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Data Report and Summary Analyses of the US West Coast Limited Entry Groundfish Bottom Trawl Fishery

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Introduction

Overview

This report summarizes discarded catch data collected by the West Coast Groundfish Observer Program (WCGOP) from the limited entry (LE) bottom trawl fishery from January 1, 2009 through April 30, 2010. The WCGOP collects at-sea data from LE trawl and fixed gear fisheries, as well as from nearshore, shrimp, California halibut, and deep-water fisheries. The WCGOP's goal is to improve total catch estimates by collecting information on the discarded catch (fish returned overboard at-sea) of west coast groundfish species. The data are used in assessing and managing a variety of groundfish species.

West Coast Limited Entry Groundfish Trawl Fishery

The LE groundfish bottom trawl fishery off the west coast of the United States operates from the Canadian border to Morro Bay, California. Each vessel that participates in the LE groundfish bottom trawl fishery must have a federal groundfish permit with a trawl endorsement. In 2009, there were 178 LE trawl permits. Permits associated with factory processors that target Pacific hake are observed by the At-Sea Hake Observer Program (ASHOP).

Groundfish bottom trawl vessels range in size from 35 to 95 feet, with an average length of 65 feet. Vessels fish throughout the year in a wide range of depths and deliver catch to shoreside processors. Bottom trawlers often target species assemblages, which can result in diverse catch, especially when compared to single species trawl fisheries, such as the midwater trawl fishery for Pacific hake. A single groundfish bottom trawl tow often includes fifteen to twenty species. Fish size and weight of the total catch also vary widely. Groundfish trawl vessels retain the portion of their catch that is marketable and permitted to be landed. The portion of the catch which is prohibited by regulations or not marketable is discarded at-sea.

Regulations for the groundfish bottom trawl fishery are set by the Pacific Fishery Management Council (PFMC). Active management of the fishery began in the early 1980's with the establishment of optimum yields (OY's) for several managed species and trip limits for widow rockfish, the *Sebastes* complex, and sablefish. The objective of trip limits has been to slow the pace of landings to maintain year-round fishing, processing, and marketing opportunities. Since the 1980's, regulations have evolved to further separate individual groundfish species for management purposes and led to the current use of cumulative two-month trip limits for most species (PFMC 2008). Cumulative trip limits are a specified weight of fish that can be landed during a particular time period.

Commercial Groundfish Bottom Trawl Fishery Data

Fisheries managers and enforcement officers use state-issued sales receipts, referred to as fish tickets, and vessel logbooks to monitor landings and fishing behavior in the LE bottom trawl fishery. Fish ticket and vessel logbook data are transferred to the Pacific Coast Fisheries Information Network (PacFIN) regional database system by state fishery agencies in Washington, Oregon, and California. Fish ticket information is uploaded to PacFIN on a monthly basis and is subject to updates frequently thereafter. Fish tickets are trip-aggregated sales receipts for market species/categories. Trip limit amounts may be changed through in-season management based on the fish ticket data. As fish tickets only provide information on the amount of fish landed, to ensure that total catch does not exceed the annual OY, managers also need discard information

for each managed species. One of the best means of acquiring accurate data needed to estimate the amount of discarded catch is through an at-sea observer program.

West Coast Groundfish Observer Program

On May 24, 2001, NOAA Fisheries (National Marine Fisheries Service, NMFS) established the WCGOP in accordance with the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660) (66 FR 20609). This regulation requires all vessels that catch groundfish in the United States Exclusive Economic Zone (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. Observers are stationed along the US west coast from Bellingham, Washington to San Diego, California.

Program Goals

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

Methods

Limited Entry Groundfish Trawl Permit Selection

Limited entry groundfish trawl permits are selected for observation using stratified random sampling. First, the WCGOP determines the amount of time (based on available resources) it will take to observe the entire fleet; this is termed the selection cycle. The selection cycle varies due to changing priorities and observer resources. Because of the data and timeline requirements for fisheries managers and historical observer program vessel coverage, the selection cycle does not coincide with the date range of the observer data analyzed in this report. The data in this report were collected during three selection cycles. The three selection cycles were November 1, 2008 to June 30, 2009 (selection cycle 10), July 1, 2009 to February 28, 2010 (selection cycle 11), and March 1, 2010 to October 31, 2010 (selection cycle 12). For each selection cycle, the number of permits selected for observer coverage were as follows: selection cycle 10 - 116 permits; selection cycle 11 - 111 permits; selection cycle 12 - 114 permits.

To avoid selecting vessels that have not been participating in the LE bottom trawl fishery, the WCGOP classified permits meeting the following criteria as inactive:

- Permits that landed little or no non-Pacific hake groundfish during the previous 18-month period.
- All permits associated with catcher-processors or motherships that only participate in the offshore component of the Pacific hake midwater trawl fishery.
- Permits associated with recently sunk vessels or that are owned by deceased or terminally ill persons.
- Permits associated with unidentified vessels.

Permits which were determined to be inactive were removed from all selection cycles. If a vessel becomes active during the selection cycle, they are required to notify the WCGOP and are subsequently added to the selection list.

The WCGOP aggregates ports along the US west coast into port groups, which are considered sampling strata. Vessels with LE groundfish trawl permits are assigned to a port group based upon the location of the previous year's landings. Within each port group, the vessels are randomly selected for coverage during a two-month period, which coincides with the two-month cumulative trip limit period. After the entire fleet has been selected, a new selection cycle begins. This selection process is designed to produce a logistically feasible sampling plan with a distribution of observations throughout the entire geographic range of the fishery over time. Based on this design and the current level of WCGOP funding, the program is currently cycling through the LE groundfish trawl fleet every eight to ten months.

For more information on the rationale behind vessel selection, see the observer coverage plan at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observersamplingplan.pdf>

Coverage of the LE Groundfish Bottom Trawl Fishery

Nearly all trips taken within the two-month period by a vessel whose permit has been selected are covered by an observer. However, in some cases, vessels whose permits are selected for a specific two-month period may not be covered by an observer during that period or may not be covered on all trips during that period.

A trip may be waived from observer coverage due to observer availability or a safety issue that can be fixed in a relatively short period of time. A few LE trawl vessels are given longer selection cycle waivers. A selection cycle waiver allows the vessel to fish without an observer during all trips taken during the entire selection cycle. Selection cycle waivers are given when a vessel has a serious safety concern that cannot be easily remedied.

Some vessels may receive a coverage period waiver. Coverage period waivers allow a vessel to fish all trips during a two-month period without an observer. Coverage period waivers are given for a variety of reasons including observer availability and vessel safety. Vessels are given a coverage period waiver for a specified two-month period and are added to the selection list for the next two-month period. For instance, if a vessel is given a coverage period waiver for January 1 through February 28, that vessel is automatically selected for observer coverage for the period March 1 through April 30. Vessels continue to be added in the subsequent selection list until either an observer covers them or until the selection cycle ends.

Trawl Data Collection

Fisheries observers are trained professionals who monitor and record catch data on commercial fishing vessels by following protocols in the WCGOP Manual (NWFSC 2009a).

Data collected by the observers on a trip basis include:

- Start time, end time, depth, and the start and end location of tows
- Gear type and fishing strategy
- Fish ticket identification numbers

Data collected by the observers on a tow basis include:

- Estimated total catch weight (including tows for which there is 100% discard)
- Weight of discard by catch category
- Reason for discard by catch category or species
- Species composition of discard by catch category
- Weight of fish retained by catch category which is generally copied from vessel logbooks
- Catch of prohibited species and incidental take of protected species
- Size composition, tags, and viability assessments for Pacific halibut
- Size composition of discarded fish
- Basic taxonomic composition of non-fish bycatch
- Biological collections (otoliths, maturity, food habits, genetic samples, etc.)

For more information regarding observer sampling on trawlers, refer to the WCGOP Observer Training Manual, Chapter 4 (NWFSC 2009a).

Data Quality Control and Management

The WCGOP uses the following procedure to ensure that the quality of data collected is maintained:

1. Data are collected at-sea by the observer following protocols in the WCGOP Manual (NWFSC 2009a).
2. Data are entered into a secure database system. A database table hierarchy is located in Appendix A.
3. Observers are debriefed by WCGOP staff after every two-month period. The debriefing includes:
 - Calculation, Data Form, and Sampling Methodology Checks - Observers send data to a debriefer on a monthly basis. The debriefer checks all calculations for accuracy, reviews data forms for completeness, and ensures appropriate sampling methodologies were employed.
 - Observer Logbook Review - Observers keep logbooks detailing the events of each trip, basic deck schematics, sampling methods used, communication logs, and confirmation of a current safety decal. Any tows during which sampling problems occurred are documented in the logbook and reviewed during debriefing.
 - Interview - The observer is interviewed by the debriefer. During the interview, sampling methodologies employed on all trips are discussed and data errors are updated.
 - Evaluation - Observers are evaluated on their performance based upon **WCGOP generated criteria**.
 - Data Entry Check - Electronic data are compared to the raw data for keypunch errors. Also, all corrections discovered during debriefing are updated in the database program.
4. Database Quality Control Queries - Quality control queries are run to detect data that fall outside specified ranges and identify other inconsistencies between data elements. These database quality control queries are run regularly (bi-annually or annually) on all data collected during a specified time period.
5. Database Update - The raw data from all entries that are highlighted by the quality control queries are reviewed and the electronic data are updated.

Data Processing

Data processing includes the following steps: expand the subsample of species composition to the tow-level; translate observer species codes to the appropriate PacFIN fish ticket data codes; identify and select the observer data records to match to fish tickets; query and process all PacFIN fish ticket data associated with the LE groundfish bottom trawl fishery; and merge observer data and fish ticket data. The translation of WCGOP to PacFIN species codes allows a more seamless match of observer data with fish ticket data and provides consistent information for calculating observer coverage of overall fishery landings.

The WCGOP database administrator expands the subsamples of catch categories to the tow level. A tow-level expansion is needed to estimate the total retained and discarded weight for each species because the sampling procedure used to collect the species composition data allows for subsampling of the population.

The following equation is used to calculate the weight of the subsample by summing across the observed weights of the individual species:

$$w_k = \sum_s x_{ks}$$

where:

x_{ks} = observed weight of the species s in catch category k in the subsample
 w_k = weight of the subsample from catch category k

The sampling ratio (R_k) used to scale the subsample weights to the amount in the catch category is calculated by dividing the weight of the subsample by the total weight of the catch category using the equation:

$$R_k = w_k / y_k$$

where:

y_k = the total weight of catch category k

The tow-level expanded weight of species s in category k is calculated by dividing the species weight in the subsample by the sampling ratio in the following equation:

$$X_{ks} = x_{ks} / R_k$$

where:

X_{ks} = the weight of species s in catch category k

Tallying the weight (X_{ks}) of the species (s) across all categories (k) within a tow provides the total weight of the species retained or discarded.

Once the tow-level expansion is complete, a data file that includes all fields necessary for the analysis is produced.

Observer data that meet the following criteria are removed for the fish ticket matching process:

- Trips with tows where no retained or discarded information is recorded.
- All discarded catch information.
- Trips where no fish ticket could be found.

- Partial trips (trips where the vessel was observed for less than 100% of their landed catch).

Next, the translation step of the process adds coding to the WCGOP observer data that allows for the appropriate match to the coding system used to record data on fish tickets in PacFIN.

Once these two steps are completed, the retained catch records from the observer data, which are typically vessel supplied estimates, are merged with fish ticket data to provide more accurate estimates of retained catch. The WCGOP data are linked to fish tickets by direct fish ticket number(s) obtained by the observer and/or by comparing the return date recorded by the observer with the dates of fish tickets from the vessel. For trips with multiple fish tickets, the fish ticket data are combined for analysis purposes. For trips with missing fish tickets, the observer retained catch data are not adjusted.

The WCGOP data are adjusted so that the total trip pounds of retained fish in a catch category matches the total trip pounds on the fish ticket, because the fish ticket weight is often more accurate and fish tickets are legally binding documents. To match the total trip pounds, the weights within each observer retained catch category are scaled up or down by the ratio of fish ticket and observer trip weights for that category, using the following equation to calculate the adjustment factor:

$$A_{mtk} = x_{mtk} / \sum_k x_{mtk}$$

where:

x_{mtk} = lbs in catch category k in tow t in trip m

A_{mtk} = adjustment factor used for catch category k in tow t in trip m

The equation used to adjust the WCGOP data is:

$$x_{mtk} = A_{mtk} \times C_{mk}$$

where:

C_{mk} = lbs in catch category k for trip m recorded on the fish ticket

When a catch category in the WCGOP data cannot be matched to a fish ticket catch category, the WCGOP data are not adjusted. Catch categories found only on the fish tickets are distributed across the observed tows using the proportion of the observed catch per tow divided by the total observed catch per trip using the following equation:

$$B_{mt} = \frac{\sum_k \sum_s x_{mtks}}{\sum_t \sum_k \sum_s x_{mtks}}$$

$$C_{mtk} = B_{mt} \times C_{mk}$$

where:

B_{mt} = the proportion of observed catch in tow t in trip m

C_{mtk} = lbs in catch category k for tow t in trip m recorded on the fish ticket

Upon completion of the observer data merge and adjustment with fish ticket data, the data that had been previously removed for the matching process are then incorporated back into the data file for analysis.

Analysis

Observer coverage rates in the LE groundfish bottom trawl fishery were calculated as the proportion of this fishery's fleet-wide landings of Pacific Coast Groundfish Fishery Management Plan (FMP) groundfish (except Pacific hake) that were observed (Appendix B). Coverage rates were computed based on the complete dataset for 2009 and January through April of 2010.

After coverage rates were calculated but prior to subsequent analyses, data that met the following criteria were removed:

- Data where WCGOP data quality standards were not met.
- Tows where no retained or discarded information was recorded.
- Tows where the species composition of discarded catch was not known (unsampled discard).

Although all of the vessels included in the sampling frame described in this report are participants in the LE groundfish bottom trawl fishery, it is necessary to remove some portions of the LE trawl data prior to analysis for two reasons. First, after being selected, some LE bottom trawl vessels may switch to midwater trawl gear, which typically yields a species catch composition and discard/bycatch trends that are distinct from the bottom trawl fleet. All midwater trawl tows are therefore removed from the dataset prior to subsequent analyses. However, none of the observed tows in 2009 or January through April of 2010 were recorded to have employed midwater trawl gear.

Second, some LE bottom trawl vessels participate in more than one fishery on a single observed trip. This is primarily an issue in California, where LE bottom trawl vessels may also participate in the state-permitted California halibut fishery. California halibut tows can occur on the same trip as tows targeting groundfish and are identified in the LE bottom trawl dataset based on the following criteria:

- The observer recorded the tow target as California halibut.
- The observer recorded the tow target as 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 that met at least one of the above requirements were removed from the LE bottom trawl dataset and excluded from further analysis. The LE bottom trawl data removed from this analysis for the California halibut fishery are reported in the annual update of the report "Data Report and Summary Analyses of the West Coast California Halibut Trawl Fishery" (NMFS 2009b).

Once these steps had been applied, the ratio estimator technique (Cochran 1977) was used to estimate bycatch and discard rates for each major species or species group. Rates were calculated for all of the stocks currently managed under rebuilding plans, as well as stocks for which discard is estimated annually on a fleet-wide basis. Bycatch and discard information for prohibited and protected resources such as Pacific halibut, salmon, green sturgeon, marine mammals, seabirds, and sea turtles are provided in separate reports, which are available electronically at www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/index.cfm. The ratio estimates (R_i) were calculated by area (i), season (j) and depth (d):

$$R_{ijd} = \sum_t y_{ijdt} / \sum_t x_{ijdt}$$

where:

y_{ijdt} = the discarded or total catch pounds of a species in tow t , area i , season j , and depth d

x_{ijdt} = the retained pounds of FMP groundfish species (except Pacific hake) in tow t , area i , season j , and depth d

The variance of R_{ijd} is approximated by using the following equation:

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

where:

\bar{x}_{ijd} and \bar{y}_{ijd} = the means of x_{it} and y_{it} over the tows in area i , season j , and depth d

$s^2(x_{ijdt})$ and $s^2(y_{ijdt})$ = the standard errors of x_{it} and y_{it} over all tows in area i , season j , and depth d

This variance estimator is that which was employed by Pikitch et al. (1998) and is based on methods presented by Cochran (1977). Note that $\text{Var}(R_{ijd})$ cannot be calculated when $x_{ijdt} = 0$ or $y_{ijdt} = 0$ for all sets and should be considered with extreme caution when R_{ijd} is equal to one. In order to best support fishery management, variance was calculated separately for data in each geographic area, season and depth. 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.

Discard ratios were computed as the observed discard weight of each species over the observed weight of all retained groundfish species listed in the Pacific Coast Groundfish FMP, except Pacific hake. Similarly, bycatch ratios were calculated as the observed total catch weight (discarded + retained) divided by the observed weight of retained FMP groundfish (except Pacific hake). Pacific hake was excluded when using a retained groundfish denominator because it is inappropriate to include retained hake as a metric of effort in the LE bottom trawl fishery. Vessels that land this species are considered to be targeting Pacific hake exclusively and are thus part of a separate fishery.

In all cases where a FMP groundfish species grouping was used to compute discard and bycatch 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 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 matching and adjusting 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 and bycatch 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 in the fixed gear fisheries, as any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

Results and Discussion

Overall Coverage Levels

The total number of observed trips, tows, vessels, and observed and total fleet-wide groundfish landings in the LE bottom trawl fishery are summarized in Table 1 for 2009 and for January through April of 2010. The observed coverage rate, calculated as the proportion of fleet-wide non-hake FMP groundfish landings observed, is provided with summaries for each WCGOP port group, two geographic areas north and south of the groundfish management line at 40°10' N. latitude, and for the entire US west coast. Observer coverage was reported in every port group where groundfish were landed by limited entry trawl vessels throughout the year.

Observer coverage in the LE bottom trawl fishery in 2009 increased on a coastwide basis relative to 2008 from 22% to 24% (NMFS 2009c). Overall, coverage was higher in the area north of 40°10' N. latitude (24%) than in the area south of this line (23%). All port groups except one had observer coverage above the 20% target coverage level in 2009. When split out by port group, Coos Bay had the highest rate of observer coverage at 30%, followed by Bellingham/Neah Bay (29%) and Crescent City (26%). Eureka was the only port group where coverage fell below the target of 20%. Relative to 2008, coverage levels in 2009 were up in all port groups except for Eureka, where it decreased from 24% to 12%, and San Francisco, where it decreased from 24% to 22% (NMFS 2009c).

During January through April of 2010, landings from observed LE bottom trawl trips were 18% of the total tonnage for all LE bottom trawl trips. The early 2010 coastwide coverage level is near the target of 20% coverage.

Spatial Distribution of Observations

The distribution of observed trips and tows among port groups provides perspective on where observer coverage and, secondarily, fishing effort was focused along the US west coast in the LE groundfish bottom trawl fishery. Overall, observed trips were distributed throughout west coast port groups from Bellingham to Morro Bay, with peaks in Astoria (156 trips) and Coos Bay (113 trips).

Coverage levels are subject to variation for several reasons. The WCGOP can control the number of boats observed, but not the amount of fish landed by these boats or the location of fishing effort. Coverage levels will fluctuate as a function of the amount of fish landed in a fishery and the amount of fish landed by the vessels observed, but these fluctuations are to be expected.

In 2009, spatial closures were employed in the LE groundfish trawl fishery by groundfish management. The Rockfish Conservation Area (RCA) closures in this fishery are the most complex in terms of latitudinal stratification and the variety of depth-related boundaries in use. Latitudinal stratification used in 2009 included the following: north of 48° 10' N. latitude, 48° 10' to 45° 46' N. latitude, 45° 46' to 40° 10' N. latitude, and south of 40° 10' N. latitude. Overall, boundaries were set anywhere from the shoreline out to 200 fathoms during 2009. The shoreward boundary was set at either 75 or 100 fathoms, when it was not extended to the shoreline in all of the latitudinal areas north of 40° 10' N. latitude. The RCA in the area south of 40° 10' N. latitude was set from 100 to 150 fathoms throughout the entire year.

Maps summarizing the spatial distribution of all LE bottom tows recorded in trawl logbooks and tows observed are presented for three sections of the US west coast in Figures 1a-c. In these figures, trawl tows were assigned to 10 km by 10 km grid blocks based on geographic coordinates of the tow start location. The shading of each block reflects the number of trawl logbook tows, with darker shading indicating more tows. The circles overlaid on each block reflect the number of observed tows, with larger circles indicating more tows. Blocks with the darkest shading and the smallest circles indicate fishing locations that received less observer coverage relative to fishing effort.

