

Data Report and Summary Analyses of the U.S. West Coast California Halibut 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 California halibut bottom trawl fishery from January 1, 2008 through April 30, 2009. The WCGOP collects at-sea data from limited entry (LE) trawl and fixed gear fisheries as well as from nearshore rockfish, 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 California Halibut Bottom Trawl Fishery

California halibut is not managed under the Pacific Fishery Management Council's (PFMC) Pacific Coast Groundfish Fishery Management Plan (FMP), although it can co-occur with other FMP flatfish species on the continental shelf. Vessels that participate in the California halibut trawl fishery can belong to either the limited entry (federal permit required) or open access (OA) (federal permit not required) sector of the federal groundfish trawl fishery. The California halibut trawl fishery generally operates out of U.S. ports from San Francisco to Los Angeles.

California began requiring state-issued licenses to participate in this fishery in 2006. Management of the fishery includes state-designated California Halibut Trawl Grounds (CHTG) from Point Arguello to Point Mugu, CA. Commercial bottom trawling is prohibited in California state waters, with the exception of the CHTG. The fishing season within the California Halibut Trawl Grounds (CHTG) covers two calendar years, thus the seasons 2007-2008 and 2009-2010 are included in this report. Regulations for vessels operating in the CHTG include minimum mesh sizes of 7.5 inches in length to reduce bycatch, a three-month closed season during California halibut spawning (March 15 - June 15), a 500 pound possession limit on the incidental take of fish other than California halibut, a 22 inch minimum size limit for retained California halibut, and mandated federal observer coverage by the WCGOP. A comprehensive review of the California halibut bottom trawl fishery in the CHTG was recently published by the California Department of Fish and Game (CDFG 2008). In August 2008, an additional CHTG spatial closure was implemented in state waters and continues into 2009 (CDFG 2009).

Generally, vessels operating in this fishery in state waters do not hold a federal limited entry groundfish trawl permit, and are therefore referred to in this report as open access. Some vessels with a federal limited entry groundfish trawl permit also have a state California Halibut Bottom Trawl Vessel Permit and these vessels primarily operate in federal waters out of the ports of Monterey and San Francisco. Federal LE groundfish permitted vessels targeting California halibut are subject to federal groundfish regulations, depth-based conservation area closures, trip limits for groundfish, and must participate in a vessel monitoring system for enforcement purposes. In federal waters, trawling for California halibut can occur year-round, but a state permit is required (as of 2006) to land more than 150 pounds of California halibut per trip.

Vessels range in size from 29 to 71 feet, with an average length of 46 feet. Fishing generally occurs in less than 30 fathoms of water and fishers deliver their catch to shore-based processors. Some vessels operating out of ports south of San Francisco and within the CHTG deliver their California halibut catch live. This is a low-volume, high-priced component of the fishery and the tow duration for live

California halibut is less than the average tow duration for the dead fish fishery (CDFG 2008). Vessels retain and deliver to processors the portion of catch that is marketable and permitted to be landed. The portion of their catch that is not marketable or prohibited by regulations is discarded at-sea.

Commercial California Halibut Bottom Trawl Fishery Data

Fisheries managers and enforcement officers use state-issued sales receipts, referred to as fish tickets, and vessel logbooks to monitor fishery landings and fishing behavior. 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 tickets provide information on the amount of fish that is landed. However, 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 that 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>.

METHODS

Open Access California Halibut Bottom Trawl Selection

Open access California halibut bottom 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. The data in this report were collected during two selection cycles. The two selection cycles were January 1, 2008 to December 31, 2008 (selection cycle 5) and January 1, 2009 to December 31, 2009 (selection cycle 6). California provided an initial list of vessels with state-issued California halibut bottom trawl permits. The following criteria were applied to the list of permits/vessels to select for the open access sector of this fishery in 2008:

- Vessel does not have a limited entry federal groundfish permit.

- Vessel landed at least 1000 lbs of California halibut between January 1, 2006 and July 31, 2007.
- Vessel used bottom trawl gear to land California halibut.
- Vessel is 17 feet in length or greater.

In 2008, a total of 57 vessels had California halibut bottom trawl permits. After the above criteria were applied, the total number of vessels selected for the 2008 open access California halibut fishery was 33.

The WCGOP aggregates ports along the US west coast into port groups, which are considered strata. Open access vessels with California halibut 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 for a two-month 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 open access California halibut bottom trawl fleet every year.

Limited Entry Bottom Trawl Vessels Targeting CA Halibut

Vessels with a federal limited entry permit are selected for coverage in the LE groundfish bottom trawl fishery by the WCGOP. For more details on the selection process for the LE groundfish bottom trawl fishery, see the most recent WCGOP report (NMFS 2008a). If a vessel was selected during a period for observer coverage under the LE groundfish bottom trawl fishery, and the vessel targeted California halibut, then those trips/tows were also observed.

Observed tows that targeted California halibut on a bottom trawl vessel with a federal limited entry groundfish permit and a state-issued California halibut bottom trawl permit are included in this report. Tows targeting California halibut were determined using the following criteria:

- Target species of the tow was recorded by the observer as California halibut.
- Target of the tow was recorded as nearshore mix, sand sole, or other flatfish, the depth of the tow was less than or equal to 30 fathoms, and the vessel was fishing south of 40° 10' N. latitude.

This selection step was necessary to ensure that all hauls targeting California halibut were included, given the variety of target codes recorded by observers from vessel logbooks. Catch and spatial data from this additional step were reviewed to confirm fishing behavior was consistent with the California halibut fishery.

Coverage of the California Halibut Bottom Trawl Fishery

A list of fisheries in order of priority for observer coverage can be found in the WCGOP observer training manual (NWFSC 2008). The open access California halibut trawl fleet is one of WCGOP's lower priorities for observer coverage. Conversely, limited entry trawl vessels are the highest priority for observer coverage, regardless of whether they are targeting groundfish or California halibut. Nearly all trips taken within the two-month period by a vessel whose California halibut or federal groundfish permit has been selected are covered by an observer. However, sometimes 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 California halibut trawl vessels were given 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 or when a vessel has serious space constraints.

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, whichever comes first.

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 2008).

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 logbook
- 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 2008).

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 2008).
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 every six months to a year 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 California halibut 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 species composition data allows for subsampling. 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 from fish tickets into 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:

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

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

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 California halibut bottom trawl fishery were calculated as the proportion of fleet-wide landings of California halibut that were observed. Coverage rates were computed based on the complete annual dataset for 2008 and January through April of 2009. Fleet-wide landings of California halibut in 2008 and January through April of 2009 were limited to vessels with California halibut permits in the open access sector and if any California halibut were landed from a trip in the limited entry sector.

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).

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 groundfish stocks currently managed under rebuilding plans, prohibited species in each fishery (Pacific halibut), and all groundfish stocks for which discard is estimated annually on a fleet-wide basis.

The ratio estimates (R_i) were calculated separately for each sector:

$$R = \sum_t y_t / \sum_t x_t$$

where:

y_t = the discarded or total catch pounds of a species in tow t

x_t = the retained pounds of California halibut in tow t

The variance of R is approximated by using the following equation:

$$Var(R) = \left(\frac{\bar{y}}{\bar{x}}\right)^2 \left[\frac{s^2(y_t)}{\bar{y}^2} + \frac{s^2(x_t)}{\bar{x}^2} \left(\frac{s^2(y_t)}{\bar{y}^2} \cdot \frac{s^2(x_t)}{\bar{x}^2} \right) \right]$$

where:

\bar{x} and \bar{y} = the means of x_t and y_t over the tows

$s^2(x_t)$ and $s^2(y_t)$ = the standard errors of x_t and y_t over all tows

This variance estimator is that which was employed by Pikitch et al. (1998) and is based on methods presented by Cochran (1977). Note that $Var(R)$ cannot be calculated when $x_t = 0$ or $y_t = 0$ for all tows and should be considered with extreme caution when R is equal to one. Variance estimates were not computed by port group and 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 fish ticket adjusted observed weight of retained California halibut. Similarly, bycatch ratios were calculated as the observed total catch weight (discarded + retained) divided by the observed weight of retained California halibut.

