

Pacific Halibut Bycatch in the U.S. West Coast Groundfish Fishery from 2002 through 2009

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EXECUTIVE SUMMARY

Pacific halibut discard mortality estimates were provided for 2002 through 2009 and for all groundfish 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. Table ES-1 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 non-nearshore fixed gear, the majority of estimated discard mortality occurred in the LE primary component, which consists of federally permitted vessels with their quota fishing 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. The OA non-nearshore fixed gear sector was observed on a coastwide basis starting in 2007.

Table ES-1. 2002-2009 Pacific halibut discard mortality estimates 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 there 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 | 345 | 23 | 0.0 | - | - | - | 0.0 |
| 2003 | 124 | 32 | 0.0 | - | 0.0 | - | 0.0 |
| 2004 | 133 | 40 | 0.0 | - | 1.0 | 0.0 | 0.8 |
| 2005 | 287 | 37 | 0.0 | - | 2.2 | 0.1 | 0.0 |
| 2006 | 242 | 107 | 0.0 | - | 0.5 | - | 0.0 |
| 2007 | 209 | 21 | 0.2 | 2.9 | 0.1 | 0.2 | 0.1 |
| 2008 | 208 | 39 | 0.4 | 6.6 | 0.4 | 0.0 | 0.3 |
| 2009 | 251 | 50 | 0.0 | 6.4 | 1.3 | 0.0 | 0.0 |

* 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. In the last few years, discard mortality has increased gradually (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 and variance estimates provided here should thus be considered as minimum possible values.

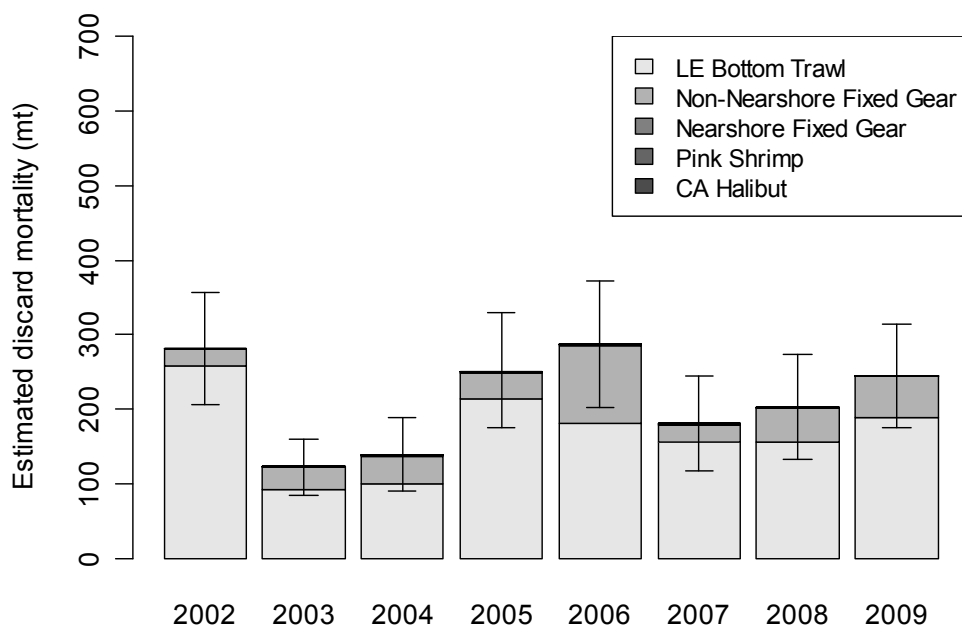


Figure ES-1. Total estimated discard mortality for 2002-2009 from all sectors observed by the West Coast Groundfish Observer Program. Estimates are not included in sectors and years where there were insufficient observer data.

In 2010, a comprehensive review of the methodology for Pacific halibut discard estimation led to several changes. In the LE bottom trawl sector, these changes resulted in higher estimates with smaller standard errors than those provided previously (Wallace and Hastie 2009). Specifically, LE bottom trawl estimates increased because of three factors: (1) The inclusion of observer and logbook data from California, which had previously been excluded from the analysis; (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.

There were two changes in discard estimation methodology for the non-nearshore fixed gear sector: (1) Directed Pacific halibut fishery landings were identified through an alternative approach to that used previously, (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.

The analysis was also expanded to estimate discard in the nearshore fixed gear sector, pink shrimp trawl fishery, and California halibut trawl fishery. Discard mortality rates were not applied to estimates from these sectors because of limited information regarding survivorship. Regardless of the mortality rate applied, Pacific halibut mortality in these sectors represents a very small component of the overall total.

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 2002-2009.

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 89 species listed in the groundfish FMP, including a variety of rockfish, flatfish, roundfish, skates, and sharks (see Appendix A). 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 is defined as consisting 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, state agencies (California Department of Fish and Game and Oregon 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.

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 California and Oregon vessels, which only fish in the 0-3 mile state

territorial zone, also 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. 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 sablefish (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 fishery 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 of the fixed gear sector. 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, due to a low total allowable catch for International Pacific Halibut Commission (IPHC) area 2A off the US west coast.

The WCGOP also observes the commercial nearshore sectors in Oregon and California, which target FMP groundfish typically in waters shallower than 50 fathoms. In addition, it provides observer coverage for the pink shrimp and California halibut trawl fisheries. Pacific halibut bycatch is rare in these fishery sectors, occurring on a maximum of 8% of observed tows/sets annually. Although we

provide our best estimates of Pacific halibut fishing mortality in nearshore, pink shrimp and California halibut sectors, we point to previous WCGOP data reports to 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 provided by Bellman et al. (2009) in the annual report on estimated total mortality of groundfish species.

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 while doing so.

This report combines discard estimates from both the LE bottom trawl sector and the non-nearshore fixed gear sector, which have historically been computed by different authors and presented in separate reports. The most recently published versions of each report are Wallace and Hastie (2009) for LE bottom trawl discard estimates, and Heery and Bellman (2009) for groundfish non-nearshore fixed gear discard estimates. The methodology employed in each of these reports was reviewed in 2010 and updates based on that review have been employed in the current analysis. In addition, we provide data summaries from the nearshore fixed gear sector, which catches and discards a small amount of Pacific halibut annually.

METHODS

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 2006a). A list of fisheries in order of coverage priority and detailed information on data collection methods employed in each observed fishery can be found in the WCGOP manual (NWFSC 2006b).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. In order 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 for 2002 through 2009 were retrieved from the PacFIN database and processed further 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, 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

Evaluation of strata

In previous reports on Pacific halibut bycatch in the LE bottom trawl sector, observer data were stratified by season, depth, area, and retained catch of arrowtooth flounder per tow hour. These strata were designated based on an analysis by Wallace (2000) that evaluated the significance of various categorical variables in determining the catch per tow hour of Pacific halibut. The data employed to conduct that analysis originated from the EDCP observer program and were collected between 1996 and 1998 (Wallace 2000). The efficacy of this stratification system was then verified annually (J. Wallace, personal communication, May 2010).

A substantial amount of observer data is now available for analysis, as the WCGOP has been collecting data on Pacific halibut bycatch in the LE bottom trawl sector since 2002. We applied the same methods as Wallace (2000) and used tree-based models (Clark and Pregon 1992) both to confirm previous findings and establish new stratification that could be used consistently across all years of observer data. Furthermore, we employed an additional constraint that all strata include data from three vessels or more. This constraint is required under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for confidentiality purposes, but also ensures a sufficient sample size in observer data for subsequent analyses. We recognize that strata in which no fishing occurred would presumably enhance the reliability of overall bycatch estimates expanded to the fleet-wide level, since a zero valued estimate has a variance of zero. However, the LE bottom trawl fleet has a wide spatial and temporal distribution (Figure 2) and isolating strata without any logbook or observer data records was not feasible.

Wallace (2000) evaluated the effectiveness of several variables at predicting observed catch-per-unit-effort (CPUE) of Pacific halibut, defined as the observed catch weight (kg) per tow hour. This response variable was defined in the same way as the bycatch ratio later applied to estimate fleet-wide bycatch amounts. Ratio estimators (Cochran 1977) have been widely used in bycatch

estimation (Stratoudakis et al. 1999, Walmsley et al. 2007, Borges et al. 2005a). The method relies heavily on the assumption that bycatch is proportional to some metric or proxy of fishing effort, in this case tow duration (Rochet and Trenkel 2005). Rochet and Trenkel (2005) note that this assumption is often not supported by the data, and that in some cases, bycatch may vary nonlinearly or even be unrelated to the ratio estimator denominator. Variability in this relationship is quite high at the tow level (Borges et al. 2005b), and tows are not considered independent within the sampling framework used by the WCGOP. However, the explanatory variables that are generally thought to relate to Pacific halibut bycatch (latitude, depth, catch of other species) coincide with individual tows. Figure 3a demonstrates that on a coastwide basis and across all years observed, it is difficult to identify a clear relationship between Pacific halibut bycatch at the tow level and tow duration. To some extent the lack of an obvious relationship may be attributed to the fact that biomass and catchability are not constant over space and time (as $C/E = Bq$ and the plot includes observer data from all locations along this coast from 2002 through 2009). While we would expect to see a linear pattern within components of the data in which Pacific halibut biomass and catchability are constant, it is difficult to identify these components without a much more comprehensive understanding of the stock's dynamics. We do see a more linear pattern when the data are split out by latitude, depth, year, and month, and re-plotted. For instance, Figure 3b shows the relationship between catch and tow hours in May 2009, in the area north of Point Chehalis, Washington, on the continental shelf, between 50 and 250 fathoms. Most of the area within this range in which observed vessels are fishing is characterized by gradually sloping sandy bottom habitat. Within a single month over a consistent bottom type such as this, we might expect biomass and catchability to be relatively constant, and thus for the relationship between catch and effort to be linear. In relation to Pacific halibut bycatch, tow duration appears to vary in a similar way to other proxies of effort, such as retained catch of target species. Because of this, there was no apparent advantage to using an alternative denominator, and we therefore maintained the status quo of tow hours.