The spatial distribution of the LE trawl fleet and those tows observed by the WCGOP can be reviewed for general spatial sampling coverage in 2009. Figure 1a depicts the coast north of Coos Bay, Oregon. Figure 1b presents the area south of Coos Bay, Oregon to just north of San Francisco, California. Figure 1c portrays the remainder of the California coast with bottom trawl fishing effort, as far south as Morro Bay. Coastwide, the spatial distribution of fleet-wide LE bottom trawl tows appears to have been well sampled by observers during 2009. Spatially, there was an increase in overall fishing effort in 2009 relative to 2008, which is also reflected in a total coastwide landings increase (Table 1). Observer coverage demonstrated a very high correspondence to spatial areas fished by the fleet and were observed at levels similar to fishing effort.

Table 2 presents the number of tows and retained weight of non-hake FMP groundfish from observer and logbook data separated by management area (north and south of 40° 10' N. latitude), depth interval (0-125, 126-250, and > 250 fathoms) and season (winter: November through April, summer: May through October). This provides an alternative form of observer coverage rate for the 2009 LE bottom trawl fishery that is based on observer and logbook tows rather than fleet-wide fish ticket landings. A similar table for the 2008 LE bottom trawl fishery was provided in the groundfish total mortality report (Bellman et al. 2009, Table 1). The depth strata indicate the areas shoreward and seaward of RCA closures relevant in the fishery management framework.

Observed Total Catch, Discard Ratios, and Bycatch Ratios

Tables 3a and 3b present the observed total catch weight (mt), discard weight (mt) and percent discarded for each species north and south of 40° 10' N. latitude in 2009 and January through April of 2010. Observed coastwide total catch (discarded + retained) in the LE groundfish bottom trawl fishery was largely comprised of dover sole, arrowtooth flounder, sablefish, thornyheads, and petrale sole. Of the rebuilding species, darkblotched rockfish and Pacific ocean perch were caught in the largest amounts north of 40° 10' N. latitude. Widow rockfish, canary rockfish, and a very small amount of bocaccio and yelloweye rockfish were also caught in this area. South of 40° 10' N. latitude, the primary rebuilding species caught were bocaccio, widow rockfish, and darkblotched rockfish, but a small amount of canary rockfish, cowcod, and yelloweye rockfish were also observed. A small amount of chinook and pink salmon was caught north and south of 40° 10' N. latitude, which will also be reported as numbers of individual fish in the annual update of the current report "Observed and Estimated Total Bycatch of Salmon in the 2008 U.S. West Coast Groundfish Fisheries" (Bellman et al. 2010).

For other non-rebuilding fish species (excluding Pacific halibut, which is prohibited), the decision to discard is dependent not only upon levels of cumulative retained catch and corresponding landing limits, but also upon the size, condition, and marketability of the catch. In 2009, arrowtooth flounder constituted the largest component of observed discard coastwide. Relatively large amounts of Pacific hake, dover sole, thornyheads, spiny dogfish, and flatfish were also discarded. Relative to 2008, the total observed catch and discard weight

of most species increased. One of the exceptions was Pacific hake, which decreased relative to 2008. The other exception was skates, which appeared to decrease relative to 2008. However, longnose skate was reported individually in 2009, rather than in the skate group. Thus, from the perspective of the overall skate group (skates + longnose skate), total catch and discard had increased relative to 2008.

Observed discard of Pacific halibut in the 2009 limited entry bottom trawl fishery included 90 metric tons of Pacific halibut discard north of 40°10' N. latitude and an additional 1.5 metric tons south of 40°10' N. latitude. Regulation prohibits Pacific halibut from being landed in this fishery. The data reported here were used to inform subsequent estimates of fleet-wide Pacific halibut bycatch. The fleet-wide analysis is presented in the report “Pacific halibut bycatch in the U.S. west coast groundfish fishery from 2002 through 2009” (Heery et al. 2010).

Tables 4a and 4b present discard ratios and standard errors for the 2009 LE groundfish bottom trawl fishery by management area, season, and depth interval. Species are grouped for discard ratio calculations according to Appendix C. All discard ratios in Table 4 were computed using retained FMP groundfish species (except Pacific hake) in the denominator. In Table 5, discard ratios are re-computed using summaries of strata tow duration (in trawl hours) in the denominator. Discard ratios computed using a retained groundfish species grouping in the denominator have traditionally been used to expand observer data to the fleet-wide level for coastwide discard estimation in the LE groundfish bottom trawl fishery (Bellman et al. 2009).

Tables 6a and 6b provide bycatch ratios for the 2009 LE groundfish bottom trawl fishery. All bycatch ratios for this fishery were computed using retained FMP groundfish species (except Pacific hake) in the denominator. Bycatch ratios for rebuilding species are presented in Figure 2 for all years observed. Relative to 2008, bycatch ratios for most rebuilding species remained fairly consistent north of 40° 10' N. latitude. South of 40° 10' N. latitude, bycatch ratios for bocaccio, cowcod, and widow rockfish increased from 2008 to 2009.

Figure 3 displays pie charts representing the percentage of observed tows in which rebuilding species were caught by management area. Overall, no catch of rebuilding species (0 pounds) was observed on more than 77% of bottom trawl tows. On a percentage basis, darkblotched rockfish was caught most frequently, as 22% of observed tows caught this species north of 40°10' N. latitude. Bocaccio was the next most commonly encountered species, with catch recorded on 19% of observed tows in the southern strata. For many rebuilding species, catch was observed on less than 5% of bottom trawl tows in each strata (i.e. cowcod, canary rockfish, widow rockfish (north of 40° 10' N. latitude), and yelloweye rockfish).

Biological Data Collection and Summary

WCGOP observers primarily collect length or sexed lengths from non-protected resources although in some circumstances they also collect otoliths or viabilities. Biological data are collected from randomly selected individuals within a species composition sample and only from the discarded portion of the total catch. Biological data collected in the LE groundfish bottom trawl fishery for non-protected resources from September 2003 through April 2010 are summarized in Table 7. Biological data were summarized for all rebuilding species, but for non-rebuilding or non-groundfish species, only those with more than 10 observations were included.

The length frequency distributions of discarded rebuilding species from biological data are reported for the LE groundfish bottom trawl fishery in Figure 4. Figure 5 presents length frequency distributions of other discarded groundfish species.

For protected resources, including any species regulated under the Endangered Species Act (ESA), additional types of biological data are collected whenever possible. It is the policy of the WCGOP to collect lengths, photographs, and tissue samples from all green sturgeon observed, as well as sexes and fin ray samples from all dead individuals. For salmon, observers record length and sex for all individuals, as well as record weight, note presence or absence of an adipose fin, and collect scales and snouts. Information regarding biosampling procedures for marine mammals, seabirds, green sturgeon, and salmon is available in the WCGOP observer training manual (NWFSC 2009a).

Table 8 summarizes the biological data for protected fish resources collected by observers in the LE groundfish bottom trawl fishery from September 2003 through April 2010. Across all years, observers sampled a total of 567 chinook salmon, 8 coho salmon, 2 chum salmon, 1 pink salmon, and 3 unidentified salmon.

Summary

Bycatch and discard rates calculated from observer data collected in the LE bottom trawl fishery from January 2009 through April 2010 are now available for use in the management process. The observer data will be used in conjunction with additional commercial bottom trawl fishery data to inform current fishery management in projection modeling of bycatch. In addition, these discard rates will be used to estimate discard at the fleet-wide level to account for annual coastwide mortality in this fishery. The collected biological data will also be available for use by stock assessment authors.

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Figures

Figure 1a. Locations of observed and fleet logbook trawl tows north of Coos Bay, Oregon in 2009.

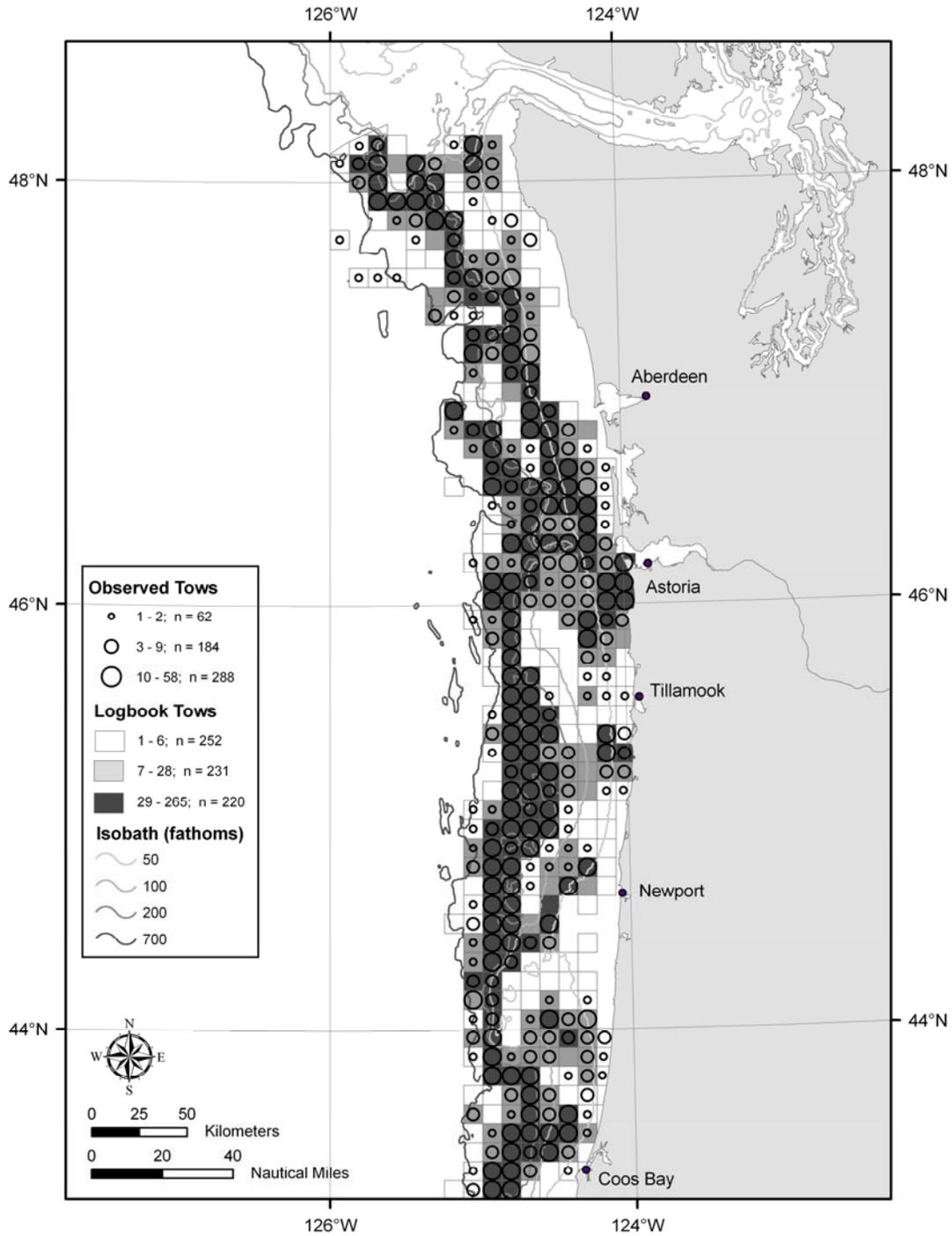


Figure 1b. Locations of observed and fleet logbook trawl tows south of Coos Bay, Oregon and north of San Francisco, California in 2009.

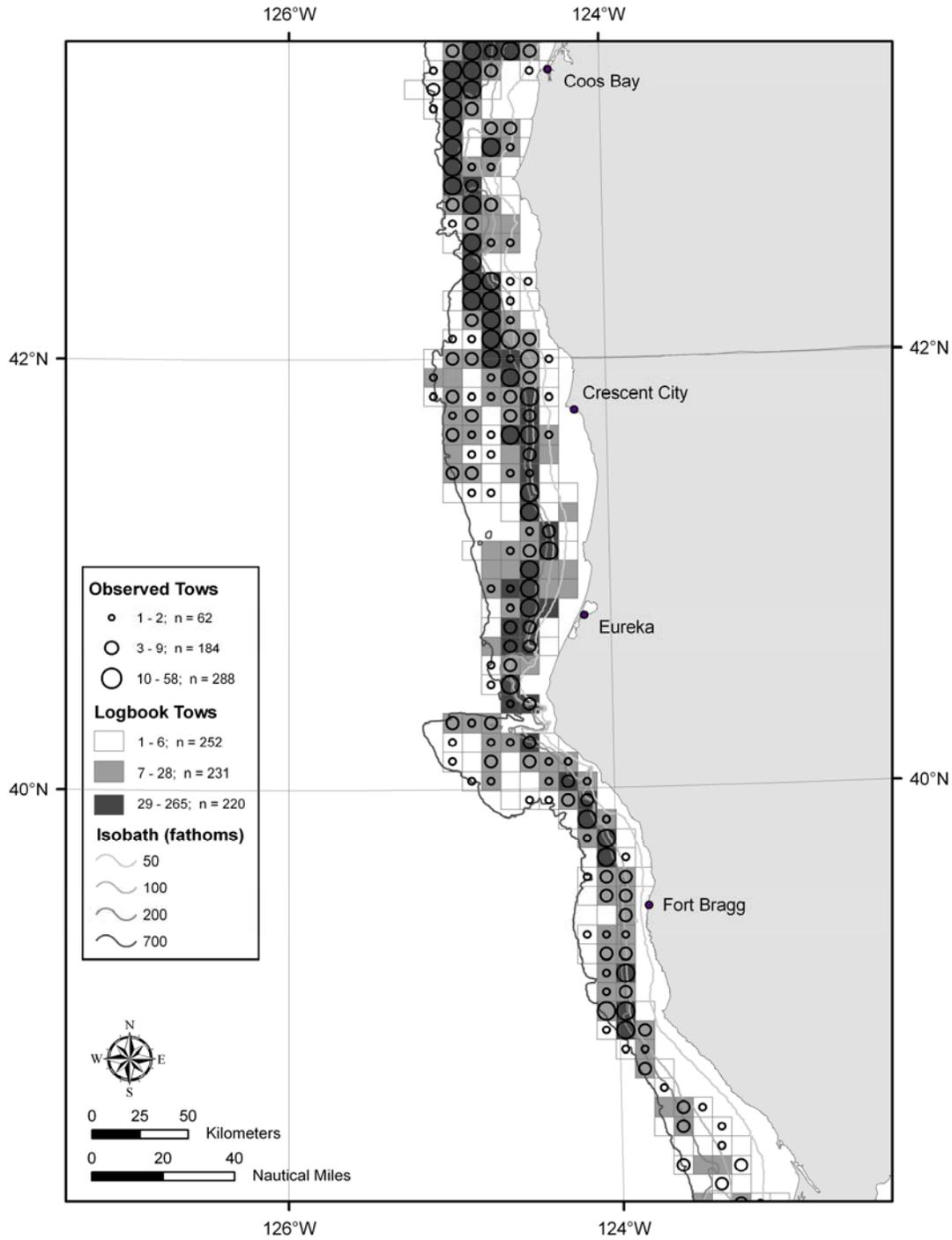


Figure 1c. Locations of observed and fleet logbook trawl tows south of San Francisco, California in 2009.

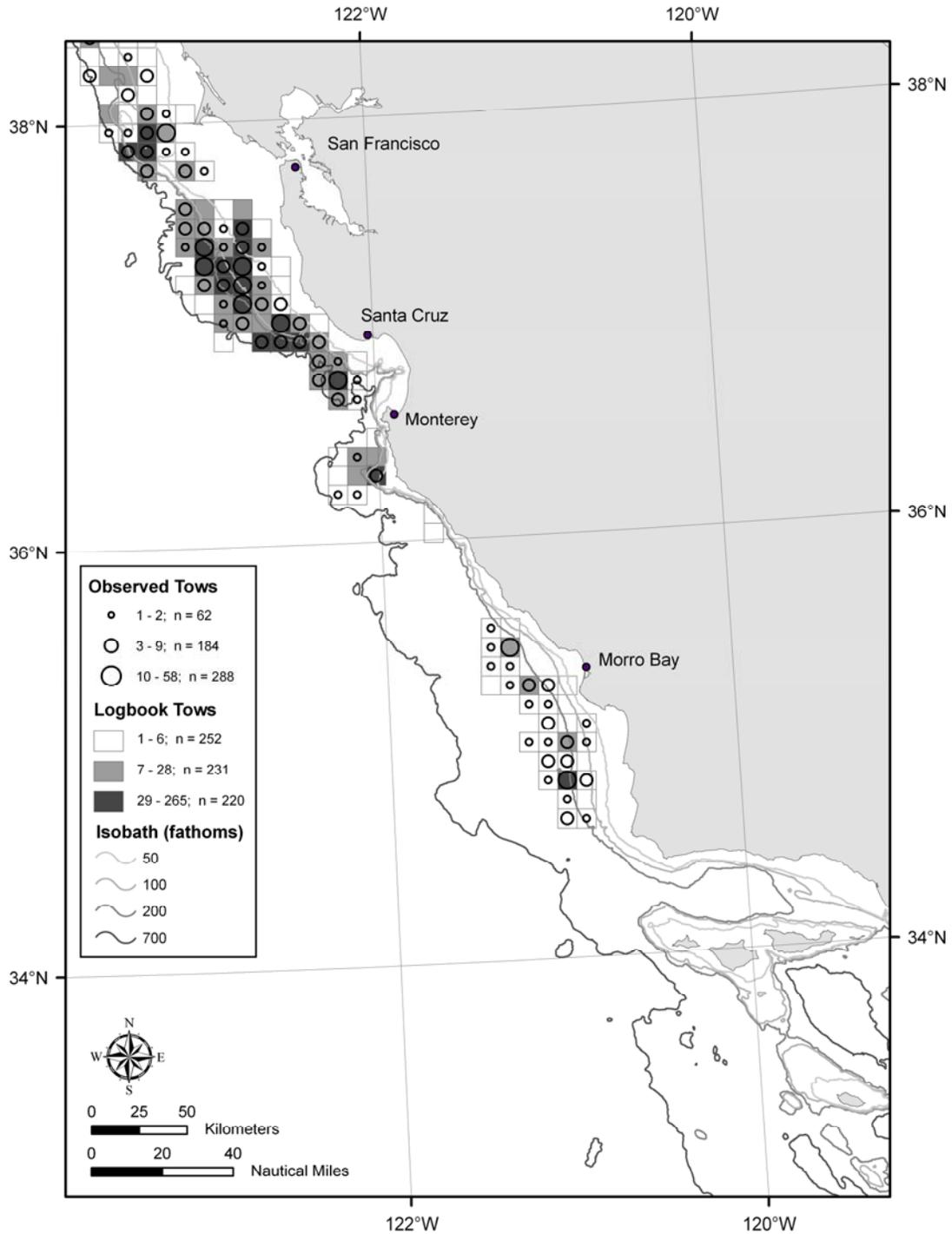


Figure 2. Bycatch ratios of groundfish rebuilding species for all observed years from the limited entry groundfish bottom trawl fishery by management area; north (solid circles) and south (outlined circles) of 40°10' N. latitude. Bycatch ratios were computed as the observed total catch of rebuilding species divided by the weight of retained FMP groundfish (excluding Pacific hake).