RESULTS AND DISCUSSION

Overall Coverage Levels

The total number of observed trips, tows, vessels, and observed and total fleet-wide California halibut landings in the LE and OA sectors of the California halibut trawl fishery are summarized in Table 1. The observed coverage rate, calculated as the proportion of fleet-wide California halibut landings observed, is provided for each WCGOP port group and for the entire California coast. Data were combined as needed to ensure confidentiality.

Observer coverage in the LE sector of the California halibut trawl fishery has centered mostly around San Francisco and Monterey, where most of the fishing activity occurs. Observer coverage in 2008 increased dramatically in the LE sector of this fishery relative to 2007, from 14% to 35% (NMFS 2008b). This is the highest annual observer coverage rate ever observed in this sector. Overall, annual coverage in the LE sector of the California halibut fishery has ranged between 3 and 23%, with the highest coverage rate occurring in 2004. However, landings of California halibut were relatively constant between 2007 and 2008 at 39 mt.

Observer coverage of the OA sector of the California halibut trawl fishery decreased in 2008 relative to

2007, from 7% to 5% (NMFS 2008b). However, landings of California halibut in the 2008 OA sector were 50 mt, which was higher than the 39 mt landed in 2007. Observer coverage in the OA sector of the California halibut trawl fishery has ranged between 4% and 10% from 2003 through 2007. Participants in the OA sector of the California halibut fishery typically operate further south than the LE sector. The OA sector is associated with WCGOP port groups from San Francisco south to Los Angeles.

Observed Total Catch, Discard Ratios, and Bycatch Ratios

Table 2 presents the observed total catch weight (mt), discard weight (mt) and percent discarded from observed vessels in the LE and OA sectors of the California halibut trawl fishery. A single total catch weight for some species groups is provided, although discard weights are reported by species within the group. Landed weights are often recorded at a broader level of species resolution than observer discard data. Because of this, in many cases it is only appropriate for the WCGOP to report total catch and retained weights for species groups rather than individual species. WCGOP analysts have evaluated which species are typically grouped on fish tickets and which are recorded at a species-specific level. Total catch weights are reported for individual species whenever possible. However, when landed weights for individual species are anticipated to be underestimated by more than 10% coastwide, total catch for these species is reported jointly with larger catch groupings under which they are typically recorded. For instance, although observers record discard of longnose skate at the species level, processors often report this weight along with other skate species as unspecified skate.

In 2008, rebuilding groundfish species were not observed in the catch from this fishery. Observed coastwide total catch (discarded + retained) in the LE sector of the California halibut fishery was largely comprised of California halibut, Dungeness crab, bat ray, big skate, California skate, and starry flounder (Table 2). A relatively large weight of other skate and ray species was also observed. For non-rebuilding species, 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. The regulated minimum size for retained California halibut is 22 inches. Overall, Dungeness crab, bat ray, and California halibut constituted the largest components of observed discard in the LE sector. All of the observed catch of Dungeness crab and bat ray were discarded. Although the discard weight of California halibut was a large component of overall discard, the total discard percentage for California halibut was only 27%. Coastwide total catch (discarded + retained) from the observed OA sector was less than that observed in the LE sector. The composition of total catch and discard were similar in both sectors. The primary components of observed discard in the OA sector were Dungeness crab and California halibut, although unlike the LE sector, Dungeness crab was larger in both total catch and discarded weight than California halibut. A major component of discard in both sectors was skates and rays, although the species composition within this grouping differs by sector.

Discard ratios and standard errors for the LE and OA sectors of the California halibut trawl fishery are reported in Table 3. Similarly, Table 4 provides bycatch ratios and standard errors for each sector. All ratios were computed using California halibut in the denominator. Species were grouped for ratio calculations according to Appendix B. Discard and bycatch ratios were higher for Dungeness crab and unspecified jellyfish in both sectors, as well as other nongroundfish in the OA sector and bat ray in the LE sector. Ratios for the unspecified jellyfish group had very large standard errors. The bycatch ratio for California halibut was similar between sectors.

The observed catch of two species of interest under the Endangered Species Act (ESA) in both the LE and OA sectors of the California halibut fishery are summarized annually in separate reports. Bycatch

of interest includes salmon species, particularly chinook (*Oncorhynchus tshawytscha*) and coho (*Oncorhynchus kisutch*), because of their threatened status on the US Pacific west coast, which are reported in Heery et al. (2009a). Green sturgeon have been of conservation concern in both commercial and recreational fisheries. Recent genetic analyses of green sturgeon indicate that there are distinct northern and southern populations of this species along the west coast. The southern Distinct Population Segment (DPS) is listed as threatened under the ESA. Bycatch of green sturgeon in the observed sectors of the groundfish fishery are reported in Heery et al. (2009b). Bycatch of salmon and green sturgeon are reported as bycatch rates in this report and by number of individual fish in the reports listed above.

Biological Sampling Data: Length-Frequency Distributions

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 and OA sectors of the California halibut fishery for non-protected resources from September 2003 through April 2009 are summarized in Table 5.

The length frequency distributions of discarded species from biological data are provided from both sectors of the California halibut fishery in Figure 1. Length frequency plots are shown for all species for which greater than 30 observations were available. These include California halibut, Dungeness crab, English sole, lingcod, longnose skate, Pacific sanddab, petrale sole, spiny dogfish, and starry flounder. Lengths for Dungeness crab reflect the carapace width of sampled individuals.

For protected resources, including any species regulated under the Endangered Species Act (ESA), additional types of biological data are collected whenever possible. Since 2007, the WCGOP has collected 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 weight, note presence or absence of an adipose fin, and collect scales and snouts. Information regarding biosampling procedures for green sturgeon and salmon is available in the WCGOP observer training manual (NWFSC 2008).

Biological data for protected fish resources collected by observers in the LE and OA sectors of the California halibut fishery from September 2003 through April 2009 are summarized in Table 6. Observers sampled a total of 165 chinook salmon, 4 coho salmon, and 54 green sturgeon across all years. Length frequency distributions for Chinook salmon and green sturgeon are presented in Figure 2, as greater than 30 observations are available for each of these protected species.

Summary

Discard and bycatch rates calculated from observer data collected in the limited entry and open access California halibut bottom trawl fishery are now available for use in the management process. The observer data will be used in conjunction with additional commercial California halibut trawl fishery landings information to expand discard estimates to the fleet-wide level in order to inform the management process on coastwide total mortality in this fishery. Biological sample data will also be available for use by stock assessment authors.

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FIGURES

Figure 1. Length frequency distributions of discarded species observed in the limited entry and open access sectors of the California halibut fishery from September 2003 - April 2009. Length frequencies are provided for FMP groundfish and other species for which 30 observations or more were available.