In accordance with methods by Wallace (2000), we plotted Pacific halibut CPUE in relation to latitude, depth, and season in order to identify natural breaks in the data. In this initial examination, Pacific halibut CPUE increased with increasing latitude, particularly in the area north of 47° N latitude. CPUE decreased with increasing depth, with a noticeable break between 100 and 150 fathoms, presumably caused by the lack of effort in this area as a result of spatial closures. These findings were in agreement with those from Wallace (2000), however, we were unable to distinguish seasonal patterns in the data.

We then examined the relationship between Pacific halibut CPUE and the retained catch of other species per tow hour, applying a log transformation to both variables. All FMP groundfish species were considered (Appendix A). The strongest relationships that were apparent graphically were with arrowtooth flounder, petrale sole, and lingcod. In addition, we found potential relationships with Pacific cod, skates, yellowtail rockfish and Pacific ocean perch. The retained catch per tow hour was thus considered as a potential level of additional stratification in subsequent steps.

A tree-based model (Clark and Pregon 1992) was applied to all potential stratification variables in order to identify breaks in the data that were most significant. A generalized linear model (GLM) was then used to evaluate the significance of each combination of variables, with Pacific halibut discard per tow hour as the response variable. A constraint was applied to ensure that strata contained at least 3 vessels and Akaike's Information Criterion (AIC) values from each run of the

model were then compared. The variables and stratification lines supported by this process were as follows:

| 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) |

Season was excluded as a potential stratification variable, as it did not improve model fit. In order 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. The AIC values associated with this adjusted model still demonstrated a considerable improvement over all other latitudinal and depth-based stratification schemes evaluated (except for that selected through tree regression, for which AIC was slightly lower) while maintaining the constraint that strata contain data from at least 3 vessels in all years. Table 1 summarizes observer coverage within each area and depth strata.

Bycatch estimation

Once the stratification scheme had been determined, 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.

Since 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. Washington Department of Fisheries and Wildlife (WDFW) calculates an expanded trawl effort amount to account for logbooks that were not submitted to the agency (Sampson and Crone 1997). Although this value has been used in previous reports on Pacific halibut bycatch in the LE bottom trawl sector (Wallace and Hastie 2009), we found that this data field was blank (did not contain a value) in some of the data when working at the tow level. Logbook effort for Washington, Oregon and California was instead 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:

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

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

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_{tap} = logbook tow hours from tow t , which landed its catch in state a during month p
 H_{adjap} = 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 in order to enable subsequent stratification of the data by area, depth, and CPUE of other species. Wallace and Hastie (2009) adjusted logbook tow hours based on an adjustment ratio that was computed for each port and month. In our evaluation, we found this approach to yield ratios with relatively small and highly variable numerators and denominators. Rather than averaging across port/month strata, we decided to aggregate logbook and fish ticket data at a higher level. The objective of adjusting logbook data was to account for submission rates of less than 100%. Since the logbook program is implemented at the state level and the data are entered into state databases, we decided to aggregate 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.

Previous reports on Pacific halibut bycatch in the LE bottom trawl fishery have focused on observed bycatch associated with vessels landing in Oregon and Washington only (Wallace and Hastie 2009). Some vessels from Oregon do fish and encounter Pacific halibut south of the California/Oregon border. A small amount of Pacific halibut is also caught in this area by vessels that are based in California and land their catch in California ports. The current analysis attempts to provide a comprehensive view of bycatch in the LE bottom trawl sector across all years in which observer data are available. Observer and logbook data from California were therefore included in our analysis.

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:

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

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

In order to best support fishery management, 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 may 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 initial 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 returned at sea.

Viability Analysis

In order to compute the total mortality of discarded Pacific halibut, discard mortality rates were computed through an additional viability analysis (Tables 3 and 4). WCGOP observers collect viability data on discarded Pacific halibut in the LE bottom trawl fishery using the condition key provided in Appendix L of the WCGOP manual (NWFSC 2006b). Observations of several condition characteristics are used to assign each fish that is evaluated to one of three categories: Excellent, Poor, or Dead (Williams and Chen 2004).

In order 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 (lb, 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. Stratification of viability data by latitude, depth, CPUE strata, and year results in very small sample sizes. 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 (Figure 4), one of the variables that was used to stratify discard ratios and initial gross discard estimates. This relationship is attributed to the time it takes to fish trawl gear in deeper versus shallow waters and the smaller amount of consistent seafloor type that is available for

trawling in shallow areas. Smaller areas of seafloor are available both because of the bottom habitat type and because of smaller trip limits associated with areas shoreward of the trawl Rockfish Conservation Area (RCA). In shallower areas, vessels are more likely to fish with a larger number of short tows, compared with vessels fishing a smaller number of longer-duration tows in deeper areas. Since depth and tow duration appeared to co-vary, 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 averages weights in each condition category across all years. Final estimates of Pacific halibut bycatch and discard mortality are presented in Table 5. In response to requests from the Pacific Fishery Management Council's Groundfish Management Team (GMT), we have Table 5 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 described above. Results from our review of stratification alternatives analyzed for the LE bottom trawl sector are summarized in Table 6 for reference.

Length frequencies

The length frequency distribution for Pacific halibut in the 2009 trawl fishery is provided as supplementary information in Table 7. Pacific halibut pose unique challenges for observer sampling. When catch from a trawl net is dumped on deck, most vessels' crew will scan the catch for Pacific halibut and immediately return them to sea, which is termed "presorting". Vessels presort Pacific halibut to increase the likelihood of survival of the discarded fish. In addition to the need for quickly returning Pacific halibut to the sea in order to enhance survival, 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 these rarely occur.

Appendix B provides the observed length frequency distributions of discarded Pacific halibut for 2004 through 2009 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 B for further details). Since 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 Appendix B 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

Evaluation of appropriate strata

Testing of alternative stratification schemes 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 therefore produced separately for each sector and gear combination. Latitudinal strata were also applied whenever there were sufficient data and the added stratification was shown to significantly improve the fit of predicted bycatch amounts to the amounts observed.

The largest number of Pacific halibut bycatch events observed in the fixed gear fishery was on LE primary vessels fishing off of Washington with longline gear. For this sector/gear combination there were sufficient data to evaluate the efficacy of additional variables for predicting bycatch. We considered a variety of additional parameters, including latitude, state of landing, season, month, and bimonthly period. Each of these was used as an explanatory variable in a generalized linear model, with Pacific halibut bycatch (kg) per set (log-transformed) as the response variable. We then compared the AIC value from each model run. For continuous variables such as latitude, tree-based models (Clark and Pregon 1992) were also applied to identify stratification lines that would result in the best model fit.

For the LE primary longline sector, latitude produced the lowest AIC values among the variables tested. Results from the tree regression model supported the application of two latitudinal breaks: at 44° 36.54' N. latitude and 47° 48.33' N. latitude. While these breaks produced the lowest AIC value from our model, this AIC value was only slightly smaller than that resulting from a single latitudinal break at Point Chehalis, Washington (46° 53.30' N. lat.). Point Chehalis was used in previous estimates of Pacific halibut bycatch in the LE primary longline sector because of its relevance to groundfish management and its apparent ability to split out higher bycatch rates off the northern coast of Washington (Heery and Bellman 2009). In this analysis, we found that coefficient of variation (CV) estimates for Pacific halibut discard ratios were lower when a latitudinal break was used at Point Chehalis. CV values associated with latitudinal strata at 44° 36.54' and 47° 48.33' N. latitude were generally about 2 times larger than CV values computed using the Point Chehalis break. This is due to the smaller sample size in each stratum that results from using more than one latitudinal break.

Given these findings, we decided to maintain the same stratification in this analysis as was used previously by Heery and Bellman (2009) for the LE primary longline sector. Similar evaluations were attempted for the other fixed gear sectors to identify whether variables other than sector and gear might be appropriate as additional strata. While there was a sufficient sample size to apply additional spatial or temporal breaks in some cases, the application of these variables as strata did not improve the fit of our model 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).

Bycatch estimation

A deterministic approach was used to estimate Pacific halibut bycatch for all sectors of the non-nearshore fixed gear fishery. Bycatch ratios 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 10). A complete listing of groundfish species included in the Groundfish Fishery Management Plan that were used to compute and expand ratios is provided in Appendices A and B. 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 with 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 total mortality.

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 was then conducted to identify landings from the directed Pacific halibut fishery and remove them 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 2009, there were two such openings on June 24th and July 8th. LE and OA fixed gear vessels that typically target groundfish can participate in the directed fishery. For most fixed gear vessels, (other than LE primary longline vessels north of Point Chehalis) this is the only time during which they are allowed to land Pacific halibut. Fish tickets that included Pacific halibut landings within 4 days of a directed fishery opening were considered to be part of the directed fishery and not part of the non-nearshore fixed gear fishery targeting federal FMP groundfish. These fish tickets were removed prior to our analysis. This approach may have resulted in the removal of some non-directed fishery landings north of Point Chehalis, but any bias introduced by this step is considered to be extremely small given the short time period across which fish tickets were removed. In the previous report on Pacific halibut discard in the non-nearshore fixed gear fishery, derby fish tickets were identified as those on which that largest landings came from Pacific halibut. This filtering step was applied to the area north of Point Chehalis only. Estimates from the previous report for 2002-2008 are maintained in the tables (Tables 8-12) presented here for comparison purposes.

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 2009).