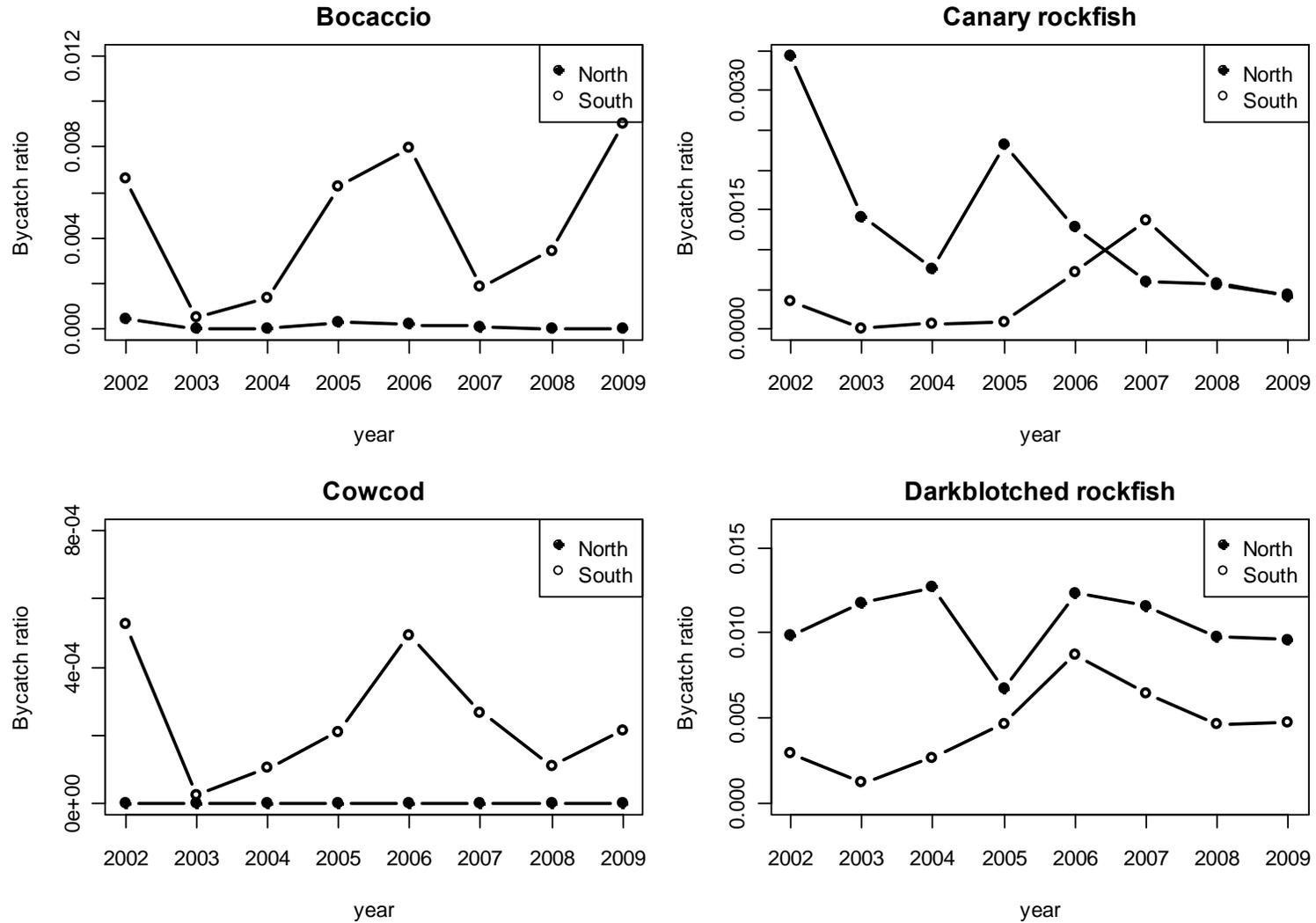


Figure 2 continued. Bycatch ratios of groundfish rebuilding species for all observed years from the limited entry groundfish bottom trawl fishery by management area; north (solid circles) and south (outlined circles) of 40°10' N. latitude. Bycatch ratios were computed as the observed total catch of rebuilding species divided by the weight of retained FMP groundfish (excluding Pacific hake).

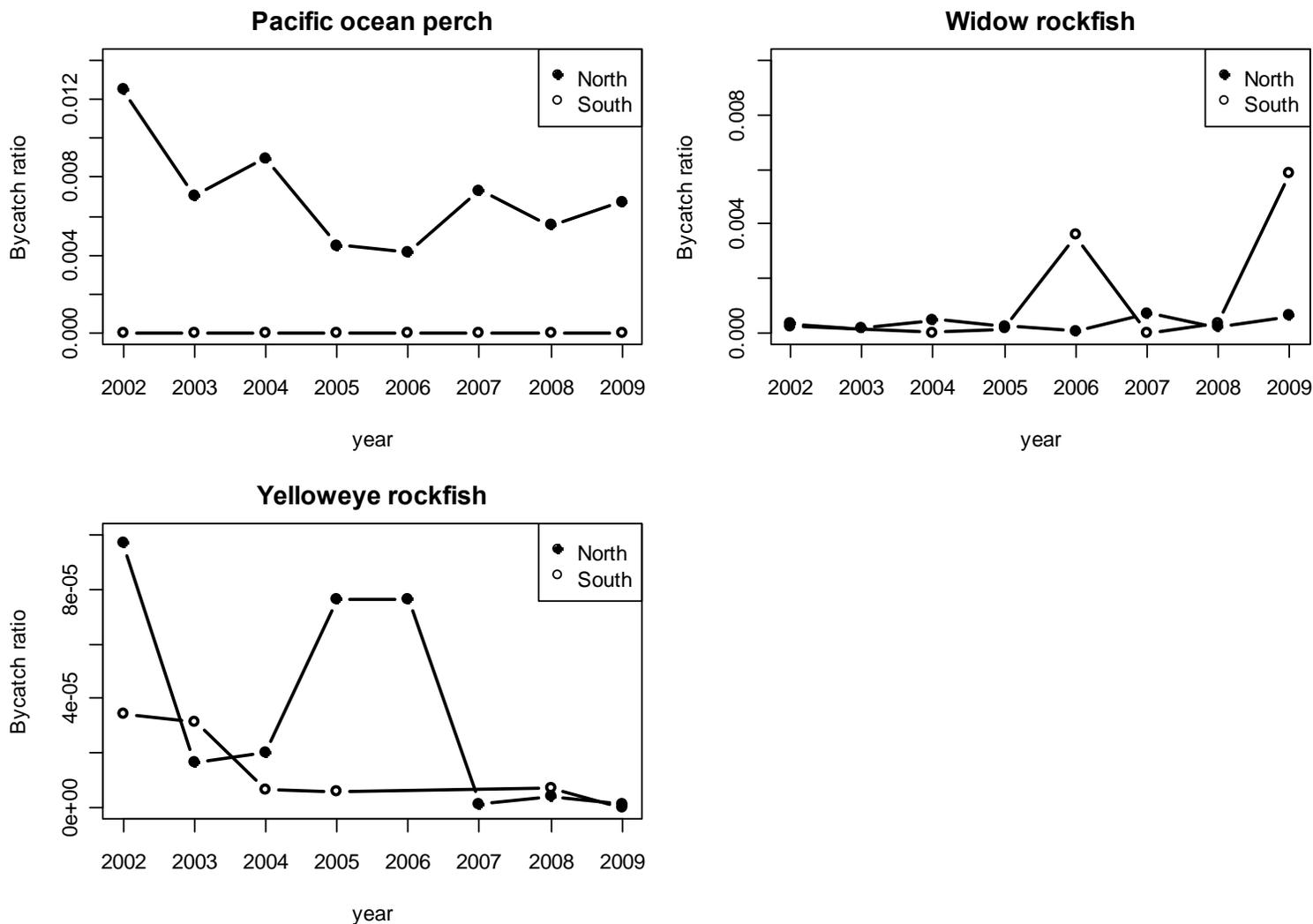


Figure 3. Pie charts showing the percentage of observed tows during which groundfish rebuilding species were caught (0, 1-15, 16-50, 51-150, 151-300, > 300 lbs) in the 2009 limited entry groundfish bottom trawl fishery by management area.

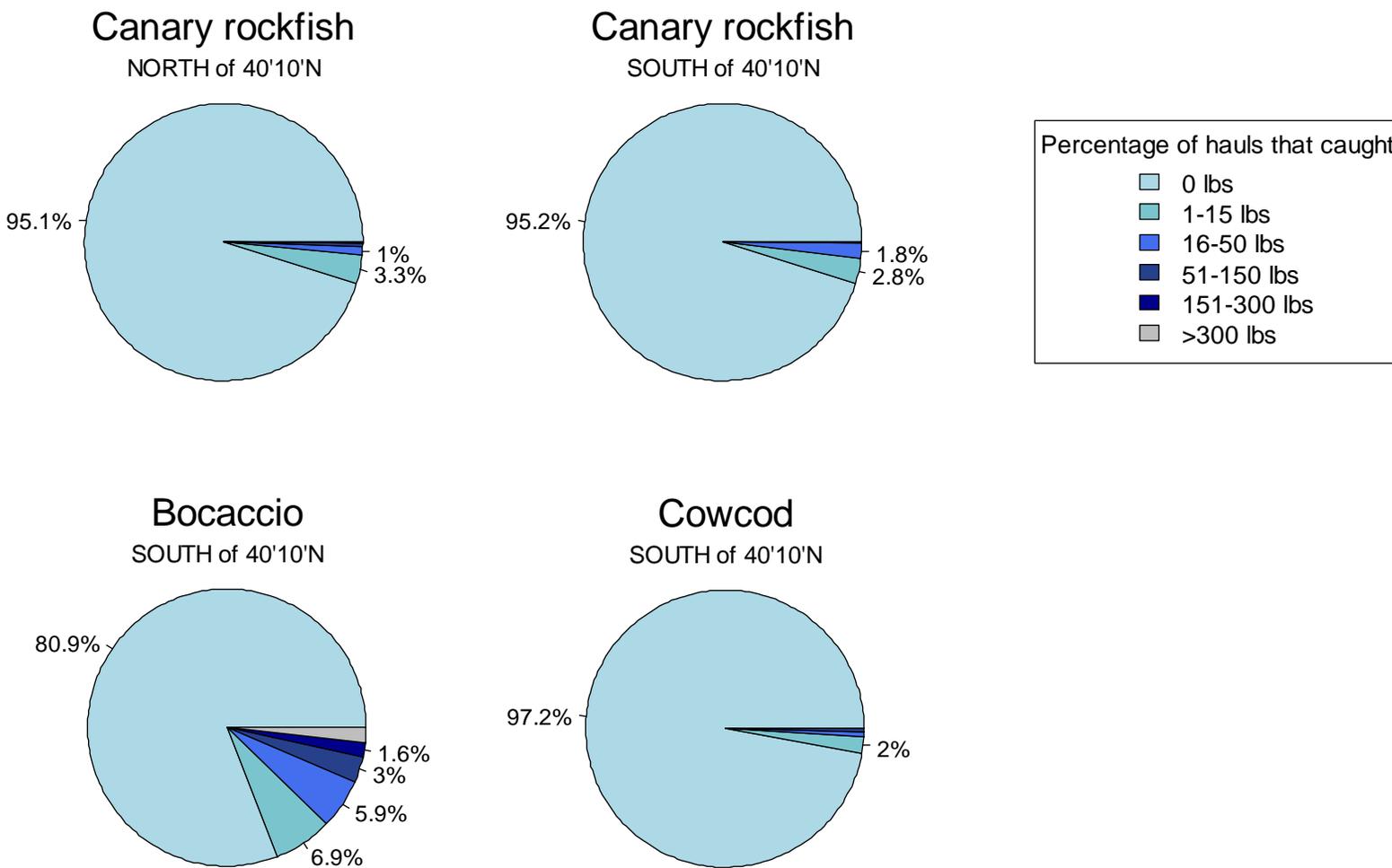
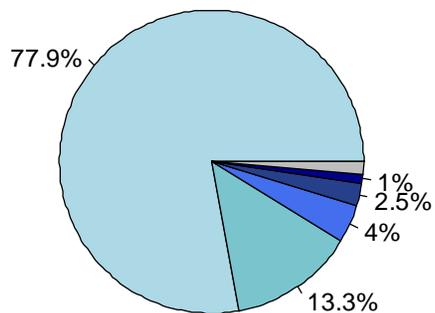


Figure 3 continued. Pie charts showing the percentage of observed tows during which groundfish rebuilding species were caught (0, 1-15, 16-50, 51-150, 151-300, > 300 lbs) in the 2009 limited entry groundfish bottom trawl fishery by management area.

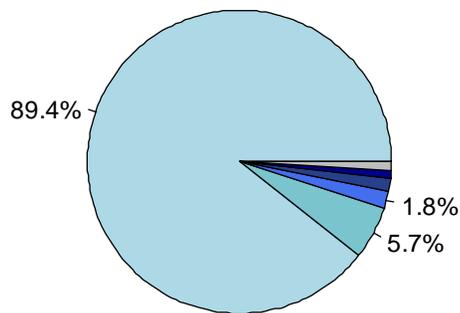
Darkblotched rockfish

NORTH of 40'10"N



Darkblotched rockfish

SOUTH of 40'10"N



Percentage of hauls that caught:



Pacific ocean perch

NORTH of 40'10"N

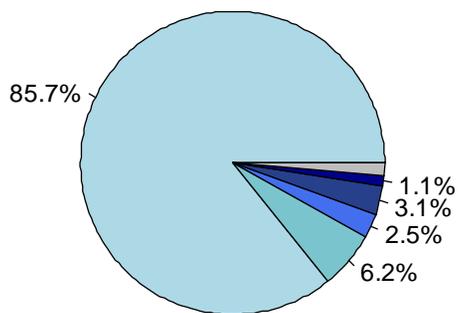


Figure 3 continued. Pie charts showing the percentage of observed tows during which groundfish rebuilding species were caught (0, 1-15, 16-50, 51-150, 151-300, > 300 lbs) in the 2009 limited entry groundfish bottom trawl fishery by management area.

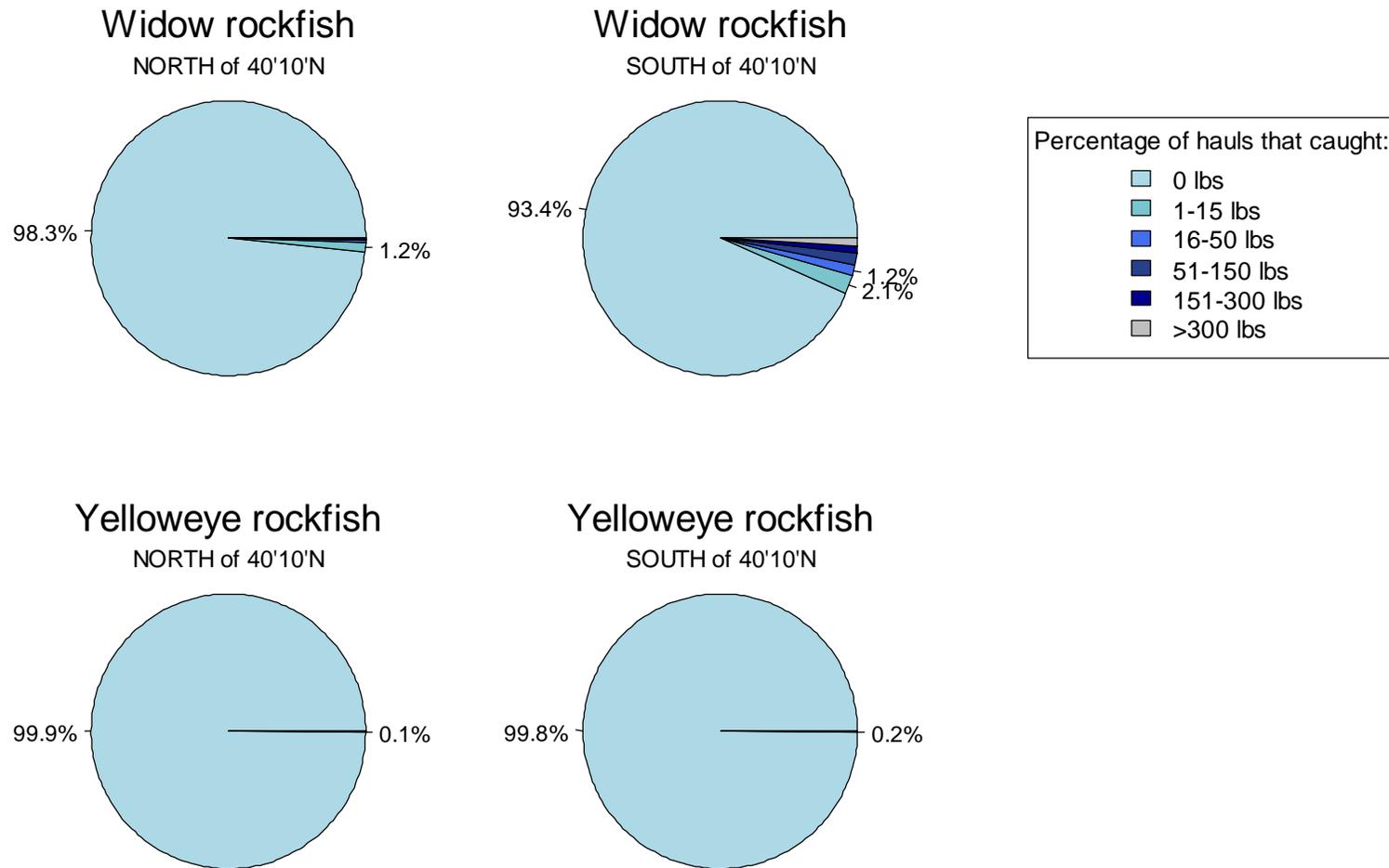


Figure 4. Length frequency distributions of discarded groundfish rebuilding species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010.

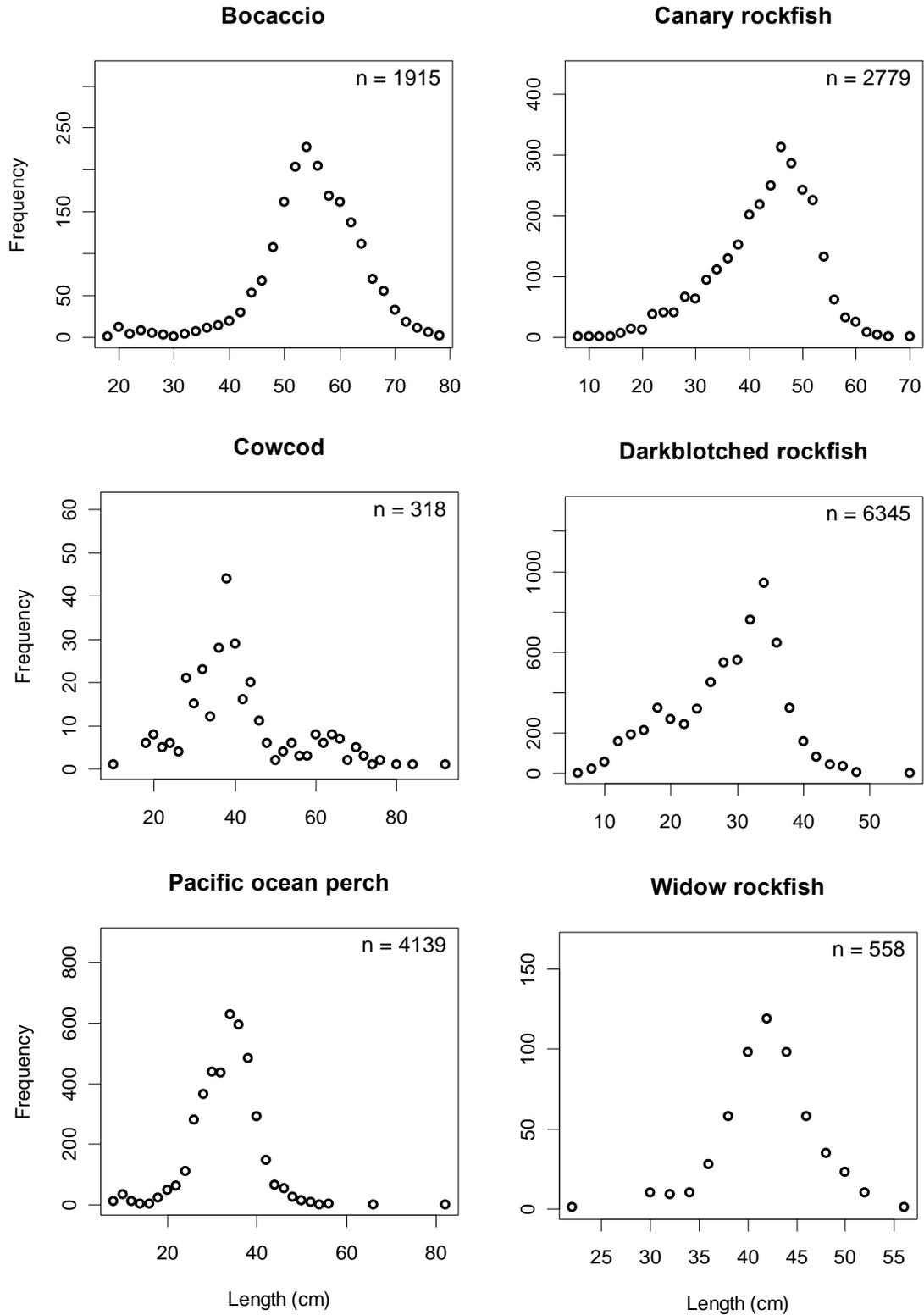


Figure 4 continued. Length frequency distributions of discarded groundfish rebuilding species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010.

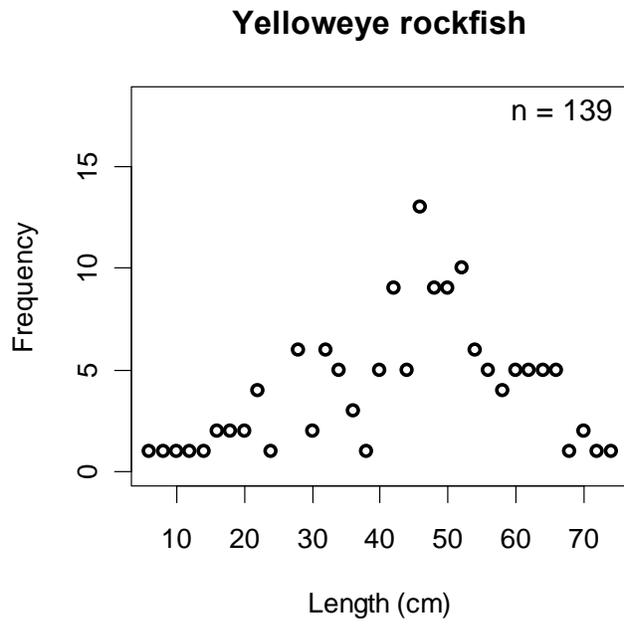


Figure 5. Length frequency distributions of discarded (non-rebuilding) groundfish species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010. Plots are provided for groundfish species for which at least 100 length measurements are available.