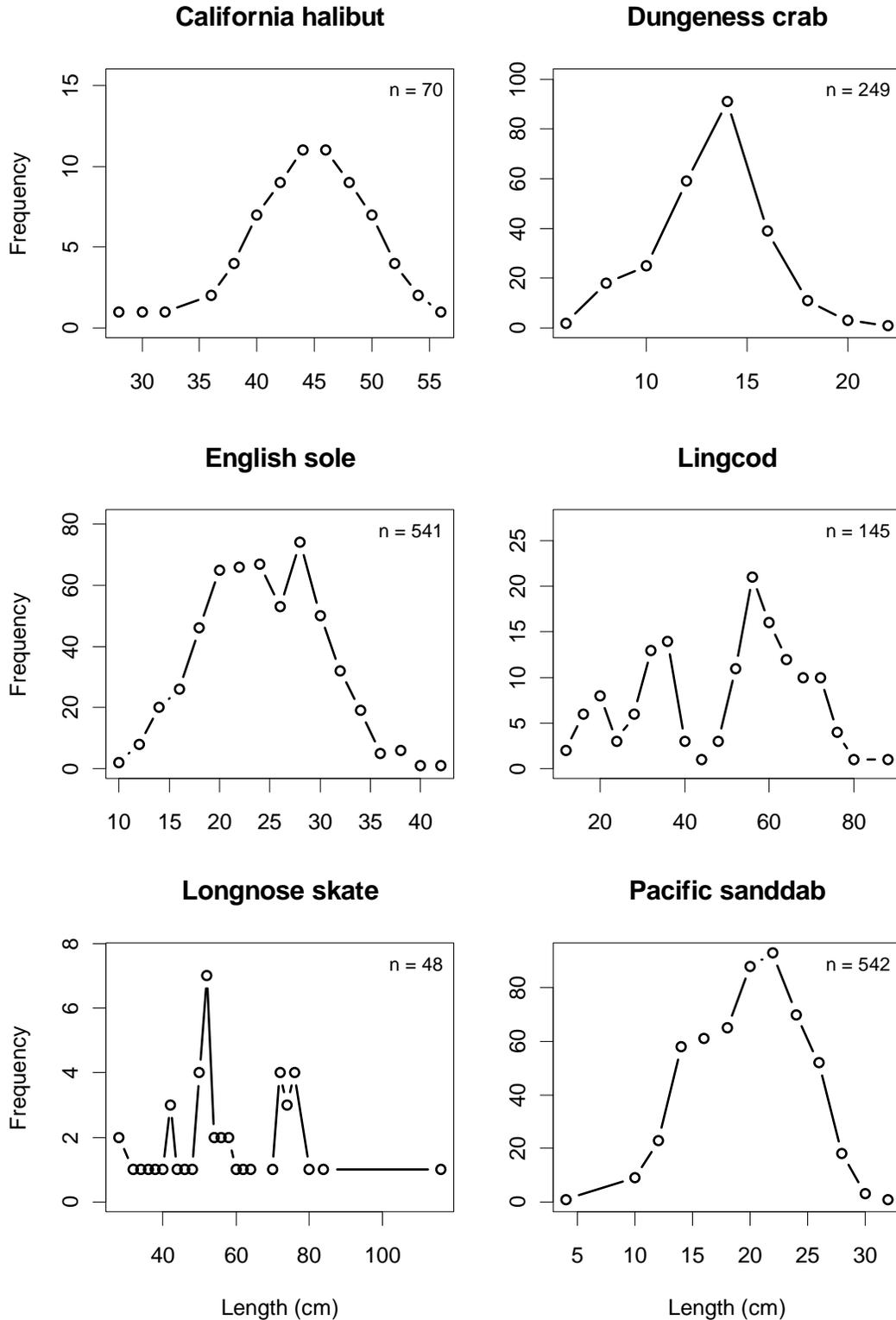


Figure 1 continued. Length frequency distributions of discarded species observed in the limited entry and open access sectors of the California halibut fishery from September 2003 - April 2009. Length frequencies are provided for FMP groundfish and other species for which 30 observations or more were available.

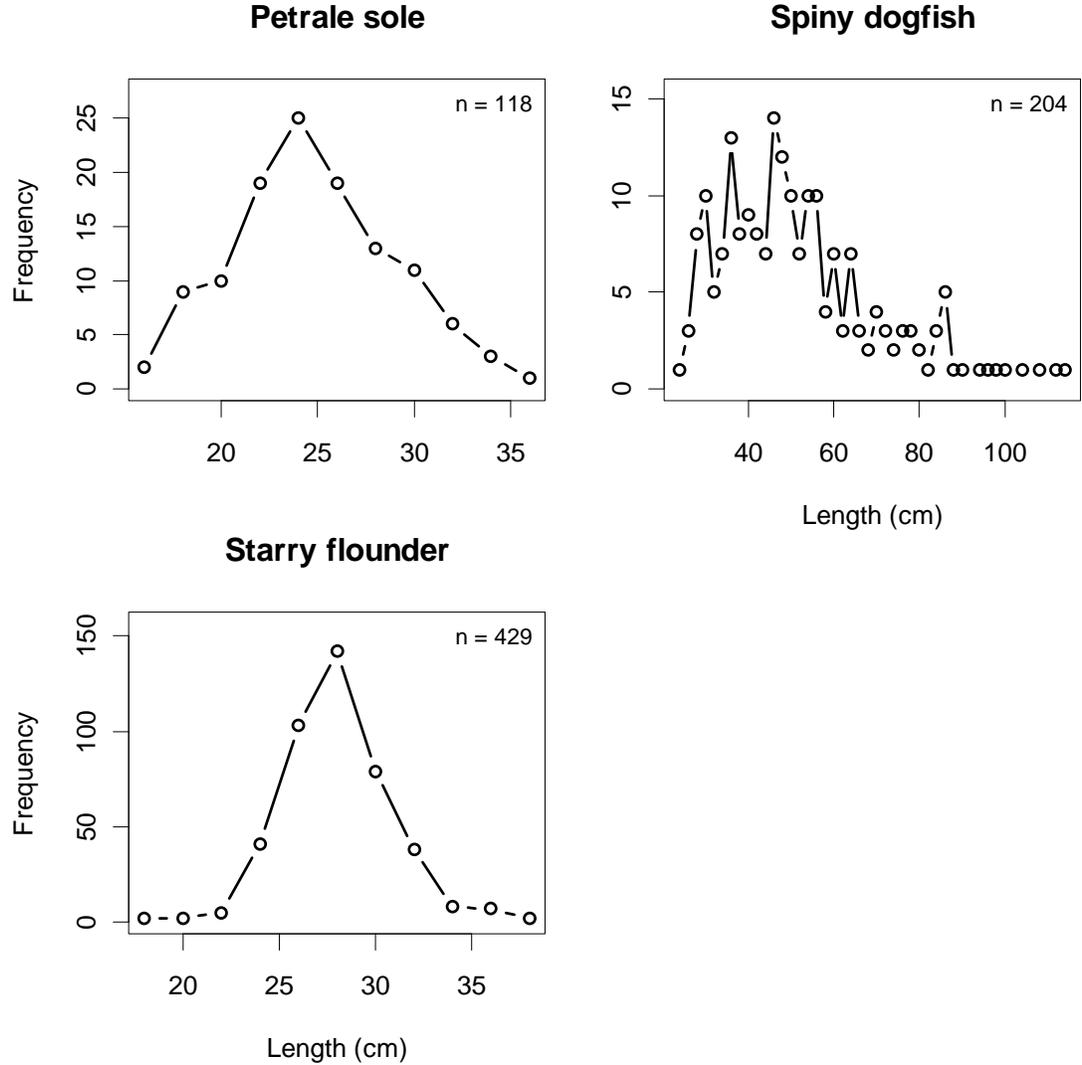
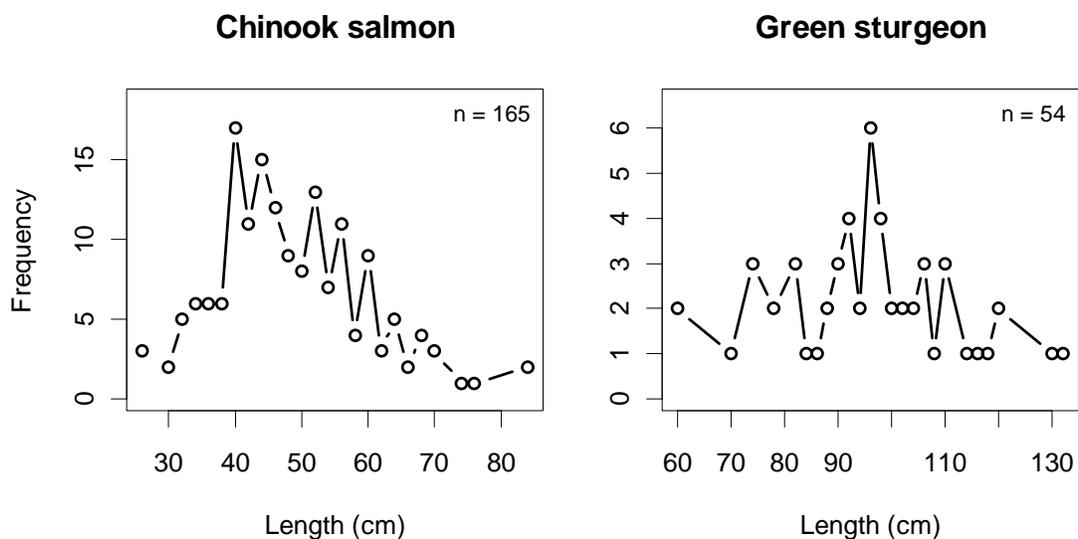


Figure 2. Length frequency distributions of discarded protected species observed in the limited entry and open access sectors of the California halibut fishery from September 2003 - April 2009. Length frequencies are provided for protected species for which 30 observations or more were available.