WCGOP observer data were stratified according to sector and gear type (longline and pot/trap). As discussed earlier, one additional latitudinal stratification at Point Chehalis, Washington (46° 53.30' N lat.) was used for the LE sablefish-endorsed longline sector. As was discussed earlier, some retention of Pacific halibut was allowed in the LE sablefish-endorsed primary season in the area north of Point Chehalis up until 2010, from May through the end of October of each year. The regulation allowing for Pacific halibut landings north of Point Chehalis was in place throughout the time period of data included in this report, with some slight annual differences in the weight of Pacific halibut which could be retained. This was the only latitudinal stratification incorporated into our analysis and was only applied to the LE sablefish-endorsed primary 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 8. 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*

For all sector/gear/area strata, except the LE non-primary longline sector, discard ratios were calculated 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 sector, rather than sablefish weight alone, because this sector targets a wider range of deepwater species. A broader denominator was therefore necessary in order to effectively capture the level of fishing effort in this sector. Values provided in the tables (Tables 8-12) for this report are identical to those provided in earlier years, but with updated information for 2009. 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. Instead, 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). Figure 5 demonstrates how each fishery sector/gear, expansion factor, and observed discard rate were used. This provided 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 (Figure 5).

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 6). 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.

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 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 138 Pacific halibut from September 2003 through December 2009. 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 7).

Other fishery sectors

Pacific halibut was also observed in the nearshore fixed gear sector and the 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/).

RESULTS

Limited entry bottom trawl sector

Gross bycatch estimates and total discard mortality estimates for the 2002-2009 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, but increased in 2009 to 251 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. The combination of these two factors has led to a gradual decline in mortality (kg) per tow hour since 2005, from 4.7 in 2005 to 2.8 in 2008. Mortality per tow hour increased slightly in 2009 to 3.0 kg per tow hour (Table 5). Estimates prior to 2004 for the LE bottom trawl sector were computed using viability data from 2004 through 2009, as viabilities from earlier years were not available.

In previous reports on Pacific halibut bycatch in the LE bottom trawl sector, discard was estimated based on observer, logbook, and fish ticket data from Washington and Oregon only (Wallace and Hastie, 2009). Although observer and logbook data were compiled from vessels that fished as far south as 40.667° N. latitude, only those that returned to Oregon or Washington to land their catch were included. Pacific halibut is caught in small amounts off of Northern California by both Oregon- and California-based vessels. We therefore chose to include observer, logbook, and fish ticket data from vessels landings in California in our analysis.

Despite differences in the stratification scheme and the base dataset used in this and previous reports, discard mortality estimates were similar. Estimates from our analysis differed from those reported previously by 11 to 25%, with the greatest difference occurring in 2007. Mortality estimates presented in this report for 2005 through 2008 are higher than previously reported values (Wallace and Hastie 2009), which would be expected given the inclusion of data from California. Interestingly, in 2004, our mortality estimate for Washington, Oregon, and California combined was actually lower than previously reported estimates for Washington and Oregon only. This difference is attributed to differences in stratification. Earlier reports employed a finer level of stratification and averaged discard ratios for strata with little to no observer data records. We have not made comparisons with previous estimates for 2002 and 2003, as Wallace and Hastie (2009) used a 50% mortality rates to estimate total discard mortality in these years.

Our 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, this 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.

Regardless of the method used to stratify observer and logbook data or the discard mortality rate applied to gross estimates, the trend in Pacific halibut bycatch mortality in the LE bottom trawl sector is consistent. Table 6 provides the estimates resulting from 5 alternative stratification schemes. The use of state of landing instead of latitude appears to result in more extreme peaks in discard estimates. However, the differences are minimal, particularly given the size of the 95% confidence intervals for each set of estimates.

Non-nearshore fixed gear sector

Estimated discard mortality of Pacific halibut in the LE sablefish primary longline sector increased from 2008 to 2009. To some extent, this increase was associated with greater fishing effort for sablefish, both north and south of the Point Chehalis line. In total, landings from the LE sablefish primary longline sector increased to 1402 mt, compared with 1048 mt in 2008. In addition, however, the discard ratio for Pacific halibut computed from observer data for the area north of Point Chehalis was noticeably larger than in 2008 (Table 9). In other words, more Pacific halibut was discarded in relation to the amount of sablefish landed. This does not appear to be associated with any increase in the rate at which Pacific halibut was encountered. In fact, a smaller percentage of observed trips, sets, and vessels had records of Pacific halibut catch in 2009 than was typically documented in previous years (Table 10). Instead, the large discard rate seems to be best explained by the increased frequency with which vessels chose to discard this species. As mentioned previously, some retention of Pacific halibut was allowed in the LE primary longline sector operating north of Point Chehalis. However, all Pacific halibut observed in this area in 2009 were discarded. Conversely, only 87% of the observed halibut weight was discarded in 2008 (Table 10).

While the increase in estimated discard of Pacific halibut in the LE sablefish primary longline sector thus appears to be associated changes in discard behavior among fishermen, it is also important to note that observer coverage in this sector was considerably lower in 2009. The 2009 sablefish primary season coincided with the end of a selection cycle, a period defined as the length of time required for the WCGOP to observe all vessels in the fleet. In 2009, there were a small number of vessels remaining for selection. This combined with other logistical constraints resulted in the coverage of only 9 vessels, compared with 18 in the previous year. Overall, WCGOP observed only 8.7% of the sablefish that was landed by the LE sablefish primary sector. This low level of observer coverage introduces a considerable degree of uncertainty into our final discard estimates.

Discard of Pacific halibut in other non-nearshore fixed gear sectors was mostly consistent with estimated discard amounts in previous years. Gross estimated discard in the LE primary pot sector decreased from 2008 to 2009, but remained within a range comparable to that estimated for 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 6.4 mt, compared with 6.6 mt in 2008. Effort in the OA fixed gear sector increased

noticeably in 2009, with sablefish landings nearly doubling from annual landings amounts in 2007 and 2008. This did not affect discard estimates however, as the observed discard rate for Pacific halibut in 2009 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). In order 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) first derived discard mortality rates for each of these categories using mark-recapture data. 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 2009, 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 in WCGOP data collection protocol as of 2010 should allow observers to spend more of their time on fixed gear vessels collecting 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 available currently.

Other fishery sectors

Observed bycatch amounts of Pacific halibut in other fishery sectors were 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

- 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.
- Discard mortality estimates were produced for the LE bottom trawl sector using data from Washington, Oregon, and California. Total annual estimates were 11 to 25% larger than previously reported estimates for 2004 through 2008 from Wallace and Hastie (2009), which were derived from Washington and Oregon data only.
- 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, particularly in the area north of Pt Chehalis, WA.

For a complete list of groundfish sectors, including those for which bycatch estimates are not provided in this report, see Bellman et al. (2009).

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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.

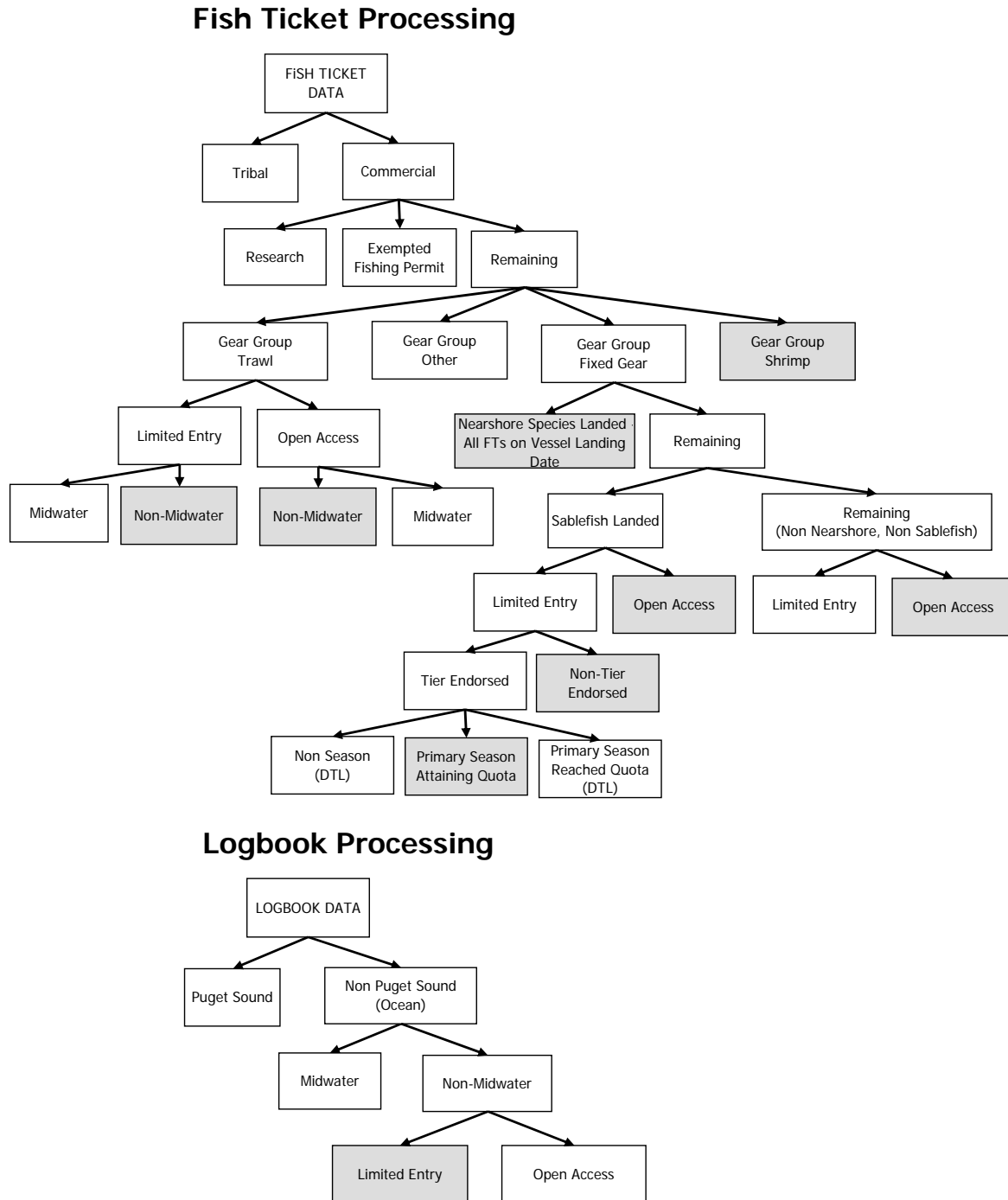


Figure 2a. Locations of observed and fleet logbook trawl tows north of Coos Bay, Oregon in 2009.