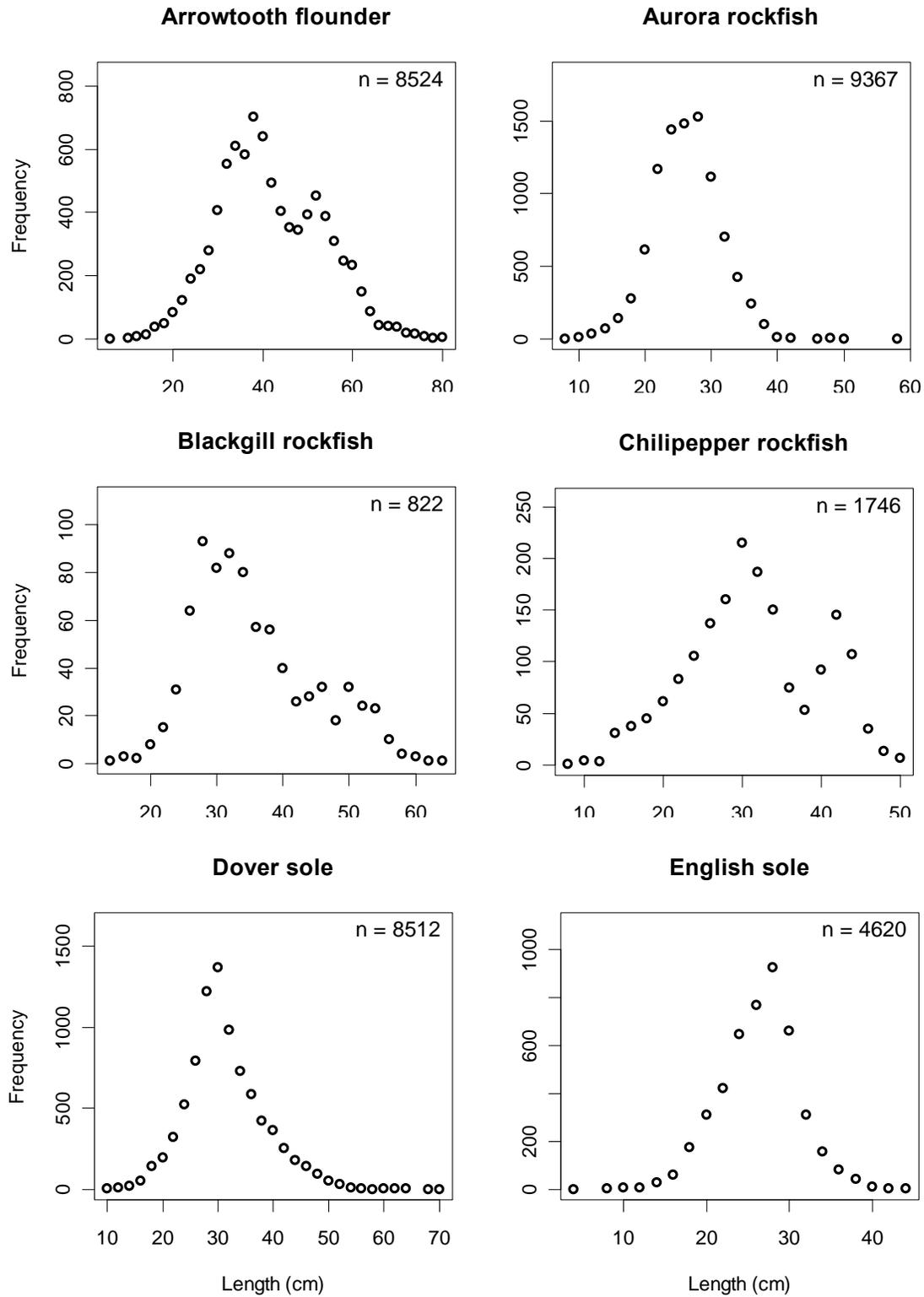


Figure 5 continued. Length frequency distributions of discarded (non-rebuilding) groundfish species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010. Plots are provided for groundfish species for which at least 100 length measurements are available.

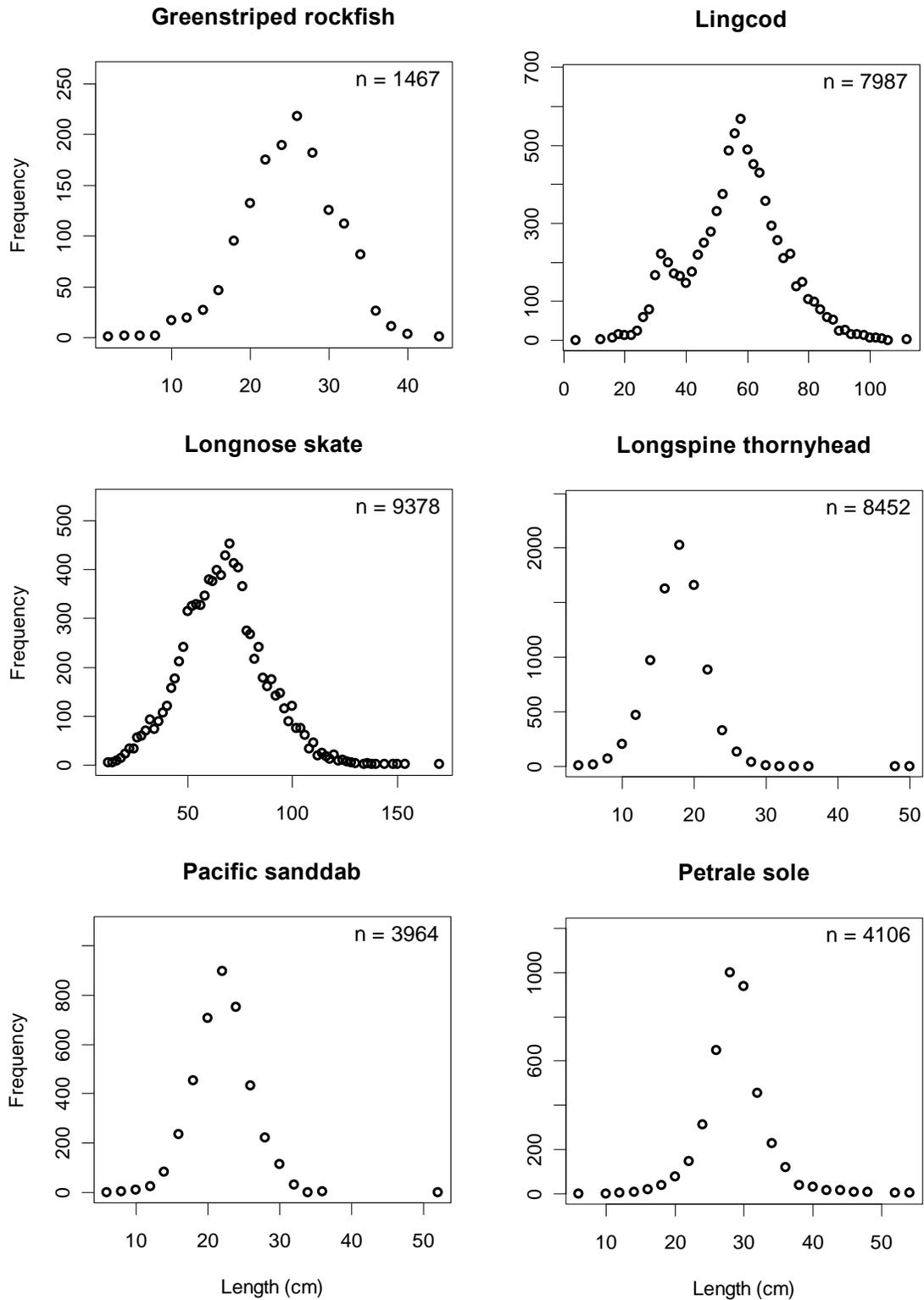


Figure 5 continued. Length frequency distributions of discarded (non-rebuilding) groundfish species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010. Plots are provided for groundfish species for which at least 100 length measurements are available.

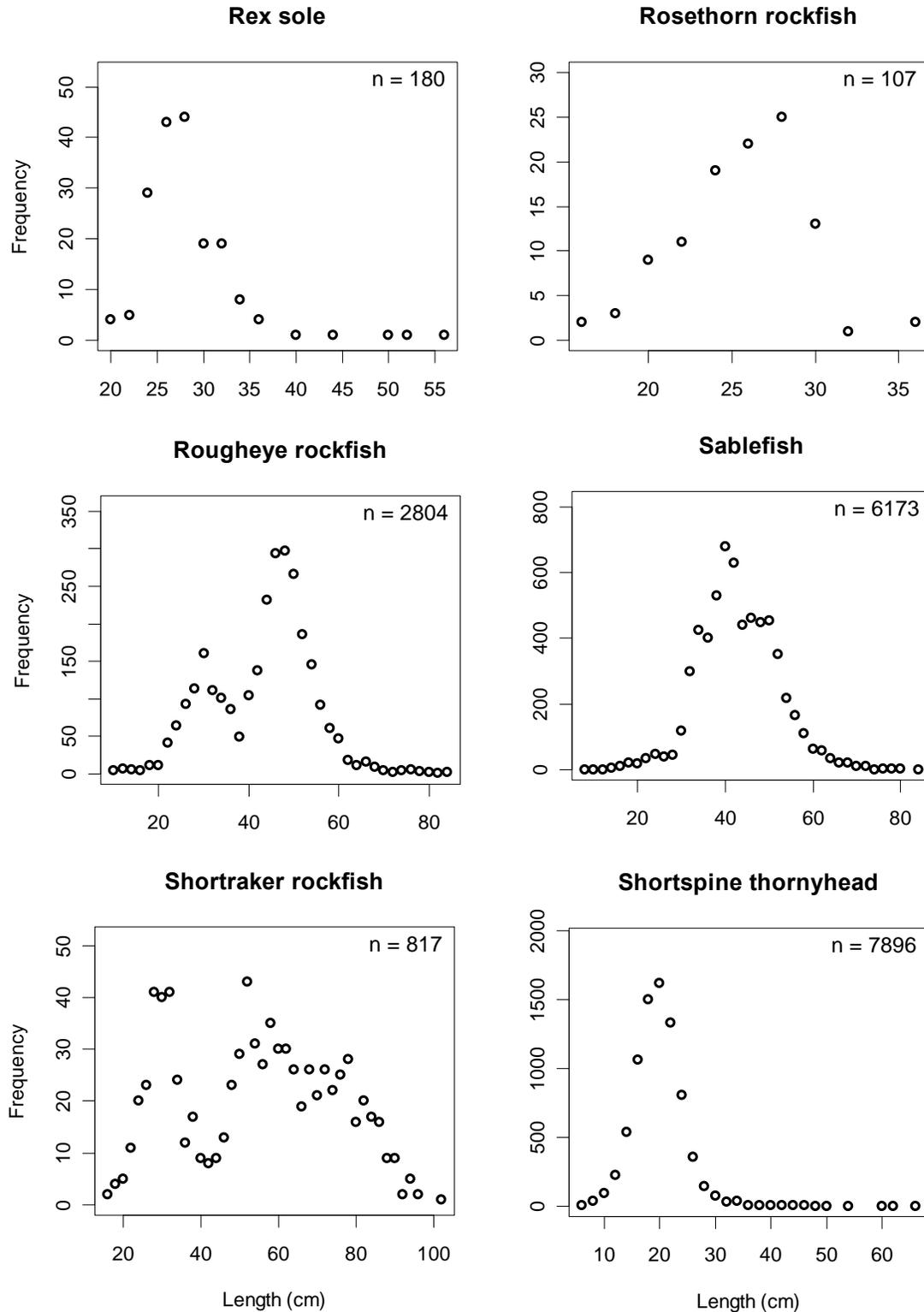
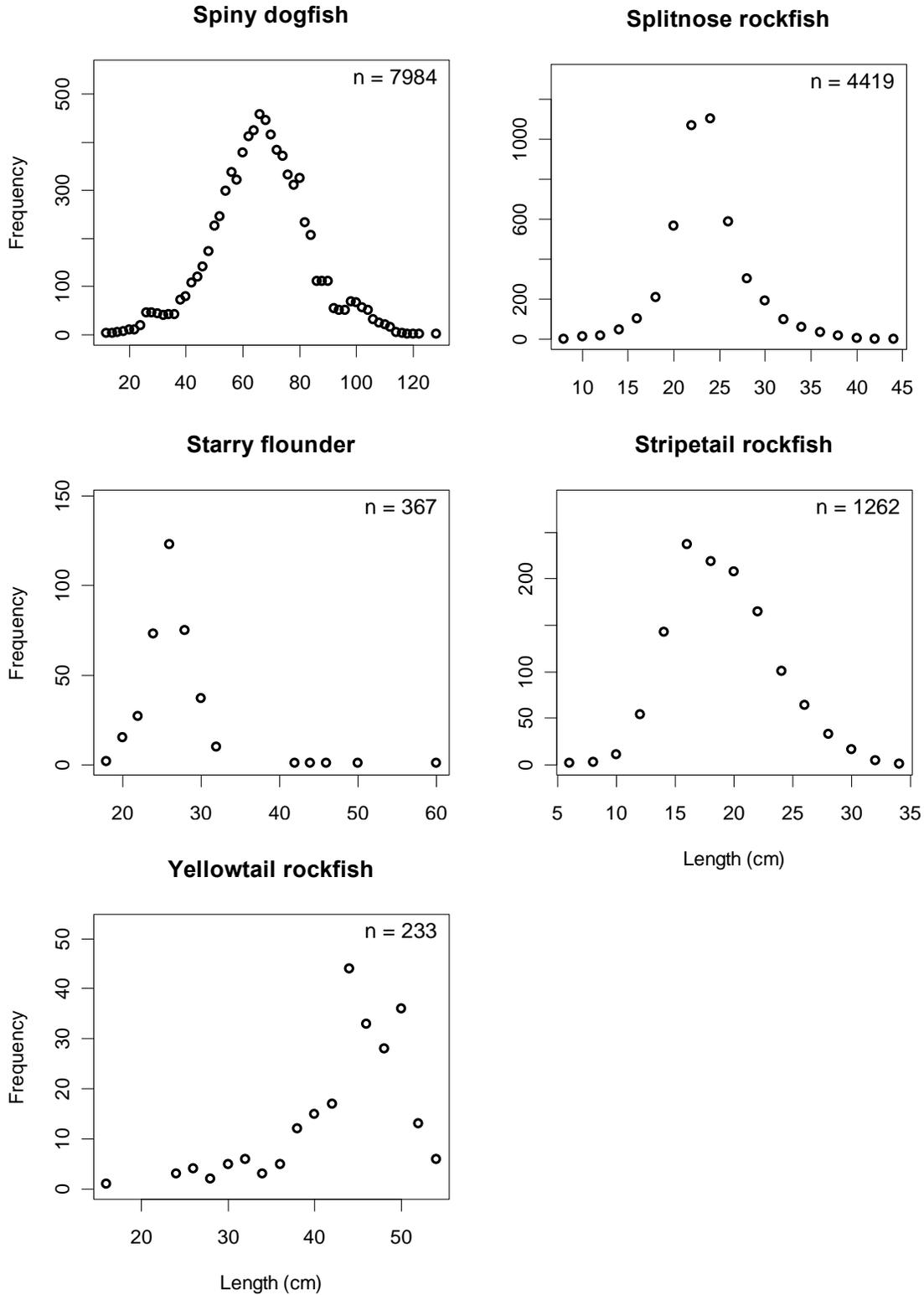


Figure 5 continued. Length frequency distributions of discarded (non-rebuilding) groundfish species observed in the limited entry groundfish bottom trawl fishery from September 2003 – April 2010. Plots are provided for groundfish species for which at least 100 length measurements are available.



Tables

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

Table 1. Total trips, tows, vessels, and groundfish landings observed in the limited entry groundfish bottom trawl fishery in 2009 (above) and January through April 2010 (below). Coverage rates (last column on right) for each port group and management area are computed as the proportion of total FMP groundfish landings (excluding Pacific hake) that were observed. Data are combined as needed to ensure confidentiality.

	Port Group	Number of observed trips	Number of observed tows	Number of observed vessels	Observed groundfish landings (mt)	Total groundfish landings (mt)	% of total groundfish landings observed
2009	Bellingham	27	264	4	394.3	1349.2	29%
	Neah Bay						
	Astoria	156	1769	26	2415.7	9773.1	25%
	Newport	87	749	21	951.5	3772.7	25%
	Coos Bay	113	670	18	1073.5	3618.4	30%
	Crescent City	68	356	14	571.2	2181.1	26%
	Eureka	35	169	7	310.5	2678.6	12%
	Fort Bragg	49	287	7	401.0	1733.3	23%
	San Francisco	42	207	5	147.6	661.7	22%
	Monterey	20	102	4	84.1	391.4	21%
	Morro Bay						
	San Francisco	--	--	--	--	--	--
	Los Angeles	--	--	--	--	--	--
	North of 40°10' N	486	3970	85	5705.7	23373.1	24%
	South of 40°10' N	113	603	18	643.6	2786.3	23%
	Coastwide total	597	4573	106	6349.3	26159.5	24%
Jan - Apr 2010	Bellingham	6	41	3	134.8	546.9	25%
	Neah Bay	--	--	--	--	--	--
	Astoria	35	324	12	700.8	3154.8	22%
	Newport	16	148	5	203.1	1174.4	17%
	Coos Bay	14	82	4	222.0	1512.9	15%
	Crescent City	18	81	4	150.2	1316.9	11%
	Eureka						
	Fort Bragg	25	154	4	78.6	628.2	13%
	San Francisco						
	Monterey	--	--	--	--	88.6	--
	Morro Bay	--	--	--	--	--	--
	Santa Barbara	--	--	--	--	--	--
	Los Angeles	--	--	--	--	--	--
	North of 40°10' N	89	671	27	1401.7	7706.0	18%
	South of 40°10' N	27	159	5	87.8	716.9	12%
	Coastwide total	114	830	32	1489.5	8422.8	18%

Note: The number of trips and vessels north and south of 40°10' N. latitude do not sum to coastwide totals because some vessels fish in both areas on the same trip. Also, any hauls that are lacking spatial information are included in coastwide and port group totals only.

Table 2. Number of tows and retained weight (mt) of FMP groundfish species (excluding Pacific hake) from observer and logbook data for the 2009 limited entry groundfish bottom trawl fishery by depth, season, and management area. Tows targeting California halibut have been removed from both observer and logbook data. Winter season is January-April and November-December and summer season is May-October. Data are combined as needed to ensure adequate sample size.