TABLES

Table 1. Total observed trips, hauls, vessels and California halibut landings in the limited entry sector (top) and the open access sector (bottom) of the California halibut fishery in 2008 and in January through April 2009. Coverage rates (far-right column) for each port group are computed as the proportion of total California halibut landings that were observed. Data are combined as needed to ensure confidentiality.

		Number of observed trips	Number of observed hauls	Number of observed vessels	Observed California halibut landings (mt)	Total California halibut landings (mt)	% of total California halibut landings observed
		Limited Entry Sector					
2008	Eureka	--	--	--	--	*	--
	Fort Bragg	--	--	--	--	*	--
	San Francisco	53	149	6	13.7	38.8	35%
	Monterey						
	Morro Bay						
	Santa Barbara	--	--	--	--	--	--
	Los Angeles	--	--	--	--	--	--
	Total	53	149	6	13.7	38.9	35%
Jan - Apr 2009	Eureka	--	--	--	--	--	--
	Fort Bragg	--	--	--	--	31.4	--
	San Francisco	--	--	--	--	--	--
	Monterey	--	--	--	--	--	--
	Morro Bay	--	--	--	--	--	--
	Santa Barbara	--	--	--	--	--	--
	Los Angeles	--	--	--	--	--	--
	Total	0	0	0	0.0	31.4	0%
		Open Access Sector					
2008	Eureka	--	--	--	--	--	--
	Fort Bragg	--	--	--	--	--	--
	San Francisco	49	199	7	2.6	49.9	5%
	Monterey						
	Morro Bay						
	Santa Barbara						
	Los Angeles	--	--	--	--	0.3	--
Total	49	199	7	2.6	50.2	5%	
Jan - Apr 2009	Eureka	--	--	--	--	--	--
	Fort Bragg	--	--	--	--	--	--
	San Francisco	--	--	--	--	7.3	--
	Monterey	--	--	--	--	--	--
	Morro Bay	*	*	*	*	1.6	*
	Santa Barbara	--	--	--	--	14.7	--
	Los Angeles	--	--	--	--	--	--
Total	*	*	*	*	23.5	*	

Table 2. Observed catch weight (mt), discard weight (mt), and percent discarded from the observed vessels in the limited entry and open access sectors of the 2008 California halibut fishery.

	Limited Entry			Open Access		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Rebuilding species						
Bocaccio *	--	--	--	--	--	--
Canary rockfish	--	--	--	--	--	--
Cowcod *	--	--	--	--	--	--
Darkblotched rockfish *	--	--	--	--	--	--
Pacific ocean perch *	--	--	--	--	--	--
Widow rockfish	--	--	--	--	--	--
Yelloweye rockfish *	--	--	--	--	--	--
Non-rebuilding species						
Big skate	3.528	3.501	99.2%	0.533	0.533	100.0%
Bronzespotted rockfish	0.000	0.000	0.0%	--	--	--
Brown rockfish	0.010	0.010	100.0%	--	--	--
Cabezon	--	--	--	0.002	0.000	0.0%
California scorpionfish	--	--	--	0.044	0.044	100.0%
California skate	1.541	1.541	100.0%	0.362	0.362	100.0%
Chilipepper rockfish	0.002	0.001	36.0%	--	--	--
Dover sole	0.002	0.000	0.0%	0.001	0.001	100.0%
English sole	0.179	0.161	89.6%	0.093	0.044	47.1%
Flatfish	0.769	0.579	75.3%	0.248	0.097	39.0%
Bigmouth sole		--			0.002	
Curlfin turbot		0.257			0.015	
Fantail sole		--			0.030	
Hornyhead turbot		0.073			0.030	
Pacific sanddab		0.213			0.019	
Slender sole		0.005			0.000	
Unspecified flatfish		0.029			0.000	
Unspecified sanddab		0.002			0.000	
Leopard shark	0.516	0.489	94.7%	0.040	0.040	100.0%
Lingcod	0.058	0.007	11.8%	0.002	0.002	100.0%
Nearshore rockfish	0.002	0.002	81.7%	--	--	--
Copper rockfish		0.002			--	
Other groundfish	0.002	0.000	0.0%	--	--	--
Pacific hake	0.010	0.010	100.0%	--	--	--
Petrale sole	0.113	0.039	34.2%	0.007	0.003	37.2%
Rex sole	0.006	0.006	100.0%	--	--	--
Rock sole	0.004	0.004	100.0%	0.000	0.000	100.0%
Sablefish	0.002	0.000	0.0%	0.000	0.000	100.0%
Sand sole	0.225	0.016	7.0%	0.264	0.008	3.1%
Shelf rockfish	0.000	0.000	93.8%	0.000	0.000	--
Greenblotched rockfish		0.000			--	
Vermilion rockfish		0.000			--	
Unspecified shelf rockfish		--			0.000	

* Mislabeling or grouping of these species on non-distributed fish tickets may cause retained catch weights to be underestimated.

Table 2 continued.

	Limited Entry			Open Access		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-rebuilding species (cont)						
Skates & Rays	1.237	0.950	76.7%	0.528	0.375	70.9%
Longnose skate		0.179			0.012	
Pacific electric ray		0.276			0.289	
Shovelnose guitarfish		0.004			0.034	
Starry skate		0.009			0.000	
Thornback skate		0.141			0.018	
Unspecified skate		0.341			0.023	
Slope rockfish	0.008	0.000	0.0%	0.001	0.001	100.0%
Blackgill rockfish		0.000			--	
Redbanded rockfish		0.000			--	
Unspecified slope rockfish		0.000			0.001	
Soupin shark	0.171	0.014	7.9%	--	--	--
Spiny dogfish	0.432	0.432	100.0%	0.095	0.077	80.9%
Spotted ratfish	0.132	0.132	100.0%	0.012	0.012	100.0%
Starry flounder	1.519	0.102	6.7%	0.328	0.079	24.1%
Thornyheads	0.004	0.000	0.0%	0.000	0.000	--
Longspine thornyhead		0.000			--	
Shortspine thornyhead		0.000			--	
Non-groundfish species						
Bat ray	7.592	7.592	100.0%	0.366	0.359	98.1%
California halibut	13.402	3.641	27.2%	3.315	0.685	20.6%
King (Chinook) salmon	0.047	0.047	100.0%	--	--	--
Dungeness crab	8.712	8.712	100.0%	6.824	6.824	100.0%
Giant sea bass	--	--	--	0.003	0.003	100.0%
Green sturgeon	0.242	0.242	100.0%	--	--	--
Northern anchovy	0.000	0.000	100.0%	--	--	--
Pacific angel shark	0.081	0.009	10.8%	0.308	0.225	73.2%
Pacific bonito	0.000	0.000	86.5%	--	--	--
Pacific butterfish	0.003	0.003	100.0%	--	--	--
Pacific halibut	0.083	0.083	100.0%	--	--	--
Pacific herring	0.000	0.000	100.0%	--	--	--
Pacific sardine	--	--	--	0.001	0.001	100.0%
Pacific tom cod	0.003	0.003	100.0%	--	--	--
Plainfin midshipman	0.003	0.003	100.0%	0.006	0.006	100.0%
Red rock crab	0.149	0.149	100.0%	0.063	0.061	97.1%
Rock crab	--	--	--	0.011	0.000	0.0%
Pink surfperch	0.003	0.003	100.0%	0.014	0.014	100.0%
Spotfin surfperch	0.001	0.001	100.0%	--	--	--
Surfperch (unidentified)	0.001	0.001	100.0%	0.000	0.000	100.0%
California lizardfish	--	--	--	0.000	0.000	100.0%
California tonguefish	0.000	0.000	100.0%	0.000	0.000	100.0%
Other nongroundfish	0.067	0.062	93.2%	0.000	0.000	100.0%
Longspine combfish	0.004	0.004	100.0%	0.040	0.040	100.0%
Midshipman (unidentified)	0.002	0.002	100.0%	0.001	0.001	100.0%
Poacher (unidentified)	0.000	0.000	100.0%	--	--	--
Ronquill (unidentified)	--	--	--	0.000	0.000	100.0%
Snailfish (unidentified)	0.002	0.002	100.0%	--	--	--

Table 2 continued.