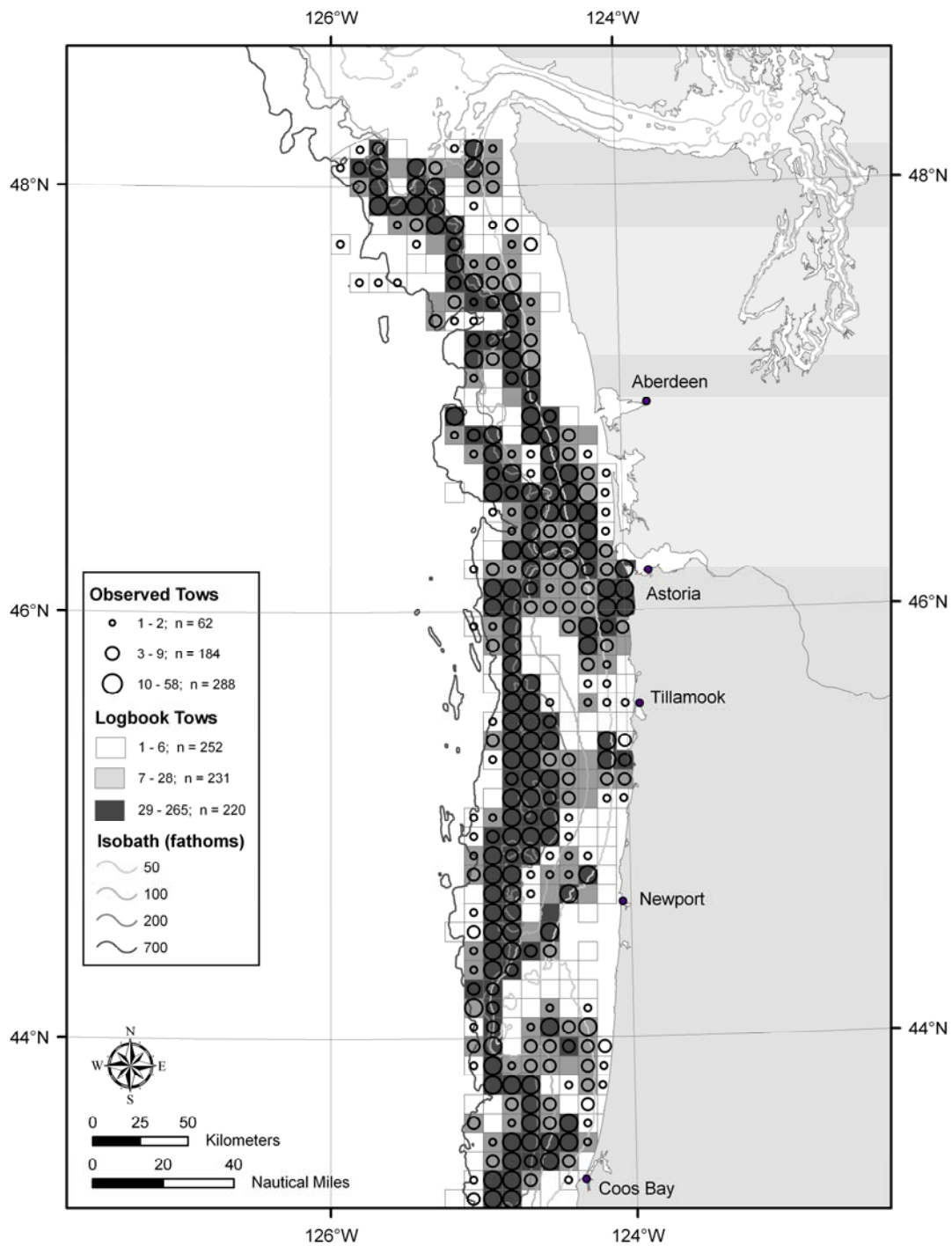


Figure 2b. Locations of observed and fleet logbook trawl tows south of Coos Bay, Oregon and north of San Francisco, California in 2009.

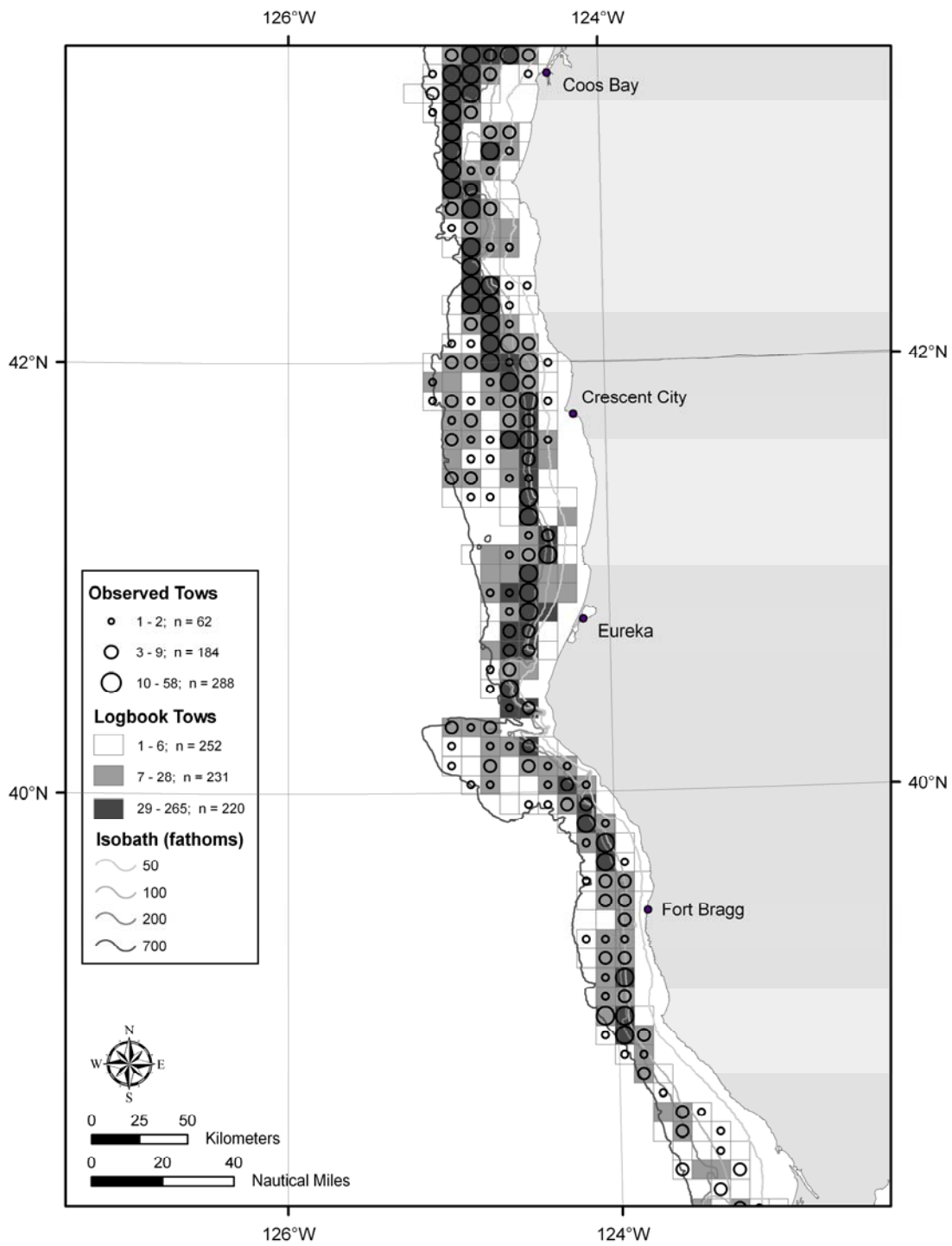


Figure 2c. Locations of observed and fleet logbook trawl tows south of San Francisco, California in 2009.