Depth interval (fathoms)	NORTH of 40°10' N Lat.				SOUTH of 40°10' N Lat.			
	Number of tows		Retained groundfish (mt)		Number of tows		Retained groundfish (mt)	
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Observed fleet								
0-125	96	1011	49.4	725.0		156		78.8
126-250	528	463	1049.0	770.0	72	105	71.5	142.0
> 250	1003	713	1791.5	1040.8	114	120	155.4	171.6
Total	1627	2187	2889.9	2535.8	186	381	226.8	392.4
All trawl logbooks								
0-125	427	3808	165.3	2742.1		629		174.6
126-250	2294	2334	4600.9	4022.5	587	381	529.3	442.5
> 250	3794	3168	6868.6	4385.9	442	538	584.6	767.8
Total	6515	9310	11634.7	11150.5	1029	1548	1113.9	1384.9
Percentage observed								
0-125	22%	27%	30%	26%		25%		45%
126-250	23%	20%	23%	19%	12%	28%	13%	32%
> 250	26%	23%	26%	24%	26%	22%	27%	22%
Total	25%	23%	25%	23%	18%	25%	20%	28%

Table 3a. Observed catch weight (mt), discard weight (mt), and percent discarded from observed vessels in the 2009 limited entry groundfish bottom trawl fishery by management area. Rebuilding, non-rebuilding, and non-groundfish species are presented alphabetically. Retained weights were grouped when species-specific information was unavailable or grouped on fish tickets and did not allow for a species-specific comparison of total catch versus discard.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Rebuilding species						
Bocaccio	0.02	0.02	86.1%	5.59	4.78	85.4%
Canary rockfish	2.29	1.53	66.7%	0.27	0.02	8.2%
Cowcod	--	--	--	0.13	0.13	100.0%
Darkblotched rockfish	52.13	29.95	57.5%	2.95	0.06	2.1%
Pacific ocean perch	36.44	18.38	50.4%	0.00	--	0.0%
Widow rockfish	3.45	2.89	83.7%	3.63	3.29	90.6%
Yelloweye rockfish	0.01	0.01	71.3%	0.00	0.00	100.0%
Non-rebuilding species						
Arrowtooth flounder	1303.93	358.42	27.5%	3.47	3.01	86.9%
Big skate	18.10	18.06	99.8%	1.39	1.18	85.1%
Black rockfish	0.08	0.06	78.7%	0.11	--	0.0%
Bronzespotted rockfish	0.00	0.00	100.0%	--	--	--
Cabezon	0.01	0.00	43.7%	--	--	--
California skate	0.07	0.07	100.0%	1.03	1.03	100.0%
Chilipepper rockfish	1.07	0.46	43.3%	80.47	22.09	27.5%
Dover sole	2515.64	129.55	5.1%	286.40	48.06	16.8%
English sole	80.40	33.83	42.1%	12.13	3.10	25.5%
Flatfish	201.16	117.75	58.5%	31.55	15.32	48.5%
Butter sole		0.36			0.00	
Curlfin turbot		0.07			0.32	
Deepsea sole		6.60			1.76	
Greenland turbot		0.00			--	
Hornyhead turbot		--			0.01	
Pacific sanddab		96.82			12.63	
Rock sole		0.13			0.25	
Sand sole		0.36			0.01	
Slender sole		8.67			0.18	
Unspecified flatfish		2.67			0.08	
Unspecified sanddab		2.08			0.09	
Flathead sole	1.30	0.48	36.9%	--	--	--
Greenspotted rockfish	0.01	0.01	100.0%	0.02	0.02	100.0%
Greenstriped rockfish	3.72	3.72	99.9%	0.41	0.41	100.0%
Grenadier	83.98	65.15	77.6%	15.96	7.63	47.8%
California grenadier		1.36			0.68	
Filamented grenadier		0.00			--	
Giant grenadier		43.01			3.42	
Pacific grenadier		20.15			3.03	
Popeye grenadier		0.01			--	
Smooth grenadier		0.00			--	
Unspecified grenadier		0.63			0.50	
Kelp greenling	0.01	0.01	100.0%	0.00	0.00	100.0%
Lingcod	44.70	26.14	58.5%	10.76	6.09	56.6%

Table 3a continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-rebuilding species (cont.)						
Longnose skate	258.07	78.64	30.5%	43.03	38.76	90.1%
Nearshore rockfish	0.09	0.02	18.5%	0.01	0.00	0.0%
Brown rockfish		--			--	
Copper rockfish		--			--	
Quillback rockfish		0.02			--	
Unspecified nearshore rockfish		--			--	
Other unspecified roundfish	0.00	0.00	100.0%	0.06	0.06	100.0%
Pacific cod	29.70	1.40	4.7%	--	--	--
Pacific flatnose	1.68	1.68	100.0%	0.69	0.69	100.0%
Pacific hake	182.80	182.45	99.8%	29.96	29.96	100.0%
Petrale sole	345.83	50.99	14.7%	62.47	1.74	2.8%
Red Irish lord sculpin	0.00	0.00	100.0%	--	--	--
Rex sole	152.27	33.09	21.7%	7.54	3.15	41.7%
Rosy rockfish	0.03	0.03	100.0%	0.00	0.00	100.0%
Sablefish	684.27	76.08	11.1%	94.53	3.85	4.1%
Shelf rockfish	6.30	3.46	54.9%	5.00	4.54	90.8%
Chameleon rockfish		0.00			--	
Greenblotched rockfish		--			0.00	
Halfbanded rockfish		--			0.01	
Pygmy rockfish		0.00			0.00	
Redstripe rockfish		0.15			0.02	
Rosethorn rockfish		0.87			0.04	
Shortbelly rockfish		--			2.11	
Silvergray rockfish		0.05			--	
Stripetail rockfish		0.57			2.37	
Vermilion rockfish		--			0.00	
Unspecified shelf rockfish		1.82			0.00	
Skates	221.59	27.76	12.5%	11.57	4.65	40.2%
Aleutian skate		0.68			0.01	
Black skate		8.32			1.88	
Deepsea skate		0.17			0.02	
Pacific electric ray		0.40			0.17	
Sandpaper skate		17.73			2.51	
Starry skate		0.01			0.04	
Unspecified ray		0.02			--	
Unspecified skate		0.44			0.02	
Slope rockfish	99.59	50.25	50.5%	79.96	30.29	37.9%
Aurora rockfish		8.34			0.85	
Bank rockfish		0.00			0.02	
Blackgill rockfish		0.41			0.03	
Redbanded rockfish		1.31			0.05	
Rougheye rockfish		11.09			0.00	
Sharpchin rockfish		1.39			1.28	
Shortraker rockfish		1.73			0.00	
Shortraker/rougheye rockfish		0.16			--	
Splitnose rockfish		16.33			27.08	
Yellowmouth rockfish		0.02			--	
Unspecified slope rockfish		9.47			0.98	
Soupin shark	0.02	--	0.0%	0.35	--	0.0%
Spiny dogfish	126.30	119.46	94.6%	23.12	16.93	73.2%
Spotted ratfish	29.63	29.63	100.0%	7.40	7.40	100.0%

Table 3a continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-rebuilding species (cont.)						
Starry flounder	3.25	0.56	17.2%	0.00	0.00	100.0%
Swordspine rockfish	0.00	0.00	100.0%	0.01	0.01	100.0%
Thornyheads	668.81	131.68	19.7%	88.82	13.96	15.7%
Longspine Thornyhead		93.56			12.93	
Shortspine Thornyhead		27.34			0.69	
Mixed thornyheads		10.78			0.33	
Unspecified greenling	0.00	0.00	100.0%	--	--	--
Yellowtail rockfish	6.46	2.58	39.9%	0.11	--	0.0%
Non-groundfish species						
Albacore tuna	0.02	--	0.0%	--	--	--
American shad	0.48	0.48	100.0%	0.16	0.16	100.0%
Anchovy (unidentified)	0.00	0.00	100.0%	0.00	0.00	100.0%
Angulatus tanner crab	0.03	0.03	100.0%	--	--	--
Armored box crab	0.00	0.00	100.0%	0.12	0.12	100.0%
Bairdi tanner crab	0.00	0.00	100.0%	--	--	--
Barracudina (unidentified)	0.00	0.00	100.0%	--	--	--
Bearded eelpout	--	--	--	0.00	0.00	100.0%
Bigfin eelpout	0.28	0.28	100.0%	0.19	0.19	100.0%
Bigscale (unidentified)	0.00	0.00	100.0%	--	--	--
Bivalves (unidentified)	0.00	0.00	100.0%	--	--	--
Black eelpout	0.00	0.00	100.0%	0.01	0.01	100.0%
Black hagfish	0.00	0.00	100.0%	--	--	--
Blackedge poacher	0.01	0.01	100.0%	--	--	--
Blob sculpin	0.05	0.05	100.0%	0.02	0.02	100.0%
Brown box crab	0.51	0.51	100.0%	0.36	0.36	100.0%
Brown cat shark	15.86	15.86	100.0%	2.27	2.27	100.0%
Brown smoothhound shark	--	--	--	0.02	0.02	100.0%
California halibut	0.01	0.01	100.0%	0.01	0.01	100.0%
California king crab	0.00	0.00	100.0%	0.01	0.01	100.0%
California slickhead	5.60	5.60	100.0%	1.66	1.66	100.0%
California tonguefish	0.00	0.00	100.0%	--	--	--
Capelin	0.01	0.01	100.0%	--	--	--
Cat shark (unidentified)	0.20	0.20	100.0%	--	--	--
Common thresher shark	0.00	0.00	100.0%	--	--	--
Crab (unidentified)	0.00	0.00	100.0%	0.00	0.00	100.0%
Daggertooth	0.00	0.00	100.0%	0.00	0.00	100.0%
Decorator/spider crab (unidentified)	0.00	0.00	100.0%	0.00	0.00	100.0%
Dragonfish (unidentified)	0.00	0.00	100.0%	--	--	--
Dungeness crab	42.35	42.35	100.0%	6.16	6.16	100.0%
Eelpout (unidentified)	7.86	7.86	100.0%	0.79	0.79	100.0%
Eulachon	0.00	0.00	100.0%	--	--	--
Fangtooth	0.00	0.00	100.0%	--	--	--
Filetail cat shark	--	--	--	0.16	0.16	100.0%
Giant wrymouth	0.01	0.01	100.0%	--	--	--
Green sturgeon	0.24	0.20	84.9%	0.00	0.00	100.0%
Gunnel (unidentified)	0.00	0.00	100.0%	--	--	--
Hachetfish (unidentified)	0.00	0.00	100.0%	--	--	--
Hagfish (unidentified)	0.01	0.01	100.0%	--	--	--
Hair crab	0.02	0.02	100.0%	--	--	--
Hermit crab (unidentified)	0.01	0.01	100.0%	0.00	0.00	100.0%
Jackmackerel	0.00	0.00	100.0%	0.02	0.02	100.0%
Jellyfish (unidentified)	0.63	0.63	100.0%	0.04	0.04	100.0%
Kelp crab (unidentified)	0.00	0.00	100.0%	--	--	--
King (Chinook) salmon	0.08	0.08	100.0%	0.04	0.04	100.0%

Table 3a continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-groundfish species (cont.)						
King of the salmon	0.02	0.02	100.0%	--	--	--
King crab (unidentified)	0.10	0.10	100.0%	0.00	0.00	100.0%
Lancetfish (unidentified)	0.04	0.04	100.0%	0.00	0.00	100.0%
Laternfish (unidentified)	0.01	0.01	100.0%	0.00	0.00	100.0%
Long-armed spider crab	0.00	0.00	100.0%	--	--	--
Longnose cat shark	0.22	0.22	100.0%	0.29	0.29	100.0%
Longnose lancetfish	0.02	0.02	100.0%	--	--	--
Longspine combfish	0.00	0.00	100.0%	0.08	0.08	100.0%
Lyre crab (unidentified)	0.00	0.00	100.0%	--	--	--
Market squid	0.05	--	0.0%	0.14	--	0.0%
Mackerel (unidentified)	0.00	0.00	100.0%	0.00	0.00	100.0%
Midshipman (unidentified)	0.39	0.39	100.0%	0.01	0.01	100.0%
Mola mola (sunfish)	0.04	0.04	100.0%	0.01	0.01	100.0%
Octopus (unidentified)	1.85	1.18	63.9%	0.34	0.28	81.3%
Other fish (unidentified)	5.59	0.39	6.9%	0.01	0.01	93.6%
Oxeye oreo	0.00	0.00	100.0%	--	--	--
Pacific hagfish	0.00	0.00	100.0%	0.00	0.00	100.0%
Pacific halibut	89.90	89.89	100.0%	1.49	1.49	100.0%
Pacific herring	0.01	0.01	100.0%	0.00	0.00	100.0%
Pacific lamprey	0.00	0.00	100.0%	--	--	--
Pacific mackerel	0.00	0.00	100.0%	0.03	0.03	100.0%
Pacific rock crab	--	--	--	0.00	0.00	100.0%
Pacific sandlance	0.01	0.01	100.0%	--	--	--
Pacific sardine	0.08	0.08	100.0%	0.00	0.00	100.0%
Pacific saury	0.00	0.00	100.0%	--	--	--
Pacific scabbardfish	0.00	0.00	100.0%	0.00	0.00	100.0%
Pacific sleeper shark	0.74	0.74	100.0%	0.46	0.46	100.0%
Pacific staghorn sculpin	0.04	0.04	100.0%	0.00	0.00	100.0%
Pacific tom cod	0.01	0.01	100.0%	--	--	--
Pacific viperfish	0.00	0.00	100.0%	0.00	0.00	100.0%
Paperbone (unidentified)	0.00	0.00	100.0%	--	--	--
Pink (Humbuck) salmon	--	--	--	0.00	0.00	100.0%
Pink surfperch	--	--	--	0.04	0.04	100.0%
Plainfin midshipman	0.01	0.01	100.0%	0.00	0.00	100.0%
Poacher (unidentified)	0.04	0.04	100.0%	0.00	0.00	100.0%
Prickleback (unidentified)	0.02	0.02	100.0%	--	--	--
Prowfish	0.02	0.02	100.0%	--	--	--
Ragfish	0.04	0.04	100.0%	--	--	--
Red rock crab	--	--	--	0.01	0.01	100.0%
Scaleless dragonfish (unidentified)	0.00	0.00	100.0%	--	--	--
Scarlet king crab	0.08	0.08	100.0%	0.00	0.00	100.0%
Sculpin (unidentified)	0.58	0.58	100.0%	0.01	0.01	100.0%
Sea cucumber (unidentified)	0.47	0.47	100.0%	0.00	0.00	100.0%
Sevengill shark	0.02	0.02	100.0%	--	--	--
Shark (unidentified)	2.13	2.13	99.9%	0.57	0.33	57.9%
Shiner surfperch	0.00	0.00	100.0%	--	--	--
Shrimp (unidentified)	0.02	0.02	100.0%	0.04	0.03	72.9%
Sixgill shark	0.01	0.01	100.0%	0.08	0.08	100.0%
Slender codling	0.00	0.00	100.0%	--	--	--
Slickhead (unidentified)	0.05	0.05	100.0%	0.00	0.00	100.0%
Smelt (unidentified)	0.00	0.00	100.0%	--	--	--
Snailfish (unidentified)	1.64	1.64	100.0%	0.10	0.10	100.0%

Table 3a continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-groundfish species (cont.)						
Snakehead eelpout	0.00	0.00	100.0%	0.00	0.00	100.0%
Snipe eel (unidentified)	0.00	0.00	100.0%	--	--	--
Specklefin midshipman	0.02	0.02	100.0%	0.00	0.00	100.0%
Spiky king crab	0.00	0.00	100.0%	--	--	--
Spiny king crab	--	--	--	0.01	0.01	100.0%
Spiny lithode crab	0.00	0.00	100.0%	--	--	--
Spotted cusk-eel	0.00	0.00	100.0%	0.00	0.00	100.0%
Squid (unidentified)	24.27	16.29	67.1%	4.43	1.79	40.4%
Stone coral	0.02	0.02	100.0%	--	--	--
Surf smelt	0.00	0.00	100.0%	--	--	--
Surfperch (unidentified)	0.01	0.01	100.0%	0.01	0.01	100.0%
Tanner crab	2.91	2.91	100.0%	0.25	0.25	100.0%
Tanner crab (unidentified)	7.04	7.04	100.0%	--	--	--
Tanneri tanner crab	90.21	90.21	100.0%	21.40	20.85	97.4%
Threadfin sculpin	0.02	0.02	100.0%	0.01	0.01	100.0%
Threadfin slickhead	0.42	0.42	100.0%	0.04	0.04	100.0%
Tubeshoulder (unidentified)	0.02	0.02	100.0%	0.39	0.39	100.0%
Twoline eelpout	0.31	0.31	100.0%	0.46	0.46	100.0%
Urchin (unidentified)	4.42	4.42	100.0%	0.28	0.28	100.0%
Viperfish (unidentified)	0.00	0.00	100.0%	--	--	--
Walleye pollock	0.16	0.16	100.0%	--	--	--
White croaker	--	--	--	0.02	0.02	100.0%
Whitebait smelt	0.00	0.00	100.0%	--	--	--
Whitebarred prickleback	0.00	0.00	100.0%	--	--	--
Wolf-eel	0.03	0.02	67.6%	0.02	0.02	100.0%
Wrymouth (unidentified)	0.01	0.01	100.0%	--	--	--

Table 3b. Observed catch weight (mt), discard weight (mt), and percent discarded from observed vessels in the January through April 2010 limited entry groundfish bottom trawl fishery by management area.

Rebuilding, non-rebuilding, and non-groundfish species are presented alphabetically. Retained weights were grouped when species-specific information was unavailable or grouped on fish tickets and did not allow for a species-specific comparison of total catch versus discard.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Rebuilding species						
Bocaccio	--	--	--	0.76	0.76	100.0%
Canary rockfish	0.00	0.00	100.0%	0.04	0.00	0.0%
Cowcod	--	--	--	--	--	--
Darkblotched rockfish	20.64	8.51	41.2%	0.19	0.02	13.1%
Pacific ocean perch	5.97	0.40	6.8%	--	--	--
Widow rockfish	0.30	0.01	3.8%	0.23	0.00	0.0%
Yelloweye rockfish	--	--	--	0.00	0.00	0.0%
Non-rebuilding species						
Arrowtooth flounder	249.28	54.86	22.0%	0.25	0.25	100.0%
Big skate	--	--	--	0.10	0.09	89.0%
California skate	--	--	--	0.35	0.35	100.0%
Chilipepper rockfish	--	--	--	16.89	1.79	10.6%
Dover sole	746.73	24.84	3.3%	24.34	2.95	12.1%
English sole	5.02	0.34	6.8%	2.93	1.21	41.3%
Flatfish	5.03	5.03	100.0%	12.57	5.70	45.3%
Curlfin turbot		--			0.01	
Deepsea sole		1.85			0.49	
Flathead sole		0.01			--	
Hornyhead turbot		--			0.00	
Pacific sanddab		--			4.82	
Rock sole		--			0.02	
Slender sole		0.24			0.35	
Unspecified flatfish		2.93			--	
Unspecified sanddab		--			0.00	
Greenspotted rockfish	--	--	--	0.01	0.00	42.3%
Greenstriped rockfish	0.00	0.00	100.0%	0.22	0.22	100.0%
Grenadier	13.50	12.03	89.1%	3.91	3.91	100.0%
California grenadier		0.02			0.06	
Giant Grenadier		6.22			1.50	
Pacific Grenadier		5.61			2.35	
Popeye Grenadier		0.00			--	
Smooth Grenadier		0.00			--	
Unspecified grenadier		0.18			--	
Lingcod	2.55	0.64	25.1%	0.43	0.19	44.2%
Longnose skate	61.90	9.65	15.6%	5.90	4.19	71.0%
Nearshore rockfish	0.01	0.00	0.0%	0.01	0.00	0.0%
Quillback rockfish		0.00			--	
Olive rockfish		--			0.00	
Pacific flatnose	0.70	0.70	100.0%	0.20	0.20	100.0%
Pacific cod	0.09	0.00	0.0%	0.00	0.00	100.0%
Pacific hake	19.29	17.03	88.3%	3.35	3.35	100.0%

Table 3b continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-rebuilding species (cont.)						
Petrale sole	91.08	11.68	12.8%	6.35	0.40	6.3%
Rex sole	18.19	1.62	8.9%	2.54	1.59	62.6%
Rosy rockfish	0.00	0.00	100.0%	--	--	--
Sablefish	133.81	26.67	19.9%	15.53	2.47	15.9%
Shelf rockfish	0.80	0.21	25.7%	3.25	3.25	99.9%
Halfbanded rockfish		--			0.00	
Redstripe rockfish		0.00			--	
Rosethorn rockfish		0.15			--	
Shortbelly rockfish		--			0.65	
Silvergray rockfish		0.05			--	
Stripetail rockfish		0.00			2.59	
Unspecified shelf rockfish		0.36			0.00	
Vermilion rockfish		0.00			--	
Skates	51.14	7.05	13.8%	1.70	1.34	78.9%
Aleutian skate		0.43			--	
Black skate		3.45			0.63	
Deepsea skate		0.05			--	
Pacific electric ray		--			0.08	
Sandpaper skate		2.50			0.62	
Unspecified skate		0.61			0.01	
Slope rockfish	21.94	4.81	21.9%	3.40	2.40	70.5%
Aurora rockfish		0.57			0.01	
Bank rockfish		--			0.00	
Blackgill rockfish		0.07			0.00	
Redbanded rockfish		0.12			0.02	
Rougheye rockfish		0.21			--	
Sharpchin rockfish		0.18			--	
Shortraker rockfish		0.18			--	
Splitnose rockfish		3.10			2.37	
Yellowmouth rockfish		0.02			--	
Unspecified slope rockfish		0.36			0.00	
Soupin shark	--	--	--	0.05	0.00	0.0%
Spiny dogfish	37.97	37.96	100.0%	1.06	1.06	100.0%
Spotted ratfish	3.47	3.47	100.0%	2.11	2.11	100.0%
Thornyheads	158.29	29.84	18.9%	16.75	1.31	7.8%
Longspine thornyhead		23.73			0.85	
Shortspine thornyhead		4.66			0.04	
Mixed thornyheads		1.45			0.43	
Yellowtail rockfish	0.05	0.03	54.1%	0.04	0.00	0.0%
Non-groundfish species						
American shad	--	--	--	0.029	0.029	100.0%
Anglerfish (unidentified)	0.001	0.001	100.0%	--	--	--
Armored box crab	--	--	--	0.222	0.222	100.0%
Barracudina (unidentified)	0.001	0.001	100.0%	--	--	--
Bigfin eelpout	0.013	0.013	100.0%	0.058	0.058	100.0%
Black eelpout	0.001	0.001	100.0%	--	--	--
Blackedge Poacher	0.000	0.000	100.0%	--	--	--
Blob sculpin	0.073	0.073	100.0%	0.013	0.013	100.0%
Brown box crab	--	--	--	0.169	0.169	100.0%
Brown cat shark	2.211	2.211	100.0%	0.207	0.207	100.0%
California king crab	--	--	--	0.003	0.003	100.0%
California slickhead	1.551	1.551	100.0%	0.945	0.945	100.0%

Table 3b continued.