	Limited Entry			Open Access		
	Total catch (mt)	Discard (mt)	Total % discarded	Total catch (mt)	Discard (mt)	Total % discarded
Non-groundfish species (cont)						
Specklefin midshipman	0.004	0.004	100.0%	--	--	--
Anchovy (unidentified)	0.002	0.002	100.0%	--	--	--
Barred sand bass	--	--	--	0.018	0.018	100.0%
Armored box crab	0.017	0.017	100.0%	0.032	0.032	100.0%
Cancer crab (unidentified)	--	--	--	0.000	0.000	100.0%
Crab (unidentified)	--	--	--	0.066	0.000	0.0%
Decorator/spider crab (unidentified)	--	--	--	0.006	0.006	100.0%
Graceful crab	0.001	0.001	100.0%	0.057	0.057	100.0%
Hermit crab (unidentified)	--	--	--	0.008	0.008	100.0%
Pacific rock crab	--	--	--	0.009	0.009	100.0%
Purple globe crab	0.000	0.000	100.0%	--	--	--
Sheep crab	0.013	0.013	100.0%	0.465	0.465	100.0%
Yellow rock crab	--	--	--	0.204	0.204	100.0%
Jellyfish (unidentified)	39.427	39.427	100.0%	1.689	1.689	100.0%
Bivalves (unidentified)	0.001	0.001	100.0%	--	--	--
Octopus (unidentified)	0.000	0.000	100.0%	0.002	0.002	100.0%
Pacific staghorn sculpin	0.006	0.006	100.0%	0.005	0.005	100.0%
Roughback sculpin	0.001	0.001	100.0%	--	--	--
Sculpin (unidentified)	0.005	0.005	100.0%	0.003	0.003	100.0%
Sea cucumber (unidentified)	--	--	--	0.069	0.012	16.8%
American shad	0.115	0.115	100.0%	--	--	--
Brown smoothhound shark	0.954	0.954	100.0%	0.293	0.293	100.0%
Filetail cat shark	--	--	--	0.001	0.001	100.0%
Horn shark	--	--	--	0.005	0.005	100.0%
Sevengill shark	0.002	0.002	100.0%	0.016	0.016	100.0%
Shark (unidentified)	0.118	0.109	92.3%	0.004	0.000	0.0%
Sixgill shark	0.065	0.065	100.0%	--	--	--
Swell shark	0.001	0.001	100.0%	0.044	0.044	100.0%
Shrimp (unidentified)	0.000	0.000	100.0%	0.010	0.009	86.6%
Squid (unidentified)	--	--	--	0.001	0.001	100.0%
Sturgeon (unidentified)	0.002	0.002	100.0%	--	--	--
White croaker	0.226	0.222	98.4%	0.045	0.042	93.8%
White sea bass	--	--	--	0.021	0.005	22.1%
Wolf-eel	0.003	0.003	100.0%	--	--	--

Table 3. Discard ratios and standard errors from observed vessels in the limited entry and open access sectors of the 2008 California halibut fishery. Discard ratios are computed as the observed discard weight divided by the weight of retained California halibut. Species are grouped according to Appendix B.

	Limited Entry		Open Access	
	Discard ratio	Standard error	Discard ratio	Standard error
Non-rebuilding species				
Big skate	0.3587	0.9991	0.2027	1.5278
Cabazon	0.0000	NA	0.0000	NA
California scorpionfish	0.0000	NA	0.0167	0.2090
Chilipepper	0.0001	0.0405	0.0000	NA
Dover sole	0.0000	NA	0.0005	0.2251
English sole	0.0165	0.0642	0.0167	0.0865
Leopard shark	0.0500	0.5179	0.0151	2.3230
Lingcod	0.0007	0.0207	0.0009	0.0237
Longnose skate	0.0184	0.3330	0.0044	0.3070
Other flatfish	0.0539	0.0706	0.0168	0.0788
Other groundfish	0.0135	0.3979	0.0047	1.2693
Other nearshore rockfish	0.0012	0.0760	0.0000	NA
Other shelf rockfish	0.0000	0.0107	0.0002	0.0480
Other slope rockfish	0.0000	NA	0.0000	NA
Pacific hake	0.0010	0.2390	0.0000	NA
Petrale sole	0.0039	0.0639	0.0010	0.1448
Soupin shark	0.0014	0.2438	0.0000	NA
Spiny dogfish	0.0442	0.4757	0.0293	0.5043
Starry flounder	0.0105	0.0486	0.0300	0.2235
Unspecified skate	0.2368	0.4697	0.2757	0.4636
Non-groundfish species				
Bat ray	0.7778	8.1046	0.1366	2.3215
California halibut	0.3730	0.5785	0.2602	0.2632
Chinook salmon	0.0048	0.2205	0.0000	NA
Dungeness crab	0.8925	2.5533	2.5941	15.1486
Green sturgeon	0.0248	0.3981	0.0000	NA
Other non-FMP flatfish	0.0080	0.0853	0.0231	0.0650
Other nongroundfish	0.1809	0.1608	0.6040	0.1888
Pacific halibut	0.0085	0.3768	0.0000	NA
Unspecified jellyfish	4.0393	58.6463	0.6421	10.4616

Table 4. Bycatch ratios and standard errors from observed vessels in the limited entry and open access sectors of the 2008 California halibut fishery. Bycatch ratios are computed as the observed total catch weight divided by the weight of retained California halibut. Species are grouped according to Appendix B.

	Limited Entry		Open Access	
	Bycatch ratio	Standard error	Bycatch ratio	Standard error
Non-rebuilding species				
Big skate	0.3614	1.0016	0.2027	1.5278
Cabezon	0.0000	NA	0.0009	NA
California scorpionfish	0.0000	NA	0.0167	0.2090
Chilipepper	0.0002	0.0424	0.0000	NA
Dover sole	0.0002	NA	0.0005	0.2251
English sole	0.0184	0.0685	0.0355	0.2452
Leopard shark	0.0528	0.5149	0.0151	2.3230
Lingcod	0.0059	0.0779	0.0009	0.0237
Longnose skate	0.0197	0.3388	0.0044	0.3070
Other flatfish	0.0948	0.0999	0.1716	0.5239
Other groundfish	0.0137	0.3968	0.0047	1.2693
Other nearshore rockfish	0.0012	0.0730	0.0000	NA
Other shelf rockfish	0.0000	0.0100	0.0002	0.0480
Other slope rockfish	0.0005	0.3463	0.0000	NA
Pacific hake	0.0010	0.2390	0.0000	NA
Petrale sole	0.0116	0.1432	0.0027	0.3172
Soupin shark	0.0176	0.6327	0.0000	NA
Spiny dogfish	0.0442	0.4757	0.0362	0.4678
Starry flounder	0.1556	0.4597	0.1245	0.9676
Unspecified skate	0.2649	0.4935	0.3340	0.5187
Non-groundfish species				
Bat ray	0.7778	8.1046	0.1392	2.3172
California halibut	1.3730	1.7562	1.2602	1.1067
Chinook salmon	0.0048	0.2205	0.0000	NA
Dungeness crab	0.8925	2.5533	2.5941	15.1486
Green sturgeon	0.0248	0.3981	0.0000	NA
Other non-FMP flatfish	0.0080	0.0853	0.0231	0.0650
Other nongroundfish	0.1901	0.1698	0.6961	0.2127
Pacific halibut	0.0085	0.3768	0.0000	NA
Unspecified jellyfish	4.0393	58.6463	0.6421	10.4616

Table 5. Summary of the number of length measurements and the number of individual fish sexed by WCGOP observers in the limited entry and open access sectors of the California halibut fishery from September 2003 through April 2009. The date range of biological data for each species is also provided.