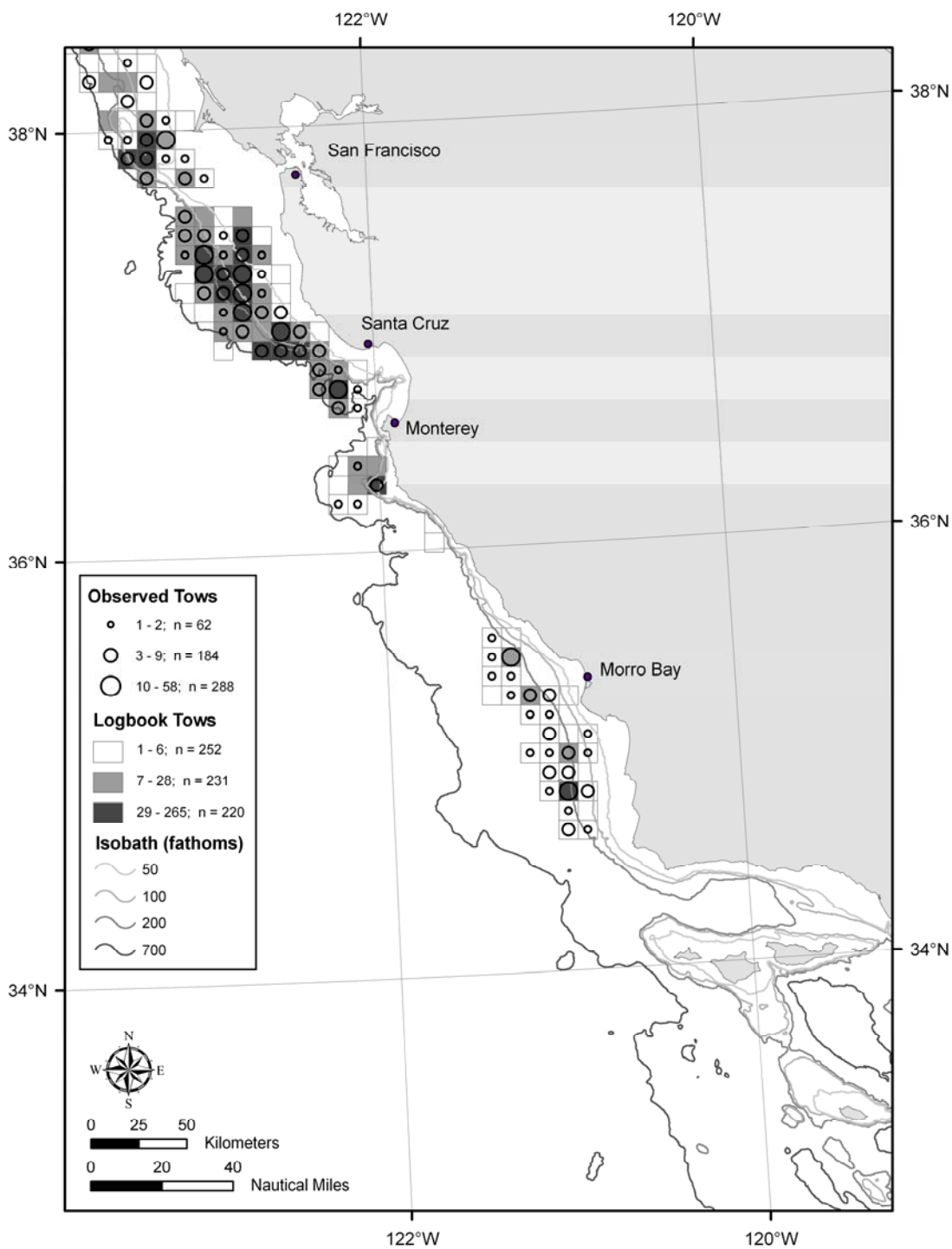


Figure 3. Log-transformed bycatch of Pacific halibut (kg) versus tow hours. A proportional relationship is not evident when including data from all areas and periods within the 2009 calendar year (a). When data from certain locations and months (b) are isolated, proportionality becomes more apparent.

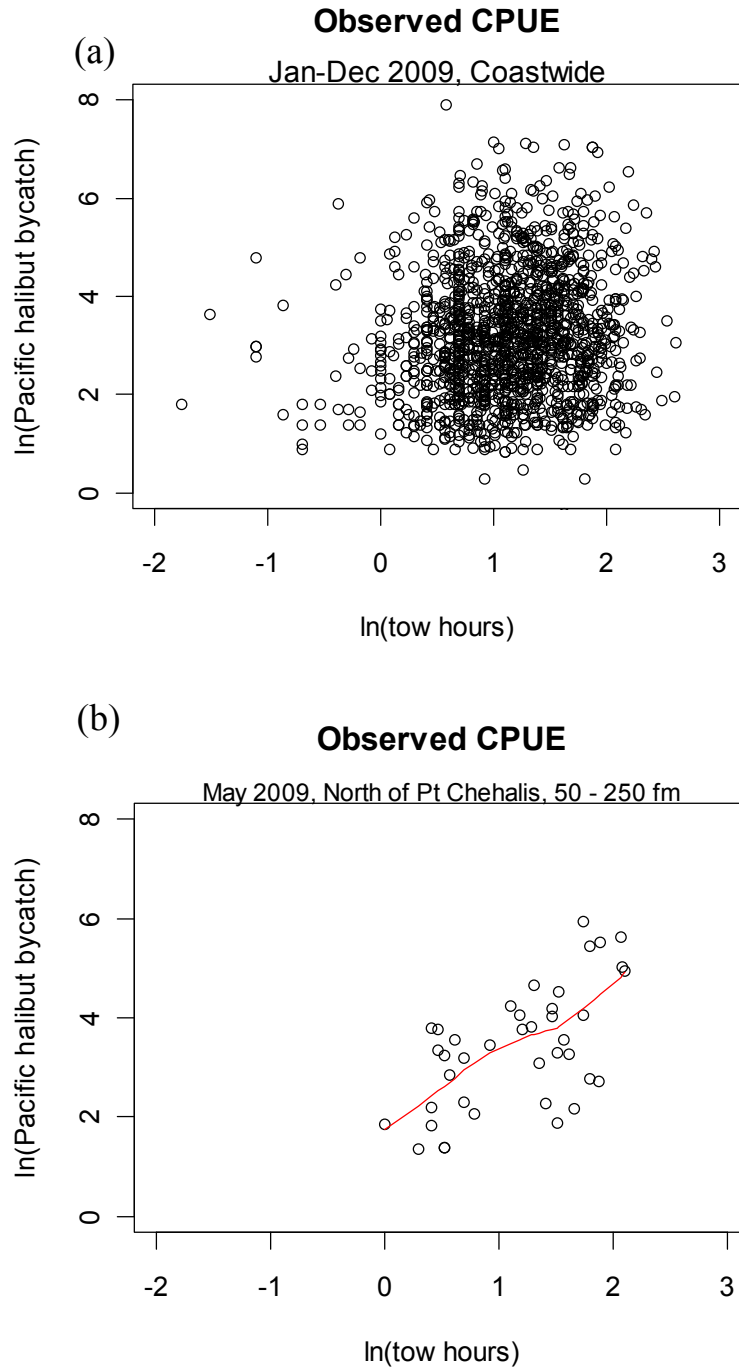


Figure 4. Tow duration (hours) versus average depth (fathoms), calculated from the depth recorded at the set and haul locations of a tow, from tows observed by the West Coast Groundfish Observer Program in the LE bottom trawl sector from 2002-2009.

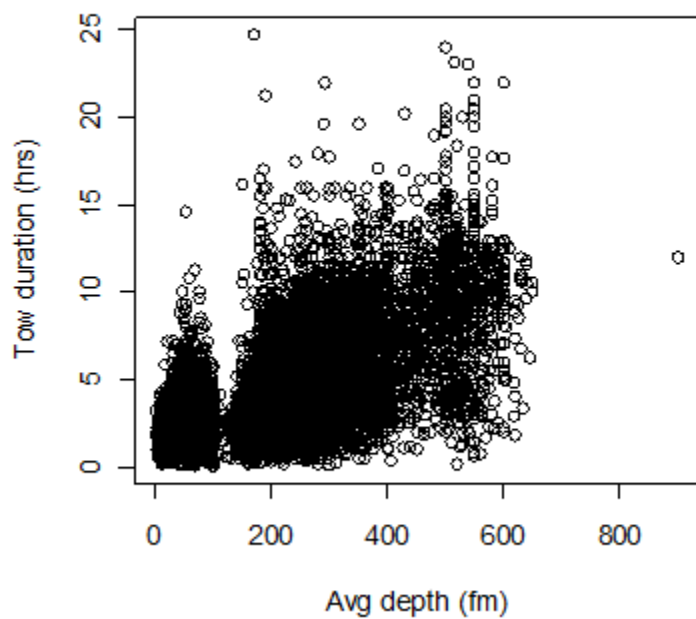


Figure 5. Expansion factors and WCGOP observed discard rate by gear type for the limited-entry (LE) and open-access (OA) non-nearshore fixed gear sectors used to expand discard estimates of Pacific halibut to the fleet-wide level.

| 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 Sablefish | 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.

Figure 6. 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.

