
SSP1	NOM. SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead	
SSPF	SHORTBILL SPEARFISH	Other nongroundfish	Other nongroundfish	
SSPN	SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead	
SSRD	Deep So. Near-shore RF	Southern nearshore rockfish	Deeper nearshore rockfish	yes
SSRK	SOUPFIN SHARK	Other groundfish	Other groundfish	
SSRS	Shallow So. Near-shore RF	Southern nearshore rockfish	Shallow nearshore rockfish	yes
STAR	STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish	
STL1	NOM. STRIPETAILED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
STLH	STEELHEAD	Other nongroundfish	Other nongroundfish	
STNA	SKIPJACK TUNA	Other nongroundfish	Other nongroundfish	
STR1	NOM. STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish	
STRK	STRIPETAILED ROCKFISH	Other shelf rockfish	Other shelf rockfish	
STRY	STARRY FLOUNDER	Starry flounder	Starry flounder	
SUSF	SOU. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SUSP	SOU. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish	
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	Southern nearshore rockfish	Deeper nearshore rockfish	yes
SWRD	SWORDFISH	Other nongroundfish	Other nongroundfish	
SWS1	NOM. SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish	
SWSP	SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish	
TCOD	PACIFIC TOMCOD	Other nongroundfish	Other nongroundfish	
TGR1	NOM. TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish	
THD1	NOM. THORNYHEADS	Mixed thornyheads	Mixed thornyheads	
THDS	THORNYHEADS (MIXED)	Mixed thornyheads	Mixed thornyheads	
TIGR	TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish	
TRE1	NOM. TREEFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
TREE	TREEFISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
TSRK	COMMON THRESHER SHARK	Other nongroundfish	Other nongroundfish	
UABL	UNSPECIFIED ABALONE	Other nongroundfish	Other nongroundfish	
UCLM	UNSPECIFIED CLAM	Other nongroundfish	Other nongroundfish	
UCRB	UNSPECIFIED CRAB	Other nongroundfish	Other nongroundfish	
UDAB	UNSP. SANDDABS	Other flatfish	Other flatfish	
UDF1	UNSP. DEEP-91 FLOUNDERS	Other flatfish	Other flatfish	
UDF2	UNSP. DEEP-95 FLOUNDERS	Other flatfish	Other flatfish	
UDM1	UNSP. DEMERSAL-91	Other groundfish	Other groundfish	
UDNR	UNSP. DEEP NEAR-SHORE RF	Other nearshore rockfish	Deeper nearshore rockfish	yes
UDSR	UNSP. DEMERSAL RKFSH	Other groundfish	Other groundfish	
UDW1	SHORTRAKER+ROUGHEYE	Other slope rockfish	Other slope rockfish	
UECH	UNSPECIFIED ECHINODERM	Other nongroundfish	Other nongroundfish	
UFL1	FLOUNDERS (NO FSOL)	Other flatfish	Other flatfish	
UFLT	UNSP. FLATFISH	Other flatfish	Other flatfish	
UGLG	UNSP. GREENLING	Other greenling	Other greenling	yes

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UGRN	UNSP. GROUND FISH	Other groundfish	Other groundfish	
UHAG	UNSPECIFIED HAG FISH	Other nongroundfish	Other nongroundfish	
UHLB	UNSPECIFIED HALIBUT	Other nongroundfish	Other nongroundfish	
UJEL	UNSP. JELLY FISH	Other nongroundfish	Other nongroundfish	
UKCR	UNSP. KING CRAB	Other nongroundfish	Other nongroundfish	