	Limited Entry			Open Access		
	Years available	# lengths	# sexes	Years available	# lengths	# sexes
Rebuilding species						
Canary rockfish	2004 - 2007	8	3		0	0
Non-rebuilding species						
California halibut	2007 - 2008	27	0	2008	43	0
Chilipepper rockfish	2008	1	0		0	0
Copper rockfish	2008	1	0		0	0
Dover sole	2006	2	0		0	0
Dungeness crab	2007 - 2008	198	198	2007 - 2008	51	51
English sole	2006 - 2008	452	0	2007 - Apr 2009	89	0
Lingcod	2004 - 2008	95	3	2004 - 2005, 2008	50	0
Longnose skate	2006 - 2008	43	43	2008	5	5
Pacific halibut	2006 - 2008	3	0		0	0
Pacific sanddab	2006 - 2008	511	0	2007 - 2008	31	0
Petrale sole	2006 - 2008	117	81	2008	1	1
Sevengill shark	2005	1	0		0	0
Spiny dogfish	2006 - 2008	194	187	2007 - 2008	10	9
Starry flounder	2006 - 2008	349	0	2007	80	0
Unidentified sanddab	2006	1	0		0	0

Table 6. Summary of biological data for protected resources collected by WCGOP observers in the limited entry and open access sectors of the California halibut fishery from September 2003 through April 2008. The number of length measurements and the number of individuals sexed is reported for each year where data are available.

	Limited Entry			Open Access		
	Year	# lengths	# sexes	Year	# lengths	# sexes
Salmon						
Chinook salmon	2004	77	77	--	--	--
Chinook salmon	2005	41	41	--	--	--
Chinook salmon	2006	14	8	--	--	--
Chinook salmon	2007	12	11	--	--	--
Chinook salmon	2008	21	21	--	--	--
Coho salmon	2006	4	4	--	--	--
Sturgeon						
Green sturgeon	2007	15	0	--	--	--
Green sturgeon	2008	39	0	--	--	--

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

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.

PacFIN Species ID	PacFIN Common Name	Species Group
ALBC	ALBACORE	Other nongroundfish
APLC	ALASKA PLAICE	Other non-FMP flatfish
ARR1	NOM. AURORA ROCKFISH	Other slope rockfish
ARRA	AURORA ROCKFISH	Other slope rockfish
ART1	NOM. ARROWTOOTH FLOUNDER	Arrowtooth flounder
ARTH	ARROWTOOTH FLOUNDER	Arrowtooth flounder
ASRK	PACIFIC ANGEL SHARK	Other nongroundfish
BABL	BLACK ABALONE	Other nongroundfish
BANK	BANK ROCKFISH	Bank rockfish (Remaining rockfish)
BCAC	BOCACCIO	Bocaccio
BCC1	NOM. BOCACCIO	Bocaccio
BCLM	BUTTER CLAM	Other nongroundfish
BGL1	NOM. BLACKGILL ROCKFISH	Blackgill rockfish (Remaining rockfish)
BKCR	BLUE KING CRAB	Other nongroundfish
BLCK	BLACK ROCKFISH	Black rockfish
BLGL	BLACKGILL ROCKFISH	Blackgill rockfish (Remaining rockfish)
BLK1	NOM. BLACK ROCKFISH	Black rockfish
BLU1	NOM. BLUE ROCKFISH	Other nearshore rockfish
BLUR	BLUE ROCKFISH	Other nearshore rockfish
BMCK	BULLET MACKEREL	Other nongroundfish
BMRL	BLUE MARLIN	Other nongroundfish
BMSL	BLUE OR BAY MUSSEL	Other nongroundfish
BNK1	NOM. BANK ROCKFISH	Bank rockfish (Remaining rockfish)
BRNZ	BRONZESPOTTED ROCKFISH	Other shelf rockfish
BRW1	NOM. BROWN ROCKFISH	Other nearshore rockfish
BRWN	BROWN ROCKFISH	Other nearshore rockfish
BRZ1	NOM. BRONZESPOTTED ROCKFISH	Other shelf rockfish
BSJK	BLACK SKIPJACK	Other nongroundfish
BSKT	BIG SKATE	Big skate
BSOL	BUTTER SOLE	Other flatfish
BSRK	BLUE SHARK	Other nongroundfish
BSRM	UNSP. BAIT SHRIMP	Other nongroundfish
BTCR	BAIRDI TANNER CRAB	Tanner crab
BTNA	BLUEFIN TUNA	Other nongroundfish
BTRY	BAT RAY	Bat ray
BYEL	BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish
CBZ1	NOM. CABEZON	Cabezon
CBZN	CABEZON	Cabezon
CEEL	SPOTTED CUSK-EEL	Other nongroundfish
CHL1	NOM. CALIFORNIA HALIBUT	California halibut
CHLB	CALIFORNIA HALIBUT	California halibut
CHN1	NOM. CHINA ROCKFISH	Other nearshore rockfish

PacFIN Species ID	PacFIN Common Name	Species Group
CHNA	CHINA ROCKFISH	Other nearshore rockfish
CHNK	CHINOOK SALMON	Chinook salmon
CHUM	CHUM SALMON	Chum salmon
CKLE	BASKET COCKLE	Other nongroundfish
CLC1	NOM. CALICO ROCKFISH	Other nearshore rockfish
CLCO	CALICO ROCKFISH	Other nearshore rockfish
CLP1	NOM. CHILIPEPPER	Chilipepper
CLPR	CHILIPEPPER	Chilipepper
CMCK	CHUB MACKEREL	Other nongroundfish
CMEL	CHAMELEON ROCKFISH	Other shelf rockfish
CML1	NOM. CHAMELEON ROCKFISH	Other shelf rockfish
CMSL	CALIFORNIA MUSSEL	Other nongroundfish
CNR1	NOM. CANARY ROCKFISH	Canary rockfish
CNRY	CANARY ROCKFISH	Canary rockfish
COHO	COHO SALMON	Coho salmon
COP1	NOM. COPPER ROCKFISH	Other nearshore rockfish
COPP	COPPER ROCKFISH	Other nearshore rockfish
CPLN	CAPELIN	Other nongroundfish
CSKT	CALIFORNIA SKATE	Unspecified skate
CSOL	CURLFIN SOLE	Other flatfish
CTRB	C-O SOLE	Other non-FMP flatfish
CUDA	PACIFIC BARRACUDA	Other nongroundfish
CWC1	NOM. COWCOD ROCKFISH	Cowcod
CWCD	COWCOD ROCKFISH	Cowcod
DBR1	NOM. DARKBLOTCHED ROCKFISH	Darkblotched rockfish
DBRK	DARKBLOTCHED ROCKFISH	Darkblotched rockfish
DCRB	DUNGENESS CRAB	Dungeness crab
DFLT	UNSP. DEEP FLOUNDERS	Other flatfish
DOVR	DOVER SOLE	Dover sole
DRDO	DORADO	Other nongroundfish
DSOL	DEEPSEA SOLE	Other non-FMP flatfish
DSRK	SPINY DOGFISH	Spiny dogfish
DTRB	DIAMOND TURBOT	Other non-FMP flatfish
DUSK	DUSKY ROCKFISH	Other groundfish
DVR1	NOM. DOVER SOLE	Dover sole
DWRF	DWARF-RED ROCKFISH	Other shelf rockfish
EELS	UNSPECIFIED EELS	Other nongroundfish
EGL1	NOM. ENGLISH SOLE	English sole
EGLS	ENGLISH SOLE	English sole
ESTR	EASTERN OYSTER	Other nongroundfish
ETNA	BIGEYE TUNA	Other nongroundfish
EULC	EULACHON	Eulachon
EURO	EUROPEAN OYSTER	Other nongroundfish
FLAG	FLAG ROCKFISH	Other shelf rockfish
FLG1	NOM. FLAG ROCKFISH	Other shelf rockfish
FNTS	FANTAIL SOLE	Other non-FMP flatfish
FRCK	FRECKLED ROCKFISH	Other shelf rockfish
FSOL	FLATHEAD SOLE	Other flatfish
GABL	GREEN ABALONE	Other nongroundfish