Estimated Discard Mortality of Pacific halibut

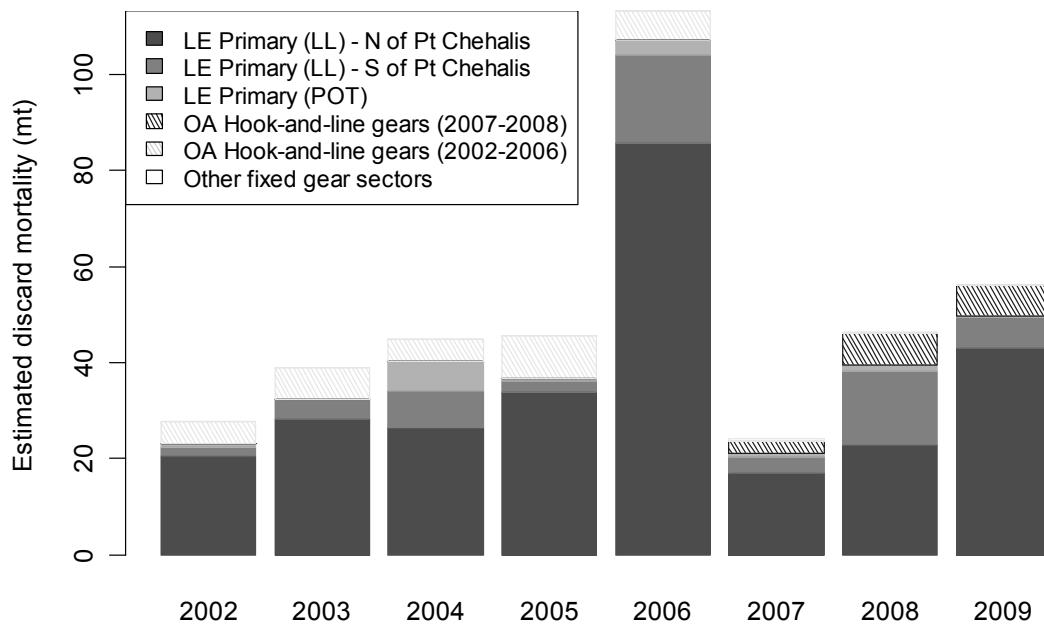
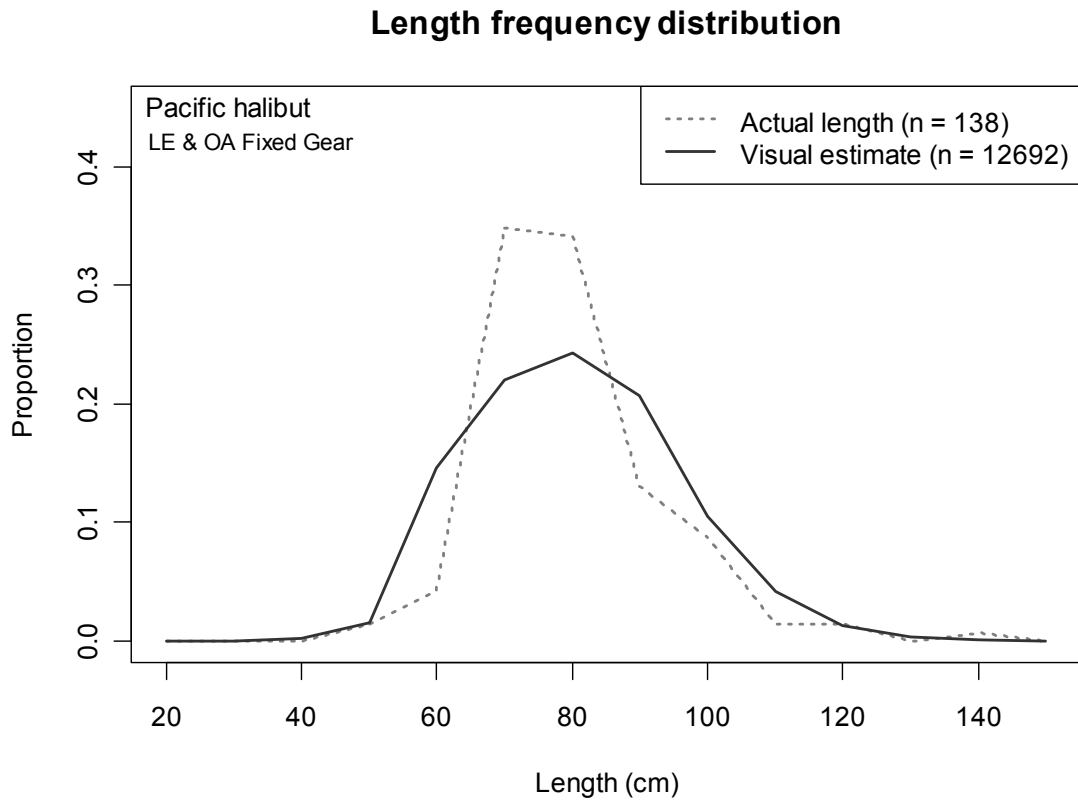


Figure 7. Length frequency distribution of discarded Pacific halibut on WCGOP observed limited entry (LE) and open access (OA) groundfish fixed gear vessels from September 2003 through December 2009. The majority of Pacific halibut lengths collected in this fishery were visual estimates (solid dark line). Actual length measurements (dashed gray line) were only available for 138 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 year, area, and depth 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* | % 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% |
| > 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% |
| 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% |
| > 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% |

* Vessel logbook total tow hours have been adjusted based on the total fish ticket landings of

Table 2. Observed discard ratios (kg/hr) and estimated gross discard (kg) for Pacific halibut in each of the area, depth, 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. 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 | |
| > 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 | |
| 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 | |
| > 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 | |

Table 3. Summary of 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 2006b), 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% |
| All years (US) | | | | | | | |
| 0 to 60 fm | 1817 | 976 | 1957 | 4750 | 43% | 20% | 37% |
| > 60 fm | 2420 | 2008 | 6827 | 11255 | 24% | 17% | 59% |

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% |
| > 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% |

Table 5. Total fleet-wide trawl effort (hours), estimated Pacific halibut bycatch (mt), estimated Pacific halibut discard mortality (mt), and mortality (kg) per tow hour in the LE bottom trawl sector from 2002 to 2009.

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

Table 6. Pacific halibut bycatch (lb, net), mortality (lb, net), and mortality (lb) per trawl hour in the LE bottom trawl sector resulting from various stratification alternatives. We produced estimates using three different stratification schemes for observer and logbook data, which are detailed in the far left column. Two alternative stratification approaches were also considered when analyzing viability data, as noted in the second column. The first set of values provided, with 2 depths, 2 areas, 2 CPUE strata, and depth only as a means for stratifying viability data, coincide with our final estimates in Table 5. Values are provided in net lbs in order to provide easy comparison to estimates from Wallace and Hastie (2009). Note that 1 kg (round weight) = 1.65375 lbs (net weight).

| Stratification of observer and logbook data | Stratification of viability data | Year | Trawl effort (hrs) | Bycatch (lb, net) | | | Mortality (lb, net) | | | Mortality (lb) per trawl hour |
|--|----------------------------------|---------|--------------------|-------------------|-------------|-------------|---------------------|-------------|-------------|-------------------------------|
| | | | | est | Lower bound | Upper bound | est | Lower bound | Upper bound | |
| 2 depths (60 fm) 2 areas (Pt Chehalis) 2 CPUE strata (125lbs/hr) * | depth only | 2002 | 95,106 | 867,249 | 637,439 | 1,097,059 | 570,252 | 419,432 | 721,072 | 6.0 |
| | | 2003 | 77,143 | 308,680 | 208,791 | 408,570 | 205,778 | 139,824 | 271,733 | 2.7 |
| | | 2004 | 56,016 | 351,300 | 252,336 | 450,265 | 220,149 | 158,339 | 281,959 | 3.9 |
| | | 2005 | 60,384 | 761,300 | 552,957 | 975,369 | 473,835 | 344,163 | 607,112 | 7.8 |
| | | 2006 | 60,476 | 646,465 | 465,181 | 827,749 | 400,981 | 288,861 | 513,100 | 6.6 |
| | | 2007 | 63,946 | 486,823 | 313,463 | 660,183 | 345,324 | 223,035 | 467,613 | 5.4 |
| | | 2008 | 75,336 | 504,735 | 349,431 | 660,039 | 343,673 | 237,810 | 449,537 | 4.6 |
| | 2009 | 85,047 | 637,084 | 480,657 | 793,512 | 415,254 | 313,591 | 516,918 | 4.9 | |
| | depth & area | 2002 | 95,106 | 867,249 | 637,439 | 1,097,059 | 571,112 | 420,151 | 722,074 | 6.0 |
| | | 2003 | 77,143 | 308,680 | 208,791 | 408,570 | 205,908 | 139,906 | 271,909 | 2.7 |
| | | 2004 | 56,016 | 351,300 | 252,336 | 450,265 | 207,435 | 149,351 | 265,518 | 3.7 |
| | | 2005 | 60,384 | 761,300 | 552,957 | 975,369 | 463,083 | 337,007 | 592,586 | 7.7 |
| | | 2006 | 60,476 | 646,465 | 465,181 | 827,749 | 408,952 | 294,308 | 523,596 | 6.8 |
| | | 2007 | 63,946 | 486,823 | 313,463 | 660,183 | 339,387 | 221,892 | 456,882 | 5.3 |
| 2008 | | 75,336 | 504,735 | 349,431 | 660,039 | 347,423 | 240,515 | 454,332 | 4.6 | |
| 2009 | 85,047 | 637,084 | 480,657 | 793,512 | 427,362 | 322,256 | 532,467 | 5.0 | | |
| 2 depths (60 fm) 2 areas (Pt Chehalis) | depth only | 2002 | 95,106 | 763,502 | 585,336 | 941,668 | 500,414 | 383,388 | 617,439 | 5.3 |
| | | 2003 | 77,143 | 249,458 | 179,631 | 319,285 | 165,710 | 119,787 | 211,633 | 2.1 |
| | | 2004 | 56,016 | 338,115 | 251,974 | 424,255 | 210,584 | 156,462 | 264,706 | 3.8 |
| | | 2005 | 60,384 | 780,600 | 616,744 | 944,456 | 485,891 | 383,925 | 587,856 | 8.0 |
| | | 2006 | 60,476 | 659,735 | 493,013 | 826,457 | 411,964 | 307,785 | 516,144 | 6.8 |
| | | 2007 | 63,946 | 451,157 | 325,528 | 576,786 | 318,223 | 229,605 | 406,841 | 5.0 |
| | | 2008 | 75,336 | 518,820 | 381,150 | 656,490 | 353,132 | 259,363 | 446,902 | 4.7 |
| | 2009 | 85,047 | 646,293 | 514,508 | 778,078 | 420,111 | 334,846 | 505,376 | 4.9 | |
| | depth & area | 2002 | 95,106 | 763,502 | 585,336 | 941,668 | 501,246 | 384,093 | 618,399 | 5.3 |
| | | 2003 | 77,143 | 249,458 | 179,631 | 319,285 | 165,792 | 119,840 | 211,743 | 2.1 |
| | | 2004 | 56,016 | 338,115 | 251,974 | 424,255 | 198,048 | 147,533 | 248,562 | 3.5 |
| | | 2005 | 60,384 | 780,600 | 616,744 | 944,456 | 475,219 | 375,699 | 574,739 | 7.9 |
| | | 2006 | 60,476 | 659,735 | 493,013 | 826,457 | 420,065 | 313,218 | 526,911 | 6.9 |
| | | 2007 | 63,946 | 451,157 | 325,528 | 576,786 | 312,506 | 227,098 | 397,914 | 4.9 |
| 2008 | | 75,336 | 518,820 | 381,150 | 656,490 | 357,648 | 262,342 | 452,953 | 4.7 | |
| 2009 | 85,047 | 646,293 | 514,508 | 778,078 | 431,344 | 342,980 | 519,709 | 5.1 | | |
| 2 depths (60 fm) by state (WA, OR, CA) | depth only | 2002 | 95,106 | 800,798 | 582,613 | 1,018,983 | 526,039 | 382,525 | 669,554 | 5.5 |
| | | 2003 | 77,143 | 229,817 | 149,752 | 309,881 | 152,157 | 99,825 | 204,489 | 2.0 |
| | | 2004 | 56,016 | 257,856 | 188,863 | 326,850 | 160,222 | 117,631 | 202,812 | 2.9 |
| | | 2005 | 60,384 | 819,617 | 628,552 | 1,010,682 | 510,200 | 391,366 | 629,034 | 8.4 |
| | | 2006 | 60,476 | 627,591 | 457,072 | 798,109 | 391,228 | 285,046 | 497,410 | 6.5 |
| | | 2007 | 63,946 | 443,613 | 306,848 | 580,378 | 313,756 | 216,075 | 411,438 | 4.9 |
| | | 2008 | 75,336 | 578,736 | 406,997 | 751,516 | 393,419 | 276,574 | 511,032 | 5.2 |
| | | 2009 | 85,047 | 605,068 | 463,631 | 746,506 | 389,973 | 299,734 | 480,212 | 4.6 |