UMCK	UNSP. MACKEREL	Other nongroundfish	Other nongroundfish	
UMSK	UNSPECIFIED MOLLUSKS	Other nongroundfish	Other nongroundfish	
UPLG	UNSP. PELAGIC RKFSH	Other groundfish	Other groundfish	
UPOP	UNSP. POP GROUP	Pacific ocean perch	Other slope rockfish	
URCK	UNSP. ROCK FISH	Other shelf rockfish (<150 fm)	Other shelf rockfish (<150 fm)	
URCK	UNSP. ROCK FISH	Other slope rockfish (>150 fm)	Other slope rockfish (>150 fm)	
URK1	SRKR+REYE+NRCK+SHRP	Other slope rockfish	Other slope rockfish	
URND	UNSP. ROUND FISH	Other groundfish	Other groundfish	
USCL	UNSPECIFIED SCALLOP	Other nongroundfish	Other nongroundfish	
USCU	UNSP. SEA CUCUMBERS	Other nongroundfish	Other nongroundfish	
USF1	UNSP. SHALLOW-91 FLOWNERS	Other flatfish	Other flatfish	
USHR	UNSP. NEAR-SHORE ROCK FISH	Other nearshore rockfish	Deeper nearshore rockfish	yes
USKT	UNSP. SKATE	Unspecified skate	Unspecified skate	
USLF	UNSP. SHELF ROCK FISH	Other shelf rockfish	Other shelf rockfish	
USLP	UNSP. SLOPE ROCK FISH	Other slope rockfish	Other slope rockfish	
USLR	UNSP. SLOPE RKFSH	Other slope rockfish	Other slope rockfish	
USMN	UNSP. SALMON	Other nongroundfish	Other nongroundfish	
USR1	UNSP. SLOPE-91	Other groundfish	Other groundfish	
USR2	UNSP. SLOPE-93	Other groundfish	Other groundfish	
USRK	UNSP. SHARK	Other nongroundfish	Other nongroundfish	
USRM	UNSP. OCEAN SHRIMP	Other nongroundfish	Other nongroundfish	
USTG	UNSP. STURGEON	Other nongroundfish	Other nongroundfish	
USTR	UNSPECIFIED OYSTER	Other nongroundfish	Other nongroundfish	
UTCR	UNSP. TANNER CRAB	Tanner crab	Tanner crab	
UTNA	UNSPECIFIED TUNA	Other nongroundfish	Other nongroundfish	
UTRB	UNSP. TURBOTS	Other flatfish	Other flatfish	
UURC	UNSP. SEA URCHINS	Other nongroundfish	Other nongroundfish	
VCLM	VARNISH CLAM	Other nongroundfish	Other nongroundfish	
VRM1	NOM. VERMILLION ROCK FISH	Other shelf rockfish	Other shelf rockfish	
VRML	VERMILION ROCK FISH	Other shelf rockfish	Other shelf rockfish	
WABL	WHITE ABALONE	Other nongroundfish	Other nongroundfish	
WBAS	WHITE SEABASS	Other nongroundfish	Other nongroundfish	
WCLM	WASHINGTON CLAM	Other nongroundfish	Other nongroundfish	
WCRK	WHITE CROAKER	Other nongroundfish	Other nongroundfish	
WDOW	WIDOW ROCK FISH	Widow rockfish	Widow rockfish	
WDW1	NOM. WIDOW ROCK FISH	Widow rockfish	Widow rockfish	
WEEL	WOLF EEL	Other nongroundfish	Other nongroundfish	
WHOO	WAHOO	Other nongroundfish	Other nongroundfish	
WSTG	WHITE STURGEON	Other nongroundfish	Other nongroundfish	
YEY1	NOM. YELLOW EYE ROCK FISH	Yelloweye rockfish	Yelloweye rockfish	
YEYE	YELLOW EYE ROCK FISH	Yelloweye rockfish	Yelloweye rockfish	
YLTL	YELLOW TAIL	Other nongroundfish	Other nongroundfish	
YMTH	YELLOW MOUTH ROCK FISH	Yellowtail rockfish (Remaining rockfish)	Other slope rockfish	
YSOL	YELLOW FIN SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
YTNA	YELLOW FIN TUNA	Other nongroundfish	Other nongroundfish	
YTR1	NOM. YELLOW TAIL ROCK FISH	Yellowtail rockfish	Yellowtail rockfish (Remaining rockfish)	
YTRK	YELLOW TAIL ROCK FISH	Yellowtail rockfish	Yellowtail rockfish (Remaining rockfish)	