PacFIN Species ID	PacFIN Common Name	Species Group
GBAS	GIANT SEA BASS	Other nongroundfish
GBL1	NOM. GREENBLOTCHED ROCKFISH	Other shelf rockfish
GBLC	GREENBLOTCHED ROCKFISH	Other shelf rockfish
GCLM	GAPER CLAM	Other nongroundfish
GDUK	GEODUCK	Other nongroundfish
GKCR	GOLDEN KING CRAB	Other nongroundfish
GPH1	NOM. GOPHER ROCKFISH	Gopher rockfish (Remaining rockfish)
GPHR	GOPHER ROCKFISH	Gopher rockfish (Remaining rockfish)
GPRW	GOLDEN PRAWN	Other nongroundfish
GRAS	GRASS ROCKFISH	Other nearshore rockfish
GRDR	UNSP. GRENADIERS	Unspecified grenadiers
GRS1	NOM. GRASS ROCKFISH	Other nearshore rockfish
GSP1	NOM. GREENSPOTTED ROCKFISH	Other shelf rockfish
GSPT	GREENSPOTTED ROCKFISH	Other shelf rockfish
GSQD	GIANT SQUID	Other nongroundfish
GSR1	NOM. GREENSTRIPED ROCKFISH	Other shelf rockfish
GSRK	GREENSTRIPED ROCKFISH	Other shelf rockfish
GSRM	GHOST SHRIMP	Other nongroundfish
GSTG	GREEN STURGEON	Green sturgeon
GTRB	GREENLAND TURBOT	Other non-FMP flatfish
HBRK	HALFBANDED ROCKFISH	Other shelf rockfish
HCLM	HORSE CLAMS	Other nongroundfish
HLQN	HARLEQUIN ROCKFISH	Other shelf rockfish
HNY1	NOM. HONEYCOMB ROCKFISH	Other shelf rockfish
HNYC	HONEYCOMB ROCKFISH	Other shelf rockfish
HTRB	HORNHEAD TURBOT	Other non-FMP flatfish
ISRK	BIGEYE THRESHER SHARK	Other nongroundfish
JCLM	CALIFORNIA JACKKNIFE CLAM	Other nongroundfish
JMCK	JACK MACKEREL	Other nongroundfish
KFSH	GIANT KELPFISH	Other nongroundfish
KGL1	NOM. KELP GREENLING	Kelp greenling
KLP1	NOM. KELP ROCKFISH	Other nearshore rockfish
KLPG	KELP GREENLING	Kelp greenling
KLPR	KELP ROCKFISH	Other nearshore rockfish
KMKA	KAMCHATKA FLOUNDER	Other non-FMP flatfish
KSTR	KUMAMOTO OYSTER	Other nongroundfish
LCD1	NOM. LINGCOD	Lingcod
LCLM	NATIVE LITTLENECK	Other nongroundfish
LCOD	LINGCOD	Lingcod
LDAB	LONGFIN SANDDAB	Other non-FMP flatfish
LDB1	NOM. LONGFIN SANDDAB	Other non-FMP flatfish
LOBS	CALIF. SPINY LOBSTER	Other nongroundfish
LSKT	LONGNOSE SKATE	Longnose skate
LSP1	NOM. LONGSPINE THORNYHEAD	Longspine thornyhead
LSPN	LONGSPINE THORNYHEAD	Longspine thornyhead
LSRK	LEOPARD SHARK	Leopard shark
LSTR	OLYMPIA OYSTER	Other nongroundfish
LUVR	LOUVAR	Other nongroundfish
MACL	MUD CLAMS	Other nongroundfish

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MAKO	SHORTFIN MAKO SHARK	Other nongroundfish
MCLM	MANILA CLAM	Other nongroundfish
MEEL	MONKEYFACE EEL	Other nongroundfish
MISC	MISC. FISH/ANIMALS	Other nongroundfish
MOLA	COMMON MOLA	Other nongroundfish
MRLN	STRIPED MARLIN	Other nongroundfish
MSC2	MISCELLANEOUS FISH	Other nongroundfish
MSHP	PLAINFIN MIDSHIPMAN	Other nongroundfish
MSQD	MARKET SQUID	Other nongroundfish
MSRM	MUD SHRIMP	Other nongroundfish
MXR1	NOM. MEXICAN ROCKFISH	Other shelf rockfish
MXRF	MEXICAN ROCKFISH	Other shelf rockfish
NANC	NORTHERN ANCHOVY	Other nongroundfish
NRCK	NORTHERN ROCKFISH	Other groundfish
NSHR	NORTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish
NSLF	NORTHERN SHELF ROCKFISH	Other shelf rockfish
NSLP	NORTHERN SLOPE ROCKFISH	Other slope rockfish
NUSF	NOR. UNSP. SHELF ROCKFISH	Other shelf rockfish
NUSP	NOR. UNSP. SLOPE ROCKFISH	Other slope rockfish
NUSR	NOR. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish
OABL	OTHER ABALONE	Other nongroundfish
OANC	OTHER ANCHOVY	Other nongroundfish
OBAS	OTHER BASS	Other nongroundfish
OCLM	OTHER CLAM	Other nongroundfish
OCRB	OTHER CRAB	Other nongroundfish
OCRK	OTHER CROAKER	Other nongroundfish
OCTP	UNSP. OCTOPUS	Other nongroundfish
ODSR	OTHER DEMERSAL RKFSH	Other groundfish
OECH	OTHER ECHINODERM	Other nongroundfish
OFLT	OTHER FLATFISH	Other flatfish
OGRN	OTHER GROUND FISH	Other groundfish
OLV1	NOM. OLIVE ROCKFISH	Other nearshore rockfish
OLVE	OLIVE ROCKFISH	Other nearshore rockfish
OMSK	OTHER MOLLUSKS	Other nongroundfish
OPLG	OTHER PELAGIC RKFSH	Other groundfish
ORCK	OTHER ROCKFISH	Other slope rockfish (>150 fm)
ORCK	OTHER ROCKFISH	Other shelf rockfish (<150 fm)
ORND	OTHER ROUND FISH	Other groundfish
OSCL	OTHER SCALLOP	Other nongroundfish
OSKT	OTHER SKATES	Unspecified skate
OSLR	OTHER SLOPE RKFSH	Other slope rockfish
OSRK	OTHER SHARK	Other nongroundfish
OSRM	OTHER SHRIMP	Other nongroundfish
OSTR	OTHER OYSTER	Other nongroundfish
OTCR	OPILO TANNER CRAB	Tanner crab
OTNA	OTHER TUNA	Other nongroundfish
OURC	OTHER SEA URCHINS	Other nongroundfish
OWFS	OCEAN WHITEFISH	Other nongroundfish
PABL	PINK ABALONE	Other nongroundfish