Table 7. Pacific halibut length frequencies collected by WCGOP observers during 2009 in the LE bottom trawl sector. The upper limits on the length intervals are inclusive, while the lower limits are not.

| Length interval (cm) | Length freq. | Percent length freq. |
|----------------------|--------------|----------------------|
| 25-30 | 0 | 0.00 |
| 30-35 | 0 | 0.00 |
| 35-40 | 0 | 0.00 |
| 40-45 | 0 | 0.00 |
| 45-50 | 0 | 0.00 |
| 50-55 | 1 | 0.00 |
| 55-60 | 18 | 0.01 |
| 60-65 | 104 | 0.07 |
| 65-70 | 242 | 0.16 |
| 70-75 | 321 | 0.21 |
| 75-80 | 294 | 0.19 |
| 80-85 | 194 | 0.13 |
| 85-90 | 149 | 0.10 |
| 90-95 | 90 | 0.06 |
| 95-100 | 51 | 0.03 |
| 100-105 | 34 | 0.02 |
| 105-110 | 12 | 0.01 |
| 110-115 | 8 | 0.01 |
| 115-120 | 3 | 0.00 |
| 120-125 | 3 | 0.00 |
| 125-130 | 2 | 0.00 |
| 130-135 | 0 | 0.00 |
| 135-140 | 0 | 0.00 |
| 140-145 | 0 | 0.00 |
| 145-150 | 0 | 0.00 |
| 150-155 | 0 | 0.00 |
| 155-160 | 0 | 0.00 |
| 160-165 | 0 | 0.00 |
| 165-170 | 0 | 0.00 |
| 170-175 | 0 | 0.00 |
| 175-180 | 0 | 0.00 |
| 180-185 | 0 | 0.00 |

Table 8. Number of observed trips, sets, and vessels in the limited-entry (LE) sablefish primary, LE sablefish non-primary, and open-access (OA) fixed gear sectors annually by the West Coast Groundfish Observer Program.

| | LE Sablefish Primary | | | LE Sablefish Non-Primary | 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 |
| 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 |
| 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 |

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 sector, where target species include a variety of deepwater 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>Sablefish landings (mt)</i> | | | <i>Groundfish landings (mt)</i> | <i>Sablefish landings (mt)</i> | <i>Sablefish landings (mt)</i> | |
| Total fleet landings <i>(Based on fish tickets)</i> | | | | | | | |
| 2002 | 390 | 407 | 354 | 452 | 6 | 266 | 109 |
| 2003 | 499 | 569 | 604 | 485 | 7 | 375 | 187 |
| 2004 | 698 | 654 | 626 | 377 | 6 | 272 | 182 |
| 2005 | 641 | 676 | 615 | 519 | 7 | 518 | 374 |
| 2006 | 684 | 708 | 611 | 441 | 4 | 347 | 435 |
| 2007 | 489 | 607 | 426 | 462 | 9 | 203 | 244 |
| 2008 | 385 | 663 | 421 | 652 | 18 | 326 | 235 |
| 2009 | 418 | 984 | 487 | 695 | 18 | 580 | 358 |
| 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) | 0.0839 | 0.0035 |
| 2008 | 0.3715 | 0.1453 | 0.0151 | 0.0041 | (0.0010) | 0.1259 | 0.0010 |
| 2009 | 0.6436 | 0.0413 | 0.0017 | 0.0003 | (0.0007) | 0.0684 | 0.0007 |

* 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 by sector, 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% | 0.7% | -- | 38.2% | 10.0% |
| Observed annual catch (mt) of Pacific halibut | | | | | | | |
| Mean | 51.5 | 11.6 | 2.1 | 0.1 | -- | 0.9 | 0.0 |
| Min | 12.1 | 2.3 | 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 | 45.0 | 11.5 | 2.1 | 0.1 | -- | 0.9 | 0.0 |
| Min | 9.5 | 2.3 | 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% | * | -- | -- | -- |
| 2003 | 82.5% | 99.5% | 100.0% | 100.0% | -- | * | * |
| 2004 | 79.0% | 97.7% | 100.0% | * | -- | * | * |
| 2005 | 84.8% | 100.0% | 100.0% | * | -- | * | * |
| 2006 | 93.5% | 97.9% | 100.0% | * | -- | 100.0% | * |
| 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% |

* No catch of Pacific halibut was observed, and thus a % discarded calculation is not possible.

-- No WCGOP observations were made for the year/sector/gear type.

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. In a previous report (Heery and Bellman 2009), potential values for these years were produced by applying a combined discard rate from 2007-2008 to 2002-2006 landings data. The results using this assumed 2007-2008 rate are shown in brackets.

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|--|--------|--------|--------|--------|--------|-------|-------|-------|
| 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 |
| Estimated discard mortality (16%) | 20.6 | 28.2 | 26.5 | 34.0 | 85.7 | 17.1 | 22.9 | 43.0 |
| <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 |
| Estimated discard mortality (16%) | 1.8 | 4.3 | 7.8 | 2.2 | 18.5 | 3.2 | 15.4 | 6.5 |
| <u>Coastwide</u> | | | | | | | | |
| Gross discard estimate | 140.2 | 202.7 | 214.1 | 226.4 | 651.4 | 127.1 | 239.5 | 309.4 |
| Estimated discard mortality (16%) | 22.4 | 32.4 | 34.3 | 36.2 | 104.2 | 20.3 | 38.3 | 49.5 |
| <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 |
| Estimated discard mortality (18%) | 0.7 | 0.1 | 5.9 | 0.5 | 3.0 | 0.7 | 1.1 | 0.2 |
| 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 |
| Estimated discard mortality (16%) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.0 |
| <i>Pot</i> | | | | | | | | |
| <u>Coastwide</u> | | | | | | | | |
| Gross discard estimate | * | * | * | * | * | 0.03 | 0.02 | 0.01 |
| <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 (18%) | * | * | * | * | * | 0.0 | 0.0 | 0.0 |
| OA Fixed Gear (mt) | | | | | | | | |
| <i>Hook-and-line Gears</i> | | | | | | | | |
| <u>Coastwide</u> | | | | | | | | |
| Gross discard estimate | | | | | | 17.0 | 41.1 | 39.7 |
| <i>Assuming 07-08 discard rate for 2002 - 2006</i> | | | | | | | | |
| | [28.7] | [40.3] | [29.3] | [55.8] | [37.4] | | | |
| Estimated discard mortality (16%) | | | | | | 2.7 | 6.6 | 6.4 |
| <i>Pot</i> | | | | | | | | |
| <u>Coastwide</u> | | | | | | | | |
| Gross discard estimate | | | | | | 0.8 | 0.2 | 0.3 |
| <i>Assuming 07-08 discard rate for 2002 - 2006</i> | | | | | | | | |
| | [0.2] | [0.4] | [0.4] | [0.8] | [0.9] | | | |
| Estimated discard mortality (18%) | | | | | | 0.2 | 0.0 | 0.0 |

* 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 sector of the non-nearshore fixed gear groundfish fishery from 2002 through 2009.

| 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 | 2.9 | 24.1 |
| 2008 | 39.3 | 0.4 | 6.6 | 46.4 |
| 2009 | 49.7 | 0.0 | 6.4 | 56.1 |

Table 13. Pacific halibut length frequencies collected by WCGOP observers in the LE sablefish primary fixed gear sector from 2002-2009. Two tables are presented: (a) length frequency based on actual length measurements, and (b) length frequency based on visually estimated lengths. Visual estimates are approximated by essentially rounding to the nearest 10 cm.