	NORTH of 40°10' N			SOUTH of 40°10' N		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-groundfish species (cont.)						
Cat shark (unidentified)	0.010	0.010	100.0%	--	--	--
Croaker (unidentified)	--	--	--	0.000	0.000	100.0%
Decomposed fish	0.728	0.728	100.0%	--	--	--
Decorator/spider crab (unidentified)	0.001	0.001	100.0%	--	--	--
Dungeness crab	0.061	0.061	100.0%	6.019	6.019	100.0%
Eelpout (unidentified)	2.215	2.215	100.0%	0.048	0.048	100.0%
Filetail cat shark	--	--	--	0.026	0.026	100.0%
Hagfish (unidentified)	0.000	0.000	100.0%	--	--	--
Hair crab	0.015	0.015	100.0%	0.000	0.000	100.0%
Hermit crab (unidentified)	0.001	0.001	100.0%	--	--	--
Jellyfish (unidentified)	0.039	0.039	100.0%	0.132	0.132	100.0%
King (Chinook) salmon	0.012	0.012	100.0%	--	--	--
King crab (unidentified)	0.008	0.008	100.0%	--	--	--
Lancetfish (unidentified)	0.004	0.004	100.0%	0.001	0.001	100.0%
Laternfish (unidentified)	0.002	0.002	100.0%	--	--	--
Longnose cat shark	0.280	0.280	100.0%	0.108	0.108	100.0%
Longnose lancetfish	0.006	0.006	100.0%	--	--	--
Longspine combfish	--	--	--	0.017	0.017	100.0%
Midshipman (unidentified)	--	--	--	0.001	0.001	100.0%
Octopus (unidentified)	0.248	0.238	96.0%	0.148	0.126	84.7%
Other nongroundfish	0.105	0.089	85.2%	0.001	0.001	100.0%
Oxeye oreo	0.000	0.000	100.0%	--	--	--
Pacific halibut	22.644	22.644	100.0%	0.019	0.019	100.0%
Pacific herring	0.000	0.000	100.0%	0.004	0.004	100.0%
Pacific mackerel	--	--	--	0.045	0.000	0.0%
Pacific scabbardfish	0.001	0.001	100.0%	--	--	--
Pacific sleeper shark	0.250	0.250	100.0%	0.021	0.021	100.0%
Pink surfperch	--	--	--	0.018	0.018	100.0%
Plainfin midshipman	--	--	--	0.051	0.051	100.0%
Poacher (unidentified)	0.005	0.005	100.0%	0.005	0.005	100.0%
Ragfish	0.127	0.127	100.0%	--	--	--
Scarlet king crab	0.023	0.023	100.0%	0.010	0.010	100.0%
Sculpin (unidentified)	0.008	0.008	100.0%	0.003	0.003	100.0%
Sea cucumber (unidentified)	0.140	0.140	100.0%	0.006	0.006	100.0%
Shark (unidentified)	0.777	0.767	98.7%	--	--	--
Shrimp (unidentified)	0.008	0.002	31.5%	0.000	0.000	100.0%
Silver (Coho) salmon	0.011	0.011	100.0%	--	--	--
Sixgill shark	0.025	0.025	100.0%	--	--	--
Slickhead (unidentified)	0.001	0.001	100.0%	--	--	--
Snailfish (unidentified)	0.419	0.419	100.0%	0.006	0.006	100.0%
Snakehead eelpout	0.001	0.001	100.0%	--	--	--
Snipe eel (unidentified)	0.000	0.000	100.0%	--	--	--
Spiny king crab	0.001	0.001	100.0%	--	--	--
Spotted cusk-eel	--	--	--	0.000	0.000	100.0%
Squid (unidentified)	0.610	0.578	94.9%	0.147	0.147	100.0%
Surfperch (unidentified)	--	--	--	0.003	0.003	100.0%
Tanner crab	1.681	1.681	100.0%	--	--	--
Tanner crab (unidentified)	2.602	2.602	100.0%	--	--	--
Tanneri tanner crab	24.632	24.632	100.0%	3.791	3.791	100.0%
Threadfin sculpin	0.002	0.002	100.0%	--	--	--
Threadfin slickhead	0.183	0.183	100.0%	0.000	0.000	100.0%
Tubeshoulder (unidentified)	0.000	0.000	100.0%	0.067	0.067	100.0%
Twoline eelpout	0.029	0.029	100.0%	0.009	0.009	100.0%
Urchin (unidentified)	0.024	0.024	100.0%	0.017	0.017	100.0%
Viperfish (unidentified)	0.003	0.003	100.0%	--	--	--
Walleye pollock	0.004	0.004	100.0%	--	--	--

Table 4a. Discard ratios and standard errors from observed trips north of 40°10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed discard weight divided by the observed weight (adjusted to fish tickets) of retained **FMP groundfish species** (excluding Pacific hake). Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Rebuilding species	Season	Denominator = Retained groundfish (mt)					
Bocaccio	winter	0.0000	NA	--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Canary rockfish	winter	0.0012	0.0254	0.0000	0.0156	0.0000	NA
	summer	0.0020	0.0500	--	NA	--	NA
Darkblotched rockfish	winter	0.0005	0.0284	0.0140	0.0565	0.0006	0.0052
	summer	0.0034	0.0411	0.0150	0.1299	0.0002	0.0034
Pacific ocean perch	winter	0.0000	0.0066	0.0126	0.1310	0.0014	0.0693
	summer	0.0003	0.0361	0.0027	0.0264	0.0004	0.0103
Widow rockfish	winter	0.0014	0.9943	0.0023	0.2203	0.0000	0.0022
	summer	0.0002	0.0403	0.0003	0.1124	0.0000	0.0011
Yelloweye rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0311	--	NA	--	NA
Non-rebuilding species		Denominator = Retained groundfish (mt)					
Arrowtooth flounder	winter	0.0646	0.3403	0.0449	0.1788	0.0131	0.0893
	summer	0.2912	1.0454	0.0405	0.1739	0.0407	0.2415
Big skate	winter	0.0330	0.1783	0.0000	0.0352	0.0000	0.0197
	summer	0.0223	0.1360	0.0000	0.0223	0.0001	0.1817
Black rockfish (North of 46°16' N. lat.)	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0483	--	NA	--	NA
Black rockfish (South of 46°16' N. lat.)	winter	--	NA	0.0000	NA	--	NA
	summer	0.0000	NA	0.0000	NA	--	NA
Cabezon (Oregon)	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0076	0.0000	NA	--	NA
California skate	winter	--	NA	--	NA	0.0000	0.0346
	summer	0.0001	0.1368	--	NA	--	NA
Chilipepper rockfish	winter	--	NA	0.0001	0.1184	--	NA
	summer	0.0004	0.4066	--	NA	--	NA
Dover sole	winter	0.0079	0.0483	0.0153	0.0950	0.0257	0.0703
	summer	0.0440	0.1203	0.0069	0.0418	0.0287	0.0821
English sole	winter	0.0627	0.1444	0.0007	0.0138	0.0000	0.0013
	summer	0.0413	0.0833	0.0001	0.0031	--	NA
Greenspotted rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0180	--	NA	--	NA
Greenstriped rockfish	winter	0.0007	0.1125	0.0001	0.0426	0.0000	0.0021
	summer	0.0047	0.0595	0.0001	0.0726	0.0000	0.2937
Grenadiers	winter	--	NA	0.0000	0.0006	0.0041	0.0309
	summer	--	NA	0.0000	0.0029	0.0142	0.1057
Kelp greenling	winter	--	NA	--	NA	0.0000	NA
	summer	0.0000	0.0134	--	NA	--	NA
Lingcod (Washington/Oregon)	winter	0.0211	0.1613	0.0007	0.0199	0.0001	0.0062
	summer	0.0332	0.1057	0.0001	0.0111	0.0000	0.0000
Lingcod (California)	winter	--	NA	0.0000	0.0040	0.0000	0.0239
	summer	0.0001	0.0111	--	NA	--	NA
Longnose skate	winter	0.0825	0.3521	0.0154	0.0356	0.0059	0.0194
	summer	0.0426	0.0730	0.0156	0.0430	0.0047	0.0157
Longspine thornyhead	winter	0.0000	NA	0.0010	0.0105	0.0284	0.0465
	summer	--	NA	0.0018	0.0070	0.0387	0.0653
Mixed thornyheads	winter	--	NA	0.0001	0.0210	0.0030	0.2811
	summer	--	NA	0.0002	0.2667	0.0049	0.9277

Table 4a continued.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Non-rebuilding species (cont.)	Season	Denominator = Retained groundfish (mt)					
Other flatfish	winter	0.1984	0.2580	0.0027	0.0156	0.0005	0.0032
	summer	0.1652	0.0998	0.0027	0.0248	0.0006	0.0026
Other groundfish	winter	0.0207	0.1090	0.0053	0.0315	0.0009	0.0099
	summer	0.0237	0.0505	0.0049	0.0287	0.0022	0.0214
Other nearshore rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0244	--	NA	--	NA
Other shelf rockfish	winter	0.0000	0.0029	0.0013	0.0492	0.0000	0.0014
	summer	0.0021	0.0919	0.0004	0.0083	0.0000	0.0019
Other slope rockfish	winter	0.0000	0.0073	0.0075	0.0172	0.0016	0.0114
	summer	0.0003	0.0145	0.0258	0.1240	0.0015	0.0053
Pacific cod (North of 43° N. lat.)	winter	0.0005	0.0046	0.0000	0.0008	--	NA
	summer	0.0019	0.0340	--	NA	--	NA
Pacific hake	winter	0.0043	0.1956	0.0264	0.0872	0.0174	0.0742
	summer	0.0566	0.7867	0.0582	0.1808	0.0360	0.1261
Petrale sole	winter	0.0214	0.0568	0.0057	0.0909	0.0031	0.1620
	summer	0.0530	0.0896	0.0000	0.0016	--	NA
Redstripe rockfish	winter	--	NA	0.0001	0.0353	0.0000	NA
	summer	0.0001	0.1111	0.0000	0.0070	--	NA
Sablefish (North of 36° N. lat.)	winter	0.0625	0.8172	0.0109	0.0413	0.0088	0.0192
	summer	0.0521	0.1394	0.0020	0.0085	0.0062	0.0420
Sharpchin rockfish	winter	0.0000	NA	0.0007	0.0970	0.0000	0.0104
	summer	0.0006	0.1607	0.0003	0.0613	0.0000	0.0212
Shortspine thornyhead	winter	0.0003	0.3456	0.0033	0.0089	0.0023	0.0052
	summer	0.0004	0.0116	0.0168	0.0273	0.0061	0.0134
Silvergray rockfish	winter	--	NA	0.0000	0.0106	0.0000	NA
	summer	0.0000	0.1898	0.0000	NA	--	NA
Spiny dogfish	winter	0.2102	1.1186	0.0572	0.1848	0.0073	0.0771
	summer	0.0365	0.3864	0.0077	0.0490	0.0034	0.0826
Splitnose rockfish	winter	0.0001	0.0071	0.0080	0.0471	0.0007	0.0422
	summer	0.0003	0.0611	0.0078	0.0675	0.0005	0.0223
Starry flounder	winter	0.0000	0.0044	--	NA	--	NA
	summer	0.0008	0.0130	--	NA	--	NA
Unspecified skate	winter	--	NA	0.0001	0.0018	0.0001	0.0023
	summer	0.0006	0.0114	0.0003	0.0050	0.0001	0.0015
Yellowmouth rockfish	winter	--	NA	0.0000	0.0264	0.0000	NA
	summer	--	NA	0.0000	NA	--	NA
Yellowtail rockfish	winter	0.0044	0.0782	0.0000	0.0014	--	NA
	summer	0.0032	0.0585	--	NA	--	NA
Non-groundfish species		Denominator = Retained groundfish (mt)					
California halibut	winter	--	NA	0.0000	NA	--	NA
	summer	--	NA	--	NA	--	NA
Dungeness crab	winter	0.0872	0.3366	0.0002	0.0274	0.0000	0.0153
	summer	0.0521	0.1211	0.0001	0.0159	--	NA
Eulachon	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0086	--	NA	--	NA
Other non-FMP flatfish	winter	0.0010	0.0208	0.0005	0.0100	0.0021	0.0055
	summer	0.0109	0.0462	0.0003	0.0031	0.0027	0.0071
Other non-FMP skate	winter	0.0190	0.1731	0.0054	0.0114	0.0045	0.0084
	summer	0.0036	0.0211	0.0063	0.0169	0.0044	0.0102
Other nongroundfish	winter	0.0533	0.1269	0.0437	0.0372	0.0249	0.0095
	summer	0.0448	0.0514	0.0259	0.0181	0.0498	0.0218
Tanner crab	winter	0.0001	NA	0.0020	0.0234	0.0343	0.0514
	summer	0.0000	0.2066	0.0015	0.0085	0.0341	0.0580

Table 4b. Discard ratios and standard errors from observed trips south of 40° 10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed discard weight divided by the observed weight (adjusted to fish tickets) of **retained FMP groundfish species** (excluding Pacific hake). Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C. Columns with darker shading signify that data were combined across more than one depth interval.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Rebuilding species	Season	Denominator = Retained groundfish (mt)					
Bocaccio	winter			0.0065	0.1814	--	NA
	summer	0.0214	0.3667	0.0169	0.4003	0.0013	0.4332
Canary rockfish	winter			0.0000	0.0102	--	NA
	summer	0.0000	0.0022	0.0001	0.0567	--	NA
Cowcod	winter			0.0001	0.0068	--	NA
	summer	0.0001	0.0222	0.0008	0.0891	--	NA
Darkblotched rockfish	winter			0.0001	0.0021	--	NA
	summer	0.0000	0.0034	0.0003	0.0039	0.0001	0.0286
Widow rockfish	winter			0.0026	0.1312	--	NA
	summer	0.0011	0.1091	0.0213	0.8870	--	NA
Yelloweye rockfish	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Non-rebuilding species		Denominator = Retained groundfish (mt)					
Arrowtooth flounder	winter			0.0099	0.2492	0.0011	0.0546
	summer	0.0011	0.0223	0.0111	0.0871	0.0028	0.1031
Bank rockfish	winter			0.0000	0.0006	--	NA
	summer	--	NA	0.0001	0.0052	0.0000	0.0007
Big skate	winter			--	NA	--	NA
	summer	0.0150	0.2924	--	NA	--	NA
Black rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Blackgill rockfish	winter			0.0001	0.0022	0.0000	0.0019
	summer	--	NA	0.0001	0.0026	0.0001	0.0043
California skate	winter			0.0012	0.0600	--	NA
	summer	0.0117	0.0698	--	NA	0.0001	NA
Chilipepper rockfish	winter			0.0093	0.1189	--	NA
	summer	0.1164	1.0185	0.0863	1.5888	0.0000	0.0250
Dover sole	winter			0.0260	0.1850	0.1082	0.3551
	summer	0.0106	0.0822	0.0446	0.3340	0.1295	0.3335
English sole	winter			0.0048	0.0311	--	NA
	summer	0.0287	0.0510	0.0034	0.0355	0.0000	0.0033
Greenspotted rockfish	winter			--	NA	--	NA
	summer	0.0002	0.0269	0.0000	0.0109	--	NA
Greenstriped rockfish	winter			0.0006	0.0468	--	NA
	summer	0.0045	0.1120	0.0001	0.0097	--	NA
Grenadiers	winter			--	NA	0.0142	0.1035
	summer	--	NA	0.0001	0.0030	0.0116	0.0740
Kelp greenling	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Lingcod	winter			0.0001	0.0025	--	NA
	summer	0.0769	0.4889	0.0002	0.0036	--	NA
Longnose skate	winter			0.0703	0.3365	0.0490	0.2575
	summer	0.0917	0.2213	0.0560	0.2173	0.0638	0.2595
Longspine thornyhead	winter			0.0000	0.0045	0.0426	0.0875
	summer	--	NA	0.0003	0.0059	0.0365	0.0867
Mixed thornyheads	winter			--	NA	0.0021	0.6148
	summer	--	NA	--	NA	0.0001	NA

Table 4b continued.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard	SE	Discard	SE	Discard	SE
Non-rebuilding species (cont.)	Season	<i>Denominator = Retained groundfish (mt)</i>					
Other flatfish	winter			0.0075	0.0400	0.0001	0.0023
	summer	0.1786	0.2043	0.0124	0.0653	0.0007	0.0101
Other groundfish	winter			0.0131	0.1033	0.0054	0.0347
	summer	0.0256	0.1203	0.0250	0.0955	0.0047	0.0314
Other nearshore rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Other shelf rockfish	winter			0.0085	0.0847	--	NA
	summer	0.0015	0.0413	0.0111	0.1334	0.0008	0.9900
Other slope rockfish	winter			0.0126	0.1702	0.0018	0.0145
	summer	0.0000	0.0019	0.0033	0.0181	0.0013	0.0072
Pacific hake	winter			0.0690	0.4149	0.0535	0.3114
	summer	0.0896	1.8654	0.0442	0.2001	0.0197	0.1420
Petrale sole	winter			0.0097	0.0957	0.0001	0.0267
	summer	0.0115	0.0262	0.0009	0.0206	0.0000	0.0031
Sablefish (North of 36° N. lat.)	winter			0.0028	0.0305	0.0093	0.0489
	summer	0.0207	0.1826	0.0034	0.0172	0.0005	0.0031
Sablefish (South of 36° N. lat.)	winter			--	NA	0.0001	0.0163
	summer	--	NA	--	NA	--	NA
Sharpchin rockfish	winter			0.0034	0.2834	--	NA
	summer	0.0078	2.0089	0.0030	0.3040	--	NA
Shortbelly rockfish	winter			0.0027	0.5671	--	NA
	summer	0.0000	0.0274	0.0125	0.7910	0.0008	NA
Shortspine thornyhead	winter			0.0007	0.0066	0.0013	0.0051
	summer	0.0000	NA	0.0018	0.0065	0.0011	0.0058
Spiny dogfish	winter			0.0642	0.3589	0.0051	0.2958
	summer	0.0563	0.9922	0.0415	0.3561	0.0071	0.3031
Splitnose rockfish	winter			0.1530	0.8999	0.0001	0.0047
	summer	0.0000	0.0049	0.1036	0.3230	0.0082	0.2624
Starry flounder	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Unspecified skate	winter			0.0005	0.0266	--	NA
	summer	0.0015	0.0171	0.0004	0.0139	0.0002	0.0168
Yellowtail rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Non-rebuilding species	Season	<i>Denominator = Retained groundfish (mt)</i>					
California halibut	winter			--	NA	--	NA
	summer	0.0001	NA	--	NA	--	NA
Dungeness crab	winter			0.0108	0.1771	0.0000	NA
	summer	0.0659	0.2417	0.0014	0.0540	0.0000	0.0027
Eulachon	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Other non-FMP flatfish	winter			0.0007	0.0123	0.0055	0.0529
	summer	0.0009	0.0137	0.0005	0.0217	0.0052	0.0266
Other non-FMP skate	winter			0.0124	0.0927	0.0105	0.0356
	summer	0.0006	0.0566	0.0041	0.0192	0.0072	0.0186
Other nongroundfish	winter			0.0129	0.0320	0.0462	0.0287
	summer	0.0267	0.0272	0.0090	0.0171	0.0242	0.0126
Tanner crab	winter			0.0010	0.0431	0.0735	0.2114
	summer	--	NA	0.0020	0.0451	0.0543	0.1228