(a) Actual length measurements

| Length interval (cm) | Length freq. | Percent length freq. |
|----------------------|--------------|----------------------|
| 25-30 | 0 | 0.00 |
| 30-35 | 0 | 0.00 |
| 35-40 | 0 | 0.00 |
| 40-45 | 0 | 0.00 |
| 45-50 | 0 | 0.00 |
| 50-55 | 2 | 0.01 |
| 55-60 | 3 | 0.02 |
| 60-65 | 8 | 0.06 |
| 65-70 | 16 | 0.12 |
| 70-75 | 34 | 0.25 |
| 75-80 | 29 | 0.21 |
| 80-85 | 14 | 0.10 |
| 85-90 | 9 | 0.07 |
| 90-95 | 9 | 0.07 |
| 95-100 | 6 | 0.04 |
| 100-105 | 3 | 0.02 |
| 105-110 | 0 | 0.00 |
| 110-115 | 2 | 0.01 |
| 115-120 | 0 | 0.00 |
| 120-125 | 2 | 0.01 |
| 125-130 | 0 | 0.00 |
| 130-135 | 0 | 0.00 |
| 135-140 | 1 | 0.01 |
| 140-145 | 0 | 0.00 |
| 145-150 | 0 | 0.00 |
| 150-155 | 0 | 0.00 |
| 155-160 | 0 | 0.00 |
| 160-165 | 0 | 0.00 |
| 165-170 | 0 | 0.00 |
| 170-175 | 0 | 0.00 |
| 175-180 | 0 | 0.00 |
| 180-185 | 0 | 0.00 |

(b) Visual length estimates

| Approximate length | Number | Proportion |
|--------------------|--------|------------|
| 20 cm | 0 | 0.00 |
| 30 cm | 5 | 0.00 |
| 40 cm | 29 | 0.00 |
| 50 cm | 191 | 0.02 |
| 60 cm | 1849 | 0.15 |
| 70 cm | 2799 | 0.22 |
| 80 cm | 3090 | 0.24 |
| 90 cm | 2635 | 0.21 |
| 100 cm | 1339 | 0.11 |
| 110 cm | 528 | 0.04 |
| 120 cm | 174 | 0.01 |
| 130 cm | 43 | 0.00 |
| 140 cm | 10 | 0.00 |
| 150 cm | 0 | 0.00 |
| 160 cm | 0 | 0.00 |
| 170 cm | 0 | 0.00 |
| 180 cm | 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 | 88 | 63.8% |
| ≥ 80 cm | 50 | 36.2% |
| Visual estimate | | |
| 0 - 74 cm | 4873 | 38.4% |
| 75 - 84 cm | 3090 | 24.3% |
| 85 - 150 cm | 4729 | 37.3% |

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 |
| 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 |

* 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 C.

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 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 | | | | | | | | 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 | Total fleet catch of pink shrimp (mt) | 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 |

* 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 | | | | | | | | 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 | Total fleet catch of California halibut (mt) | 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 |
| 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 |

* 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) from 2002 through 2009. 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 | 17.9 | 0.1 | 0.2 | 0.1 | 445 |
| 2008 | 305 | 246 | 2.7 | 41.3 | 0.4 | 0.0 | 0.3 | 596 |
| 2009 | 385 | 310 | 0.2 | 40.0 | 1.3 | 0.0 | 0.0 | 737 |
| 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 | 2.9 | "" | | | 233 |
| 2008 | 208 | 39 | 0.4 | 6.6 | "" | | | 254 |
| 2009 | 251 | 50 | 0.0 | 6.4 | "" | | | 307 |

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

APPENDIX A

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*

ROUNDFISH

Cabezon, *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. serranoides*
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 B

Weighted catch composition data from the limited entry bottom trawl fishery. The frequency within each length bin were 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 for 2004 through 2009.

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

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

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' N latitude | Species Group - South of 40° 10' N latitude | FMP |
|-------------------|-----------------------------|---|---|-----|
| ALBC | ALBACORE | Other nongroundfish | Other nongroundfish | |
| AKSK | ALASKA SKATE | Other non-FMP skate | Other non-FMP skate | |
| 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 | |
| BSLK | 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 |
| BSRK | BLUE SHARK | Other nongroundfish | Other nongroundfish | |
| BSRM | UNSP. BAIT SHRIMP | Other nongroundfish | Other nongroundfish | |
| BTCR | BAIRDI TANNER CRAB | Tanner crab | Tanner crab | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | FMP |
|--------------------------|--------------------------------|--|--|------------|
| 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 | |
| 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 rockfish | yes |
| CLPR | CHILIPEPPER | Chilipepper (Remaining rockfish) | Chilipepper rockfish | 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 | |
| CSRK | BROWN CAT SHARK | Other nongroundfish | Other nongroundfish | |
| CSOL | CURLFIN SOLE | Other flatfish | Other flatfish | yes |
| 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 | DEESEA 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 |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | FMP |
|--------------------------|-----------------------------|--|--|------------|
| 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 |
| 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 | HORNYHEAD 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | FMP |
|--------------------------|--------------------------------|--|--|------------|
| 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 | |
| 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 slope rockfish (>150 fm) | Other slope rockfish (>150 fm) | yes |
| ORCK | OTHER ROCKFISH | Other shelf rockfish (<150 fm) | Other shelf rockfish (<150 fm) | yes |

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|--------------------------|----------------------------|--|--|------------|
| 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 | OPILO 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 | PYGYM 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 | |
| RATF | SPOTTED RATFISH | Other groundfish | Other groundfish | yes |
| RCK1 | BOCACIO+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 |

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| 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 | |
| SLGR | SILVERGREY ROCKFISH | Silvergrey rockfish | Other shelf rockfish | yes |

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|-------------------|--------------------------------|---|---|-----|
| | | (Remaining 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 | yes |
| SNS1 | NOM. SPLITNOSE ROCKFISH | Splitnose rockfish (Remaining rockfish) | Splitnose rockfish | yes |
| SOCK | SOCKEYE SALMON | Other nongroundfish | Other nongroundfish | |
| 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 |

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|--------------------------|----------------------------|--|--|------------|
| 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 | |
| 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 slope rockfish (>150 fm) | Other slope rockfish (>150 fm) | yes |
| URCK | UNSP. ROCKFISH | Other shelf rockfish (<150 fm) | Other shelf rockfish (<150 fm) | yes |
| URK1 | SRKR+REYE+NRCK+SHRP | Other slope rockfish | Other slope rockfish | yes |
| URND | UNSP. ROUND FISH | 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 | |

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| 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 | Yellowmouth 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' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|-------------------|-----------------------------|---|---|------------|
| ALBC | ALBACORE | Other nongroundfish | Other nongroundfish | |
| AKSK | ALASKA SKATE | Other non-FMP skate | Other non-FMP skate | |
| 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 | |
| BSCL | 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 | |
| BSRK | BLUE SHARK | Other nongroundfish | Other nongroundfish | |
| BSRM | UNSP. BAIT SHRIMP | Other nongroundfish | Other nongroundfish | |
| BTCR | BAIRDI TANNER CRAB | Tanner crab | Tanner crab | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|--------------------------------|--|--|-------------------|
| 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 |
| 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 rockfish | |
| CLPR | CHILIPEPPER | Chilipepper (Remaining rockfish) | Chilipepper rockfish | |
| 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|-----------------------------|--|--|-------------------|
| 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 rockfish) | yes |
| 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 | HORNYHEAD 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|--------------------------------|--|--|-------------------|
| 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 ROCKFISH | Other nearshore rockfish | Northern nearshore rockfish | yes |
| 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 slope rockfish (>150 fm) | Other slope rockfish (>150 fm) | |
| ORCK | OTHER ROCKFISH | Other shelf rockfish (<150 fm) | Other shelf rockfish (<150 fm) | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|----------------------------|--|--|-------------------|
| 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 | Petrale sole | Petrale sole | |
| PTRL | PETRALE SOLE | Petrale sole | Petrale 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 |
| 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 |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|---------------------------|--|--|-------------------|
| 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|--------------------------------|--|--|-------------------|
| SLGR | SILVERGREY ROCKFISH | Silvergray 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 | |
| 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 (>10 fm) | yes |
| SSHR | SOUTHERN NEAR-SHORE ROCKFISH | Southern nearshore rockfish | Shallow nearshore rockfish (<10 fm) | 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 | |
| SSPF | SHORTBILL SPEARFISH | Other nongroundfish | Other nongroundfish | |
| SSP1 | NOM. SHORTSPINE THORNYHEAD | Shortspine thornyhead | Shortspine thornyhead | |
| 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. STRIPETAIL 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 | STRIPETAIL 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 (>10 fm) | yes |
| SUSR | SOU. UNSP. NEAR-SHORE ROCKFISH | Southern nearshore rockfish | Shallow nearshore rockfish (<10 fm) | 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|----------------------------|--|--|-------------------|
| 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 |
| UGRN | UNSP. GROUND FISH | Other groundfish | Other groundfish | |
| 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 | |
| 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. ROCKFISH | Other slope rockfish (>150 fm) | Other slope rockfish (>150 fm) | |
| URCK | UNSP. ROCKFISH | Other shelf rockfish (<150 fm) | Other shelf 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 FLOUNDERS | Other flatfish | Other flatfish | |
| USHR | UNSP. NEAR-SHORE ROCKFISH | Other nearshore rockfish | Deeper nearshore rockfish (>10 fm) | yes |
| USHR | UNSP. NEAR-SHORE ROCKFISH | Other nearshore rockfish | Shallow nearshore rockfish (<10 fm) | yes |
| USKT | UNSP. SKATE | Unspecified skate | Unspecified skate | |
| USLF | UNSP. SHELF ROCKFISH | Other shelf rockfish | Other shelf rockfish | |
| USLP | UNSP. SLOPE ROCKFISH | 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 | |

| PacFIN Species ID | PacFIN Common Name | Species Group - North of 40° 10' N latitude | Species Group - South of 40° 10' N latitude | NS Species |
|--------------------------|---------------------------|--|--|-------------------|
| 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 | |
| VRML | VERMILION ROCKFISH | 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 ROCKFISH | Widow rockfish | Widow rockfish | |
| WDW1 | NOM. WIDOW ROCKFISH | 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. YELLOWEYE ROCKFISH | Yelloweye rockfish | Yelloweye rockfish | |
| YEYE | YELLOWEYE ROCKFISH | Yelloweye rockfish | Yelloweye rockfish | |
| YLTL | YELLOWTAIL | Other nongroundfish | Other nongroundfish | |
| YMTH | YELLOWMOUTH ROCKFISH | Yellowmouth rockfish (Remaining rockfish) | Other slope rockfish | |
| 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) | |
| YTRK | YELLOWTAIL ROCKFISH | Yellowtail rockfish | Yellowtail rockfish (Remaining rockfish) | |