Table 5a. Discard ratios and standard errors from observed trips north of 40°10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed discard weight (lbs) divided by the observed **tow duration** (hrs). Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Rebuilding species	Season	Denominator = Tow duration (hrs)					
Bocaccio	winter	0.0026	NA	--	NA	--	NA
	summer	0.0178	NA	--	NA	--	NA
Canary rockfish	winter	0.5494	0.4966	0.0186	0.6857	0.0005	NA
	summer	1.3404	1.4131	--	NA	--	NA
Darkblotched rockfish	winter	0.2548	0.5490	16.0414	2.5277	0.3914	0.1595
	summer	2.2396	1.1519	11.5920	4.0549	0.1207	0.0782
Pacific ocean perch	winter	0.0028	0.1343	14.4146	5.9375	0.9554	2.1211
	summer	0.1740	1.0237	2.0649	0.8190	0.2010	0.2369
Widow rockfish	winter	0.6624	20.0706	2.6616	10.0539	0.0108	0.0665
	summer	0.1052	1.1457	0.2404	3.5367	0.0005	0.0249
Yelloweye rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0052	0.8835	--	NA	--	NA
Non-rebuilding species		Denominator = Tow duration (hrs)					
Arrowtooth flounder	winter	30.7873	6.1308	51.4031	8.0450	8.9374	2.7192
	summer	194.3538	29.1279	31.3808	5.3729	20.5494	5.4884
Big skate	winter	15.7346	2.8160	0.0219	1.6043	0.0199	0.6000
	summer	14.9136	3.6841	0.0094	0.6968	0.0706	4.1660
Black rockfish (North of 46°16' N. lat.)	winter	--	NA	0.0029	NA	--	NA
	summer	0.0058	NA	0.0375	NA	--	NA
Black rockfish (South of 46°16' N. lat.)	winter	--	NA	--	NA	--	NA
	summer	0.0162	1.3723	--	NA	--	NA
Cabezon (Oregon)	winter	--	NA	--	NA	--	NA
	summer	0.0024	0.2154	0.0009	NA	--	NA
California skate	winter	--	NA	--	NA	0.0022	1.0599
	summer	0.0633	3.8680	--	NA	--	NA
Chilipepper rockfish	winter	--	NA	0.1558	5.4065	--	NA
	summer	0.2946	11.5412	0.0000	NA	--	NA
Dover sole	winter	3.7806	0.8958	17.5253	4.2922	17.4875	2.1000
	summer	29.3666	3.3496	5.3449	1.3030	14.4991	1.8492
English sole	winter	29.8761	2.4295	0.7695	0.6268	0.0238	0.0411
	summer	27.5480	2.2704	0.0389	0.0985	--	NA
Greenspotted rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0057	0.5091	--	NA	--	NA
Greenstriped rockfish	winter	0.3425	2.2337	0.1157	1.9402	0.0005	0.0649
	summer	3.1549	1.6312	0.1104	2.2650	0.0194	6.7463
Grenadiers	winter	--	NA	0.0068	0.0284	2.8046	0.9341
	summer	--	NA	0.0259	0.0898	7.1501	2.4055
Kelp greenling	winter	--	NA	--	NA	0.0022	NA
	summer	0.0011	0.3800	--	NA	--	NA
Lingcod (Washington/Oregon)	winter	10.0277	3.1429	0.7876	0.9074	0.0369	0.1902
	summer	22.1680	2.9265	0.0890	0.3483	0.0000	0.0000
Lingcod (California)	winter	--	NA	0.0091	0.1810	0.0268	0.7320
	summer	0.0376	0.3140	--	NA	--	NA
Longnose skate	winter	39.2883	6.4583	17.6307	1.5335	4.0409	0.5753
	summer	28.4080	1.9705	12.0644	1.2948	2.3934	0.3514
Longspine thornyhead	winter	0.0056	NA	1.1412	0.4751	19.3261	1.3532
	summer	--	NA	1.3642	0.2051	19.5644	1.4391
Mixed thornyheads	winter	--	NA	0.1166	0.9563	2.0579	8.5817
	summer	--	NA	0.1500	8.3861	2.4801	21.2674

Table 5a continued.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard	SE	Discard	SE	Discard	SE
Non-rebuilding species (cont.)	Season	Denominator = Tow duration (hrs)					
Other flatfish	winter	94.4940	4.6054	3.1163	0.7070	0.3466	0.0969
	summer	110.2527	2.6677	2.1198	0.7793	0.3058	0.0589
Other groundfish	winter	9.8519	1.7981	6.0831	1.3834	0.6091	0.2966
	summer	15.8317	1.2545	3.7659	0.8475	1.1364	0.4822
Other nearshore rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0147	0.6939	--	NA	--	NA
Other shelf rockfish	winter	0.0237	0.0583	1.5299	2.2455	0.0160	0.0429
	summer	1.4159	2.6109	0.2977	0.2533	0.0055	0.0427
Other slope rockfish	winter	0.0087	0.1466	8.6272	0.7702	1.1206	0.3482
	summer	0.1692	0.4094	20.0221	3.8891	0.7687	0.1197
Pacific cod (North of 43° N. lat.)	winter	0.2150	0.0899	0.0058	0.0356	--	NA
	summer	1.2655	0.9603	--	NA	--	NA
Pacific hake	winter	2.0589	3.9008	30.2130	3.7421	11.8781	2.1911
	summer	37.7547	22.2072	45.0999	5.2870	18.1999	2.7839
Petrale sole	winter	10.2003	0.9604	6.4878	4.1430	2.1005	4.9625
	summer	35.4007	2.4379	0.0098	0.0490	--	NA
Redstripe rockfish	winter	0.0000	NA	0.0799	1.6040	0.0002	NA
	summer	0.0659	3.1511	0.0031	0.2185	--	NA
Sablefish	winter	29.7827	16.0409	12.4345	1.8350	6.0095	0.5696
	summer	34.7802	3.7925	1.5773	0.2607	3.1237	0.9615
Sharpchin rockfish	winter	0.0018	NA	0.7808	4.4274	0.0058	0.3189
	summer	0.3769	4.5166	0.2331	1.9172	0.0077	0.4862
Shortspine thornyhead	winter	0.1454	6.9801	3.8193	0.3917	1.5981	0.1552
	summer	0.2462	0.3282	13.0603	0.7908	3.0949	0.3006
Silvergray rockfish	winter	--	NA	0.0230	0.4791	0.0014	NA
	summer	0.0129	5.3940	0.0110	NA	--	NA
Spiny dogfish	winter	100.1092	20.0353	65.4700	7.7447	5.0001	2.3093
	summer	24.3897	10.8661	5.9425	1.4571	1.7131	1.8785
Splitnose rockfish	winter	0.0247	0.0792	9.1181	2.0800	0.4530	1.2907
	summer	0.2078	1.7200	6.0340	2.0697	0.2736	0.5102
Starry flounder	winter	0.0222	0.0893	--	NA	--	NA
	summer	0.5113	0.3667	--	NA	--	NA
Unspecified skate	winter	--	NA	0.0702	0.0809	0.0977	0.0716
	summer	0.3704	0.3244	0.2516	0.1562	0.0323	0.0343
Yellowmouth rockfish	winter	--	NA	0.0217	1.2005	0.0003	NA
	summer	--	NA	0.0021	NA	--	NA
Yellowtail rockfish	winter	2.1161	1.5569	0.0018	0.0645	--	NA
	summer	2.1681	1.6591	--	NA	--	NA
Non-groundfish species		Denominator = Tow duration (hrs)					
California halibut	winter	--	NA	0.0091	NA	--	NA
	summer	--	NA	--	NA	--	NA
Dungeness crab	winter	41.5432	4.6150	0.1937	1.2428	0.0070	0.4691
	summer	34.7954	3.2061	0.0533	0.4948	--	NA
Eulachon	winter	--	NA	--	NA	--	NA
	summer	0.0007	0.2449	--	NA	--	NA
Other non-FMP flatfish	winter	0.4662	0.3837	0.6051	0.4534	1.4203	0.1487
	summer	7.2568	1.2253	0.2672	0.0942	1.3499	0.1525
Other non-FMP skate	winter	9.0693	3.1972	6.1576	0.4378	3.0627	0.2240
	summer	2.4266	0.5578	4.8639	0.4668	2.2394	0.2127
Other nongroundfish	winter	25.4119	2.1992	50.0105	1.5980	16.9496	0.2559
	summer	29.8736	1.3733	20.0443	0.5210	25.1432	0.4727
Tanner crab	winter	0.0651	NA	2.2463	1.0478	23.3509	1.3123
	summer	0.0295	5.8686	1.1809	0.2470	17.2142	1.1889

Table 5b. Discard ratios and standard errors from observed trips south of 40° 10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed discard weight (lbs) divided by the observed tow duration (hrs) summarized in each strata. Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C. Columns with darker shading signify that data were combined across more than one depth interval.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Rebuilding species	Season	Denominator = Tow duration (hrs)					
Bocaccio	winter			6.0908	9.0816	--	NA
	summer	8.3469	6.3369	15.8122	16.7803	0.7591	12.5324
Canary rockfish	winter			0.0317	0.5115	--	NA
	summer	0.0088	0.0395	0.1186	2.4397	--	NA
Cowcod	winter			0.0661	0.3008	--	NA
	summer	0.0373	0.3852	0.7929	3.7544	--	NA
Darkblotched rockfish	winter			0.0772	0.1073	--	NA
	summer	0.0080	0.0588	0.2841	0.1598	0.0367	0.8288
Widow rockfish	winter			2.3848	6.3489	--	NA
	summer	0.4267	1.9499	19.9189	37.2923	--	NA
Yelloweye rockfish	winter			--	NA	--	NA
	summer	0.0007	NA	--	NA	--	NA
Non-rebuilding species		Denominator = Tow duration (hrs)					
Arrowtooth flounder	winter			9.2459	12.4369	0.4926	1.3238
	summer	0.4376	0.3530	10.3588	3.4201	1.5742	2.9542
Bank rockfish	winter			0.0074	0.0296	--	NA
	summer	--	NA	0.1242	0.2204	0.0030	0.0201
Big skate	winter			--	NA	--	NA
	summer	5.8628	4.7470	--	NA	--	NA
Black rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Blackgill rockfish	winter			0.0516	0.1110	0.0021	0.0477
	summer	--	NA	0.0614	0.1111	0.0440	0.1214
California skate	winter			1.0772	2.8101	--	NA
	summer	4.5747	0.9837	--	NA	0.0756	NA
Chilipepper rockfish	winter			8.6912	5.9058	--	NA
	summer	45.4722	17.8374	80.8474	67.6632	0.0181	0.7228
Dover sole	winter			24.2624	8.9399	48.4794	8.2695
	summer	4.1400	1.3463	41.8072	13.9881	73.7563	9.0120
English sole	winter			4.4357	1.5002	--	NA
	summer	11.2274	0.7053	3.1875	1.4669	0.0254	0.0960
Greenspotted rockfish	winter			--	NA	--	NA
	summer	0.0848	0.4758	0.0330	0.4592	--	NA
Greenstriped rockfish	winter			0.5281	2.3449	--	NA
	summer	1.7453	1.9646	0.1146	0.4044	--	NA
Grenadiers	winter			--	NA	6.3623	2.4807
	summer	--	NA	0.0775	0.1232	6.6097	2.0986
Kelp greenling	winter			--	NA	--	NA
	summer	0.0009	NA	--	NA	--	NA
Lingcod	winter			0.0990	0.1252	--	NA
	summer	30.0699	8.4535	0.1445	0.1524	--	NA
Longnose skate	winter			65.4629	14.8358	21.9581	6.0104
	summer	35.8390	3.2113	52.4355	7.9110	36.3455	7.1567
Longspine thornyhead	winter			0.0243	0.2252	19.0993	1.9735
	summer	--	NA	0.3266	0.2480	20.7765	2.3870
Mixed thornyheads	winter			--	NA	0.9257	15.0760
	summer	--	NA	--	NA	0.0376	NA

Table 5b continued.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard	SE	Discard	SE	Discard	SE
Non-rebuilding species (cont.)	Season	<i>Denominator = Tow duration (hrs)</i>					
Other flatfish	winter			7.0157	1.9220	0.0492	0.0545
	summer	69.7794	2.9595	11.6186	2.6050	0.4142	0.2909
Other groundfish	winter			12.1855	4.9206	2.4067	0.7941
	summer	10.0119	1.8505	23.4696	3.4781	2.6843	0.8729
Other nearshore rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Other shelf rockfish	winter			7.9331	4.0399	--	NA
	summer	0.6018	0.7198	10.3700	5.4502	0.4791	28.6480
Other slope rockfish	winter			11.7435	8.5857	0.8274	0.3395
	summer	0.0023	0.0342	3.1304	0.7493	0.7364	0.1987
Pacific hake	winter			64.3002	19.4745	23.9584	7.1784
	summer	35.0323	33.3722	41.4474	7.4179	11.2120	3.9788
Petrale sole	winter			9.0160	4.7847	0.0562	0.6549
	summer	4.4868	0.4047	0.7980	0.8878	0.0045	0.0904
Sablefish (North of 36° N. lat.)	winter			2.6165	1.5030	4.1544	1.1780
	summer	8.0761	3.0562	3.1701	0.6831	0.2996	0.0873
Sablefish (South of 36° N. lat.)	winter			--	NA	0.0281	0.4007
	summer	--	NA	--	NA	--	NA
Sharpchin rockfish	winter			3.1353	14.2550	--	NA
	summer	3.0366	35.9270	2.8077	12.6635	--	NA
Shortbelly rockfish	winter			2.4716	28.4186	--	NA
	summer	0.0165	0.4872	11.6906	33.6436	0.4668	NA
Shortspine thornyhead	winter			0.6676	0.3017	0.5777	0.1214
	summer	0.0009	NA	1.7109	0.2441	0.5985	0.1665
Spiny dogfish	winter			59.8415	16.4961	2.2979	7.2248
	summer	21.9975	17.5393	38.8766	14.5325	4.0351	8.7255
Splitnose rockfish	winter			142.5659	43.8288	0.0612	0.1144
	summer	0.0017	0.0877	97.0892	12.5055	4.6825	7.5767
Starry flounder	winter			--	NA	--	NA
	summer	0.0013	NA	--	NA	--	NA
Unspecified skate	winter			0.4874	1.3255	--	NA
	summer	0.5922	0.2915	0.3920	0.5944	0.1334	0.4848
Yellowtail rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	--	NA
Non-rebuilding species	Season	<i>Denominator = Tow duration (hrs)</i>					
California halibut	winter			--	NA	--	NA
	summer	0.0276	NA	--	NA	--	NA
Dungeness crab	winter			10.0547	8.5686	0.0024	NA
	summer	25.7443	3.5240	1.2788	2.2203	0.0078	0.0774
Other non-FMP flatfish	winter			0.6415	0.5887	2.4684	1.2455
	summer	0.3660	0.2210	0.5136	0.9192	2.9654	0.7166
Other non-FMP skate	winter			11.5938	4.2060	4.7177	0.7935
	summer	0.2242	1.0011	3.8582	0.6706	4.1279	0.4701
Other nongroundfish	winter			12.0577	1.4697	20.6875	0.5922
	summer	10.4417	0.3765	8.4504	0.6452	13.7612	0.2872
Tanner crab	winter			0.9669	2.0282	32.9373	4.4318
	summer	--	NA	1.8344	1.8593	30.9460	3.0005

Table 6a. Bycatch ratios and standard errors from observed trips north of 40°10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed total catch weight divided by the observed weight (adjusted to fish tickets) of **retained FMP groundfish** species (excluding Pacific hake). Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Bycatch ratio	SE	Bycatch ratio	SE	Bycatch ratio	SE
Rebuilding species	Season	Denominator = Retained groundfish (mt)					
Bocaccio	winter	0.0000	NA	0.0000	0.0034	0.0000	0.0003
	summer	0.0000	NA	--	NA	--	NA
Canary rockfish	winter	0.0044	0.0628	0.0000	0.0156	0.0000	NA
	summer	0.0028	0.0522	0.0000	0.0382	--	NA
Darkblotched rockfish	winter	0.0007	0.0336	0.0221	0.0602	0.0041	0.0125
	summer	0.0040	0.0433	0.0199	0.1316	0.0032	0.0361
Pacific ocean perch	winter	0.0017	1.8750	0.0213	0.1382	0.0026	0.0816
	summer	0.0020	0.2800	0.0092	0.0602	0.0008	0.0116
Widow rockfish	winter	0.0014	0.9943	0.0027	0.2207	0.0001	0.0028
	summer	0.0002	0.0409	0.0003	0.1122	0.0000	0.0008
Yelloweye rockfish	winter	--	NA	0.0000	0.0003	0.0000	0.0006
	summer	0.0000	0.0311	--	NA	--	NA
Non-rebuilding species		Denominator = Retained groundfish (mt)					
Arrowtooth flounder	winter	0.0683	0.3415	0.3072	0.5439	0.1288	0.4620
	summer	0.4406	1.2006	0.3522	0.7423	0.1507	0.6242
Big skate	winter	0.0333	0.1783	0.0000	0.0256	0.0000	0.0181
	summer	0.0223	0.1360	0.0000	0.0223	0.0001	0.1817
Black rockfish (North of 46°16' N. lat.)	winter	0.0001	0.0270	--	NA	--	NA
	summer	0.0000	0.0556	--	NA	--	NA
Black rockfish (South of 46°16' N. lat.)	winter	--	NA	0.0000	NA	--	NA
	summer	0.0000	NA	0.0000	NA	--	NA
Cabezon (Oregon)	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0262	0.0000	NA	--	NA
California skate	winter	--	NA	--	NA	0.0000	0.0346
	summer	0.0001	0.1368	--	NA	--	NA
Chilipepper rockfish	winter	--	NA	0.0002	0.1153	0.0000	0.0091
	summer	0.0012	0.7310	0.0000	0.0024	--	NA
Dover sole	winter	0.0973	1.1118	0.4157	0.7479	0.5635	0.6465
	summer	0.3250	0.3428	0.4580	0.6802	0.4582	0.4849
English sole	winter	0.1756	0.3304	0.0094	0.0623	0.0009	0.0152
	summer	0.0817	0.1041	0.0007	0.0215	0.0004	0.0169
Greenspotted rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0180	--	NA	--	NA
Greenstriped rockfish	winter	0.0007	0.1125	0.0001	0.0426	0.0000	0.0021
	summer	0.0047	0.0595	0.0001	0.0726	0.0000	0.2937
Grenadiers	winter	--	NA	0.0002	0.0600	0.0067	0.0371
	summer	--	NA	0.0000	0.0029	0.0277	0.1400
Kelp greenling	winter	--	NA	--	NA	0.0000	NA
	summer	0.0000	0.0134	--	NA	--	NA
Lingcod (Washington/Oregon)	winter	0.0424	0.2109	0.0054	0.0985	0.0005	0.0201
	summer	0.0446	0.1095	0.0027	0.1309	0.0006	0.0375
Lingcod (California)	winter	--	NA	0.0004	0.1025	0.0001	0.0289
	summer	0.0004	0.0418	0.0001	0.0279	--	NA
Longnose skate	winter	0.1223	0.3884	0.0527	0.0767	0.0246	0.0401
	summer	0.1194	0.1117	0.0474	0.0647	0.0284	0.0454
Longspine thornyhead	winter	0.0000	NA	0.0031	0.0173	0.0935	0.0979
	summer	--	NA	0.0089	0.0489	0.1360	0.1440
Mixed thornyheads	winter	--	NA	0.0033	0.2795	0.0089	0.3138
	summer	--	NA	0.0009	0.7331	0.0217	1.2953

Table 6a continued.

NORTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Bycatch ratio	SE	Bycatch ratio	SE	Bycatch ratio	SE
Non-rebuilding species (cont.)	Season	Denominator = Retained groundfish (mt)					
Other flatfish	winter	0.3863	0.3696	0.0210	0.0417	0.0133	0.0268
	summer	0.3124	0.1306	0.0314	0.0513	0.0229	0.0332
Other groundfish	winter	0.0207	0.1090	0.0053	0.0315	0.0009	0.0099
	summer	0.0237	0.0505	0.0049	0.0287	0.0023	0.0214
Other nearshore rockfish	winter	--	NA	--	NA	--	NA
	summer	0.0000	0.0242	0.0001	NA	--	NA
Other shelf rockfish	winter	0.0230	0.9094	0.0014	0.0492	0.0001	0.0107
	summer	0.0040	0.0955	0.0005	0.0148	0.0000	0.0019
Other slope rockfish	winter	0.0009	0.3199	0.0253	0.0280	0.0064	0.0198
	summer	0.0013	0.0509	0.0481	0.1296	0.0055	0.0122
Pacific cod (North of 43° N. lat.)	winter	0.2229	2.4488	0.0000	0.0021	0.0000	0.0015
	summer	0.0253	0.3919	0.0003	0.2371	0.0000	0.0052
Pacific hake	winter	0.0043	0.1956	0.0264	0.0872	0.0174	0.0742
	summer	0.0566	0.7867	0.0583	0.1808	0.0363	0.1263
Petrale sole	winter	0.1587	0.3411	0.1542	0.4224	0.0111	0.2157
	summer	0.2148	0.1715	0.0007	0.0493	0.0001	0.0023
Redstripe rockfish	winter	--	NA	0.0001	0.0353	0.0000	NA
	summer	0.0001	0.1111	0.0000	0.0070	--	NA
Sablefish	winter	0.0627	0.8172	0.0524	0.1343	0.1576	0.1532
	summer	0.0666	0.1494	0.0907	0.1424	0.2169	0.2527
Sharpchin rockfish	winter	0.0000	NA	0.0007	0.0970	0.0000	0.0104
	summer	0.0006	0.1607	0.0003	0.0613	0.0000	0.0212
Shortspine thornyhead	winter	0.0126	13.5842	0.0307	0.0493	0.0712	0.0659
	summer	0.0023	0.0505	0.0651	0.0668	0.0909	0.0734
Silvergray rockfish	winter	9.0000	NA	0.0000	0.0106	0.0000	NA
	summer	0.0000	0.1898	0.0000	NA	--	NA
Spiny dogfish	winter	0.2102	1.1186	0.0624	0.2277	0.0073	0.0771
	summer	0.0375	0.3867	0.0077	0.0490	0.0040	0.1096
Splitnose rockfish	winter	0.0001	0.0071	0.0080	0.0471	0.0007	0.0422
	summer	0.0003	0.0611	0.0078	0.0675	0.0006	0.0223
Starry flounder	winter	0.0003	0.0097	--	NA	--	NA
	summer	0.0045	0.0962	--	NA	--	NA
Unspecified skate	winter	0.1414	0.6900	0.0419	0.1217	0.0193	0.0856
	summer	0.0855	0.2001	0.0364	0.0891	0.0186	0.0808
Yellowmouth rockfish	winter	--	NA	0.0000	0.0264	0.0000	NA
	summer	--	NA	0.0000	NA	0.0000	NA
Yellowtail rockfish	winter	0.0295	0.2258	0.0000	0.0046	0.0001	0.0598
	summer	0.0066	0.0703	0.0000	0.0042	0.0000	0.0018
Non-groundfish species		Denominator = Retained groundfish (mt)					
California halibut	winter	--	NA	0.0000	NA	--	NA
	summer	--	NA	0.0000	NA	--	NA
Dungeness crab	winter	0.0872	0.3366	0.0002	0.0274	0.0000	0.0153
	summer	0.0521	0.1211	0.0001	0.0159	--	NA
Eulachon	winter	--	NA	0.0000	NA	--	NA
	summer	0.0000	0.0086	0.0000	NA	--	NA
Other non-FMP flatfish	winter	0.0010	0.0208	0.0005	0.0100	0.0021	0.0055
	summer	0.0109	0.0462	0.0003	0.0031	0.0027	0.0071
Other non-FMP skate	winter	0.0190	0.1731	0.0054	0.0114	0.0045	0.0084
	summer	0.0036	0.0211	0.0063	0.0169	0.0044	0.0102
Other nongroundfish	winter	0.0534	0.1269	0.0457	0.0379	0.0257	0.0096
	summer	0.0458	0.0516	0.0319	0.0204	0.0546	0.0224
Tanner crab	winter	0.0001	NA	0.0020	0.0234	0.0343	0.0514
	summer	0.0000	0.2066	0.0015	0.0085	0.0341	0.0580

Table 6b. Bycatch ratios and standard errors from observed trips south of 40° 10' N latitude in the 2009 limited entry groundfish bottom trawl fishery by season and depth. Ratios are computed as the observed total catch weight divided by the observed weight (adjusted to fish tickets) of **retained FMP groundfish** species (excluding Pacific hake). Winter season is January-April and November-December and summer season is May-October. Species are grouped according to Appendix C. Columns with darker shading signify that data were combined across more than one depth interval.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Rebuilding species	Season	Denominator = Retained groundfish (mt)					
Bocaccio	winter			0.0117	0.1912	0.0001	0.0291
	summer	0.0214	0.3667	0.0195	0.3999	0.0017	0.4122
Canary rockfish	winter			0.0001	0.0074	--	NA
	summer	0.0027	0.0904	0.0003	0.0415	0.0001	0.0073
Cowcod	winter			0.0001	0.0068	--	NA
	summer	0.0001	0.0222	0.0008	0.0891	--	NA
Darkblotched rockfish	winter			0.0072	0.0955	0.0026	0.0910
	summer	0.0000	0.0034	0.0126	0.1704	0.0014	0.3619
Widow rockfish	winter			0.0026	0.1304	--	NA
	summer	0.0024	0.1349	0.0228	0.8807	0.0001	0.0183
Yelloweye rockfish	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Non-rebuilding species		Denominator = Retained groundfish (mt)					
Arrowtooth flounder	winter			0.0099	0.2492	0.0012	0.0541
	summer	0.0014	0.0239	0.0136	0.1010	0.0031	0.1016
Bank rockfish	winter			0.0778	1.6949	0.0013	0.1706
	summer	0.0003	0.0328	0.0902	2.4121	0.0019	0.0500
Big skate	winter			--	NA	--	NA
	summer	0.0171	0.2878	0.0003	NA	--	NA
Black rockfish	winter			--	NA	--	NA
	summer	--	NA	--	NA	0.0007	NA
Blackgill rockfish	winter			0.0085	0.3337	0.0014	0.2490
	summer	0.0001	0.0419	0.0068	0.4327	0.0002	0.0117
California skate	winter			0.0012	0.0600	--	NA
	summer	0.0117	0.0698	--	NA	0.0001	NA
Chilipepper	winter			0.2246	1.7146	0.0061	0.8231
	summer	0.3847	1.8235	0.2314	2.1352	0.0017	1.1454
Dover sole	winter			0.1066	0.6413	0.5298	1.0238
	summer	0.0164	0.1568	0.6015	2.2110	0.6397	0.9780
English sole	winter			0.0321	0.1374	0.0002	0.1158
	summer	0.0839	0.1233	0.0202	0.1611	0.0019	0.1481
Greenspotted rockfish	winter			--	NA	--	NA
	summer	0.0002	0.0269	0.0000	0.0109	--	NA
Greenstriped rockfish	winter			0.0006	0.0468	--	NA
	summer	0.0045	0.1120	0.0001	0.0097	--	NA
Grenadiers	winter			--	NA	0.0263	0.1225
	summer	--	NA	0.0001	0.0030	0.0492	0.2638
Kelp greenling	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Lingcod	winter			0.0353	0.7214	0.0000	0.0035
	summer	0.0930	0.4988	0.0057	0.0762	0.0005	0.0917
Longnose skate	winter			0.0703	0.3365	0.0505	0.2573
	summer	0.1095	0.2362	0.0627	0.2268	0.0736	0.2652
Longspine thornyhead	winter			0.0002	0.0264	0.2001	0.3044
	summer	0.0003	NA	0.0024	0.0272	0.1524	0.2077
Mixed thornyheads	winter			0.0005	NA	0.0087	0.6587
	summer	--	NA	--	NA	0.0001	NA

Table 6b continued.

SOUTH OF 40°10' N Lat.		Depth interval (fathoms)					
		0-125		126-250		≥ 250	
		Discard ratio	SE	Discard ratio	SE	Discard ratio	SE
Non-rebuilding species (cont.)	Season	Denominator = Retained groundfish (mt)					
Other flatfish	winter			0.0188	0.0597	0.0090	0.1023
	summer	0.3846	0.3940	0.0184	0.0735	0.0086	0.0425
Other groundfish	winter			0.0133	0.1034	0.0054	0.0347
	summer	0.0256	0.1203	0.0277	0.1089	0.0049	0.0315
Other nearshore rockfish	winter			--	NA	--	NA
	summer	0.0001	0.0161	--	NA	--	NA
Other shelf rockfish	winter			0.0107	0.0949	--	NA
	summer	0.0031	0.0829	0.0123	0.1361	0.0008	0.9900
Other slope rockfish	winter			0.1771	0.6631	0.0205	0.1862
	summer	0.0009	0.2272	0.0175	0.0601	0.0119	0.1024
Pacific hake	winter			0.0690	0.4149	0.0535	0.3114
	summer	0.0896	1.8654	0.0442	0.2001	0.0197	0.1420
Petrale sole	winter			0.3965	1.3101	0.0026	0.4343
	summer	0.3499	0.6467	0.0393	0.2568	0.0033	0.7050
Sablefish (North of 36° N. lat.)	winter			0.0238	0.1431	0.2703	0.5506
	summer	0.0294	0.2250	0.0694	0.2565	0.2155	0.4147
Sablefish (South of 36° N. lat.)	winter			0.0030	0.3795	0.0095	0.7188
	summer	--	NA	--	NA	--	NA
Sharpchin rockfish	winter			0.0034	0.2834	--	NA
	summer	0.0078	2.0089	0.0030	0.3040	--	NA
Shortbelly rockfish	winter			0.0027	0.5671	--	NA
	summer	0.0000	0.0274	0.0125	0.7910	0.0008	NA
Shortspine thornyhead	winter			0.0072	0.1489	0.0943	0.1707
	summer	0.0000	NA	0.0108	0.0351	0.0764	0.1328
Spiny dogfish	winter			0.0642	0.3589	0.0051	0.2958
	summer	0.1282	2.2863	0.0452	0.3609	0.0071	0.3031
Splitnose rockfish	winter			0.2363	1.4235	0.0115	0.1266
	summer	0.0003	0.3839	0.1180	0.3325	0.0118	0.2620
Starry flounder	winter			--	NA	--	NA
	summer	0.0000	NA	--	NA	--	NA
Unspecified skate	winter			0.0026	0.0643	0.0029	0.1656
	summer	0.0141	0.1063	0.0192	0.2442	0.0158	0.2259
Yellowtail rockfish	winter			--	NA	--	NA
	summer	0.0013	0.2215	0.0000	NA	0.0000	0.0032
Non-rebuilding species	Season	Denominator = Retained groundfish (mt)					
California halibut	winter			--	NA	--	NA
	summer	0.0001	NA	--	NA	--	NA
Dungeness crab	winter			0.0108	0.1771	0.0000	NA
	summer	0.0659	0.2417	0.0014	0.0540	0.0000	0.0027
Other non-FMP flatfish	winter			0.0007	0.0123	0.0055	0.0529
	summer	0.0009	0.0137	0.0005	0.0217	0.0052	0.0266
Other non-FMP skate	winter			0.0124	0.0927	0.0105	0.0356
	summer	0.0006	0.0566	0.0041	0.0192	0.0072	0.0186
Other nongroundfish	winter			0.0184	0.0441	0.0614	0.0377
	summer	0.0307	0.0307	0.0092	0.0173	0.0242	0.0126
Tanner crab	winter			0.0010	0.0431	0.0771	0.2219
	summer	--	NA	0.0020	0.0451	0.0543	0.1228

Table 7. Summary of the number of length measurements and the number of individual fish sexed by WCGOP observers in the limited entry groundfish bottom trawl fishery from September 2003 through April 2010. The date range of biological data for each species is also provided. Biological data is only summarized for non-rebuilding and non-groundfish species with more than 10 observations.

	Years available	# lengths	# sexes
Rebuilding species			
Bocaccio	2004 - Apr 2010	1915	812
Canary rockfish	2004 - Apr 2010	2779	1802
Cowcod	2004 - 2009	318	152
Darkblotched rockfish	Sep 2003 - Apr 2010	6345	2221
Pacific ocean perch	2004 - Apr 2010	4139	685
Widow rockfish	2004 - Apr 2010	558	127
Yelloweye rockfish	Sep 2003 - 2009	139	92
Non-rebuilding species / Non-groundfish			
Arrowtooth flounder	2006 - Apr 2010	8524	1
Aurora rockfish	2004, 2006 - Apr 2010	9367	3
Bank rockfish	2006 - 2009	54	0
Blackgill rockfish	2004 - Apr 2010	822	5
Chilipepper rockfish	2004, 2006 - Apr 2010	1746	6
Dover sole	2006 - Apr 2010	8512	4
Dungeness crab	2007 - Apr 2010	3538	3323
English sole	2006 - Apr 2010	4620	0
Greenspotted rockfish	2007, 2009	12	0
Greenstriped rockfish	2005 - Apr 2010	1467	7
Lingcod	2004 - Apr 2010	7987	503
Longnose skate	2006 - Apr 2010	9378	9121
Longspine thornyhead	2006 - Apr 2010	8452	1
Pacific halibut	Sep 2003 - Apr 2010	5276	0
Pacific sanddab	2006 - Apr 2010	3964	0
Petrable sole	2006 - Apr 2010	4106	2773
Redbanded rockfish	2006 - Apr 2010	2801	0
Redstripe rockfish	2006 - Apr 2010	84	0
Rex sole	2009 - Apr 2010	180	0
Rosethorn rockfish	2007 - Apr 2010	107	0
Rougheye rockfish	2004 - Apr 2010	2804	79
Sablefish	2004 - Apr 2010	6173	171
Sharpchin rockfish	2007 - Apr 2010	73	0
Shorotraker rockfish	2004 - Apr 2010	817	30
Shorotraker / Rougheye	2005, 2008	17	12
Shortspine thornyhead	2006 - Apr 2010	7896	5
Silvergray rockfish	2004 - Apr 2010	105	25
Spiny dogfish	2006 - Apr 2010	7984	7899
Splitnose rockfish	2004, 2006 - Apr 2010	4419	2
Starry flounder	2006 - 2009	367	0
Stripetail rockfish	2006 - Apr 2010	1262	0
Unidentified dogfish shark	2006	10	5
Unidentified rockfish	2007 - 2009	14	0
Unidentified sanddab	2006, 2008 - 2009	28	0
Unidentified skate	2007 - 2008	106	106
Yellowtail rockfish	2004, 2006 - Apr 2010	233	0

Table 8. Summary of biological data for protected fish resources collected by WCGOP observers in the limited entry groundfish bottom trawl fishery from September 2003 through April 2010. The number of length measurements and the number of individuals sexed is reported for each year where data are available.

	# lengths	# sexes
Salmon		
Chinook salmon		
Sep - Dec 2003	8	8
2004	276	265
2005	118	105
2006	9	9
2007	28	28
2008	54	53
2009	74	72
2010	4	2
Chum salmon		
2003	1	0
2004	1	1
Coho salmon		
2004	5	5
2005	1	1
2007	2	1
2010	2	1
Pink salmon		
2009	1	0
Unidentified salmon		
2004	3	3

Appendix A

WCGOP Database Table Hierarchy

TRIPS

FISHING_ACTIVITIES

FISHING_LOCATIONS

CATCHES

SPECIES COMPOSITION

SPECIES_COMPOSITION_ITEMS

BIO_SPECIMENS

BIO_SPECIMEN_ITEMS

DISSECTIONS

Database Table Descriptions

The database tables listed below are a subset of the tables contained in the entire Oracle database. They represent the tables that are actually used to contain the WCGOP data collected by the WCGOP.

BIO_SPECIMENS	Sets of species physical measurements resulting from sampling catches occurring in a tow or set
BIO_SPECIMEN_ITEMS	Physical measurements collected for an individual fish, mammal or bird occurring in a biological sample
CATCHES	PacFIN catch category based on estimates of fish caught during a tow or set
CATCH_CATEGORIES	PacFIN catch categories
DISSECTIONS	Physical specimens collected for an individual fish, mammal or bird
FISHING_ACTIVITIES	Fishing tows or sets occurring during a trip
FISHING_LOCATIONS	Locations of tows or sets
PORTS	Coastal cities where fishing activity is based out of
SPECIES	Fish, mammal, and bird species that might be encountered during fishing
SPECIES_COMPOSITIONS	Sets of species weights and counts resulting from sampling catches occurring in a tow or set
SPECIES_COMPOSITIONS_ITEMS	Weights and counts for individual species occurring in a species composition sample
TRIPS	Sets of fishing activities that occur between the time a vessel leaves port and when it returns
VESSELS	Trawl, longline, pot, or other fishing vessels

Appendix B

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

Sharks

Big skate, *Raja binoculata*
California skate, *R. inornata*
Leopard shark, *Triakis semifasciata*
Longnose skate, *R. rhina*
Soupfin shark, *Galeorhinus gyoferus*
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. alentiannus*
Sharpchin, *S. zacentrus*
Shortbelly, *S. jordani*
Shortraker, *S. borealis*
Shortspine thornyhead, *Sebastolobus alascanus*
Silvergrey, *Sebastes. brevispinus*
Speckled, *S. ovalis*
Splitnose rockfish, *S. diploproa*
Squarespot, *S. hopkinsi*
Starry, *S. constellatus*
Stripetail, *S. saxicola*
Swordspine, *S. ensifer*
Tiger, *S. nigrocinctus*
Treefish, *S. serriceps*
Vermilion, *S. miniatus*
Widow, *S. entomelas*
Yelloweye, *S. ruberrimus*
Yellowmouth, *S. reedi*
Yellowtail, *S. flavidus*

Appendix C

Species identification codes used in the Pacific Coast Fisheries Information Network (PacFIN) database and assigned to WCGOP observer data, with aggregated species groups used in this report (Tables 4-6).

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	
BLSK	BLACK SKATE	Other non-FMP skate	Other non-FMP skate	
BLU1	NOM. BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BLUR	BLUE ROCKFISH	Blue rockfish	Blue rockfish	yes
BMCK	BULLET MACKEREL	Other nongroundfish	Other nongroundfish	
BMRL	BLUE MARLIN	Other nongroundfish	Other nongroundfish	
BMSL	BLUE OR BAY MUSSEL	Other nongroundfish	Other nongroundfish	
BNK1	NOM. BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)	yes
BRNZ	BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
BRW1	NOM. BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BRWN	BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BRZ1	NOM. BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
BSCL	BUFFALO SCULPIN	Other nongroundfish	Other nongroundfish	
BSJK	BLACK SKIPJACK	Other nongroundfish	Other nongroundfish	
BSKT	BIG SKATE	Big skate	Big skate	yes
BSOL	BUTTER SOLE	Other flatfish	Other flatfish	yes
BSRK	BLUE SHARK	Other nongroundfish	Other nongroundfish	
BSRM	UNSP. BAIT SHRIMP	Other nongroundfish	Other nongroundfish	
BTCR	BAIRDI TANNER CRAB	Tanner crab	Tanner crab	
BTNA	BLUEFIN TUNA	Other nongroundfish	Other nongroundfish	
BTRY	BAT RAY	Other nongroundfish	Other nongroundfish	
BYEL	BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
BYL1	NOM. BLACK-AND-YELLOW	Other nearshore rockfish	Other 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	FMP
	ROCKFISH			
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 rockfish (Remaining rockfish)	Chilipepper rockfish	yes
CLPR	CHILIPEPPER	Chilipepper rockfish (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	DEEPSEA SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
DSRK	SPINY DOGFISH	Spiny dogfish	Spiny dogfish	yes
DTRB	DIAMOND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
DUSK	DUSKY ROCKFISH	Other groundfish	Other groundfish	yes
DVR1	NOM. DOVER SOLE	Dover sole	Dover sole	yes
DWRF	DWARF-RED ROCKFISH	Other shelf rockfish	Other shelf rockfish	yes
EELS	UNSPECIFIED EELS	Other nongroundfish	Other nongroundfish	
EGL1	NOM. ENGLISH SOLE	English sole	English sole	yes
EGLS	ENGLISH SOLE	English sole	English sole	yes

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude	FMP
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	HORNHEAD TURBOT	Other non-FMP flatfish	Other non-FMP flatfish	
ISRK	BIGEYE THRESHER SHARK	Other nongroundfish	Other nongroundfish	
JCLM	CALIFORNIA JACKKNIFE CLAM	Other nongroundfish	Other nongroundfish	
JMCK	JACK MACKEREL	Other nongroundfish	Other nongroundfish	
KFSH	GIANT KELPFISH	Other nongroundfish	Other nongroundfish	
KGL1	NOM. KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLP1	NOM. KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
KLPG	KELP GREENLING	Kelp greenling	Kelp greenling	yes
KLPR	KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish	yes
KMKA	KAMCHATKA FLOUNDER	Other non-FMP flatfish	Other non-FMP flatfish	
KSTR	KUMAMOTO OYSTER	Other nongroundfish	Other nongroundfish	
LCD1	NOM. LINGCOD	Lingcod	Lingcod	yes
LCLM	NATIVE LITTLENECK	Other nongroundfish	Other nongroundfish	

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude	FMP
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
ORND	OTHER ROUND FISH	Other groundfish	Other groundfish	yes
OSCL	OTHER SCALLOP	Other nongroundfish	Other nongroundfish	
OSKT	OTHER SKATES	Unspecified skate	Unspecified skate	yes

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OSLR	OTHER SLOPE RKFISH	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	PYGYMY 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	BOCACCIO+CHILIPEPPER RCKFSH	Other shelf rockfish	Other shelf rockfish	yes
RCK2	UNSP. BOLINA RCKFSH	Other nearshore rockfish	Other nearshore rockfish	yes
RCK3	UNSP. DPWTR REDS RCKFSH	Other slope rockfish	Other slope rockfish	yes
RCK4	UNSP. REDS RCKFSH	Other groundfish	Other groundfish	yes
RCK5	UNSP. SMALL REDS RCKFSH	Other groundfish	Other groundfish	yes
RCK6	UNSP. ROSEFISH RCKFSH	Other groundfish	Other groundfish	yes

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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
SBL2	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 (Remaining rockfish)	Other shelf rockfish	yes
SLNS	SLENDER SOLE	Other non-FMP flatfish	Other non-FMP flatfish	
SMLT	UNSP. SMELT	Other nongroundfish	Other nongroundfish	

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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
TSRK	COMMON THRESHER SHARK	Other nongroundfish	Other nongroundfish	
UABL	UNSPECIFIED ABALONE	Other nongroundfish	Other nongroundfish	
UCLM	UNSPECIFIED CLAM	Other nongroundfish	Other nongroundfish	

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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	
WCLM	WASHINGTON CLAM	Other nongroundfish	Other nongroundfish	
WCRK	WHITE CROAKER	Other nongroundfish	Other nongroundfish	
WDOW	WIDOW ROCKFISH	Widow rockfish	Widow rockfish	yes

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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