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PBNT	PACIFIC BONITO	Other nongroundfish
PBTR	PACIFIC BUTTERFISH	Other nongroundfish
PCLM	PISMO CLAM	Other nongroundfish
PCOD	PACIFIC COD	Other groundfish
PDAB	PACIFIC SANDDAB	Other flatfish
PDB1	NOM. PACIFIC SANDDAB	Other flatfish
PGMY	PYGMY ROCKFISH	Other shelf rockfish
PHLB	PACIFIC HALIBUT	Pacific halibut
PHRG	PACIFIC HERRING	Other nongroundfish
PINK	PINK SALMON	Pink salmon
PLCK	WALLEYE POLLOCK	Other groundfish
PNK1	NOM. PINK ROCKFISH	Other shelf rockfish
PNKR	PINK ROCKFISH	Other shelf rockfish
POMF	PACIFIC POMFRET	Other nongroundfish
POP	PACIFIC OCEAN PERCH	Other slope rockfish
POP1	GEN. SHELF/SLOPE RF	Other slope rockfish
POP2	NOMINAL POP	Other slope rockfish
PRCL	PURPLE CLAM	Other nongroundfish
PROW	PROWFISH	Other nongroundfish
PRR1	NOM. PINKROSE ROCKFISH	Other shelf rockfish
PRRK	PINKROSE ROCKFISH	Other shelf rockfish
PSDN	PACIFIC SARDINE	Other nongroundfish
PSHP	PINK SHRIMP	Other nongroundfish
PSRK	PELAGIC THRESHER SHARK	Other nongroundfish
PSTR	PACIFIC OYSTER	Other nongroundfish
PTR1	NOM. PETRALE SOLE	Petrale sole
PTRL	PETRALE SOLE	Petrale sole
PUGT	PUGET SOUND ROCKFISH	Other shelf rockfish
PWHT	PACIFIC WHITING	Pacific hake
QCLM	NORTHERN QUAHOG CLAM	Other nongroundfish
QFSH	QUEENFISH	Other nongroundfish
QLB1	NOM. QUILLBACK ROCKFISH	Other nearshore rockfish
QLBK	QUILLBACK ROCKFISH	Other nearshore rockfish
RABL	RED ABALONE	Other nongroundfish
RATF	SPOTTED RATFISH	Other groundfish
RCK1	BOCACCI+CHILIPEPPER RCKFSH	Other shelf rockfish
RCK2	UNSP. BOLINA RCKFSH	Other nearshore rockfish
RCK3	UNSP. DPWTR REDS RCKFSH	Other slope rockfish
RCK4	UNSP. REDS RCKFSH	Other groundfish
RCK5	UNSP. SMALL REDS RCKFSH	Other groundfish
RCK6	UNSP. ROSEFISH RCKFSH	Other groundfish
RCK7	UNSP. GOPHER RCKFSH	Gopher rockfish (Remaining rockfish)
RCK8	CANARY+VERMILION RCKFSH	Canary rockfish
RCK9	BLACK+BLUE ROCKFISH	Black rockfish
RCKG	ROCK GREENLING	Other nongroundfish
RCLM	RAZOR CLAM	Other nongroundfish
RCRB	ROCK CRAB	Other nongroundfish
RDB1	NOM. REDBANDED ROCKFISH	Other slope rockfish
RDBD	REDBANDED ROCKFISH	Other slope rockfish

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REDS	REDSTRIPE ROCKFISH	Other shelf rockfish
REX	REX SOLE	Other flatfish
REX1	NOM. REX SOLE	Other flatfish
REYE	ROUGHEYE ROCKFISH	Other slope rockfish
RFLT	REMAINING FLATFISH	Other flatfish
RGL1	NOM. ROCK GREENLING	Other nongroundfish
RGRN	REMAINING GROUND FISH	Other groundfish
RHRG	ROUND HERRING	Other nongroundfish
RKCR	RED KING CRAB	Other nongroundfish
ROS1	NOM. ROSY ROCKFISH	Other shelf rockfish
ROSY	ROSY ROCKFISH	Other shelf rockfish
RPRW	RIDGEBACK PRAWN	Other nongroundfish
RRCK	REMAINING ROCKFISH	Other groundfish
RRND	REMAINING ROUND FISH	Other groundfish
RSL1	NOM. ROCK SOLE	Other flatfish
RSOL	ROCK SOLE	Other flatfish
RST1	NOM. ROSETHORN ROCKFISH	Other shelf rockfish
RSTN	ROSETHORN ROCKFISH	Other shelf rockfish
RURC	RED SEA URCHIN	Other nongroundfish
RZCL	ROSY RAZOR CLAM	Other nongroundfish
SABL	SABLEFISH	Sablefish
SAIL	SAILFISH	Other nongroundfish
SARY	PACIFIC SAURY	Other nongroundfish
SBL1	NOM. SHORTBELLY ROCKFISH	Shortbelly rockfish
SBLY	SHORTBELLY ROCKFISH	Shortbelly rockfish
SCLM	SOFT-SHELLED CLAM	Other nongroundfish
SCLP	UNSP. SCULPIN	Other nongroundfish
SCOR	CALIFORNIA SCORPIONFISH	Other nearshore rockfish
SCR1	NOM. CALIF. SCORPIONFISH	Other nearshore rockfish
SDB1	NOM. SPECKLED SANDDAB	Other non-FMP flatfish
SFL1	NOM. STARRY FLOUNDER	Starry flounder
SFLT	UNSP. SHALLOW FLOUNDERS	Other flatfish
SHAD	UNSPECIFIED SHAD	Other nongroundfish
SHP1	NOM. CALIFORNIA SHEEPHEAD	Other nongroundfish
SHPD	CALIFORNIA SHEEPHEAD	Other nongroundfish
SHRP	SHARPCHIN ROCKFISH	Sharpchin rockfish (Remaining rockfish)
SKCR	SCARLET KING CRAB	Other nongroundfish
SLGR	SILVERGREY ROCKFISH	Other shelf rockfish
SLNS	SLENDER SOLE	Other non-FMP flatfish
SMLT	UNSP. SMELT	Other nongroundfish
SNOS	SPLITNOSE ROCKFISH	Splitnose rockfish
SNS1	NOM. SPLITNOSE ROCKFISH	Splitnose rockfish
SOCK	SOCKEYE SALMON	Sockeye salmon
SPK1	NOM. SPECKLED ROCKFISH	Other shelf rockfish
SPKL	SPECKLED ROCKFISH	Other shelf rockfish
SPRW	SPOTTED PRAWN	Other nongroundfish
SQID	UNSP. SQUID	Other nongroundfish
SQR1	NOM. SQUARESPOT	Other shelf rockfish
SQRS	SQUARESPOT ROCKFISH	Other shelf rockfish

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SRFP	SURFPERCH SPP.	Other nongroundfish
SRKR	SHORTRAKER ROCKFISH	Other slope rockfish
SSCL	SHARPNOSE SCULPIN	Other nongroundfish
SSDB	SPECKLED SANDDAB	Other non-FMP flatfish
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish
SSLF	SOUTHERN SHELF ROCKFISH	Other shelf rockfish
SSLP	SOUTHERN SLOPE ROCKFISH	Other slope rockfish
SSO1	NOM. SAND SOLE	Other flatfish
SSOL	SAND SOLE	Other flatfish
SSP1	NOM. SHORTSPINE THORNYHEAD	Shortspine thornyhead
SSPN	SHORTSPINE THORNYHEAD	Shortspine thornyhead
SSRD	Deep So. Nearshore RF	Other nearshore rockfish
SSRK	SOUPFIN SHARK	Soupin shark
SSRS	Shallow So. Nearshore RF	Other nearshore rockfish
STAR	STARRY ROCKFISH	Other shelf rockfish
STL1	NOM. STRIPETAILED ROCKFISH	Other shelf rockfish
STLH	STEELHEAD	Steelhead
STNA	SKIPJACK TUNA	Other nongroundfish
STR1	NOM. STARRY ROCKFISH	Other shelf rockfish
STRK	STRIPETAILED ROCKFISH	Other shelf rockfish
STRY	STARRY FLOUNDER	Starry flounder
SUSF	SOU. UNSP. SHELF ROCKFISH	Other shelf rockfish
SUSP	SOU. UNSP. SLOPE ROCKFISH	Other slope rockfish
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish
SWRD	SWORDFISH	Other nongroundfish
SWS1	NOM. SWORDSPINE ROCKFISH	Other shelf rockfish
SWSP	SWORDSPINE ROCKFISH	Other shelf rockfish
TCOD	PACIFIC TOMCOD	Other nongroundfish
TGR1	NOM. TIGER ROCKFISH	Other shelf rockfish
THD1	NOM. THORNYHEADS	Mixed thornyheads
THDS	THORNYHEADS (MIXED)	Mixed thornyheads
TIGR	TIGER ROCKFISH	Other shelf rockfish
TRE1	NOM. TREEFISH	Other nearshore rockfish
TREE	TREEFISH	Other nearshore rockfish
TSRK	COMMON THRESHER SHARK	Other nongroundfish
UABL	UNSPECIFIED ABALONE	Other nongroundfish
UCLM	UNSPECIFIED CLAM	Other nongroundfish
UCRB	UNSPECIFIED CRAB	Other nongroundfish
UDAB	UNSP. SANDDABS	Other flatfish
UDF1	UNSP. DEEP-91 FLOUNDERS	Other flatfish
UDF2	UNSP. DEEP-95 FLOUNDERS	Other flatfish
UDM1	UNSP. DEMERSAL-91	Other groundfish
UDNR	UNSP. DEEP NEAR-SHORE RF	Other nearshore rockfish
UDSR	UNSP. DEMERSAL RKFSH	Other groundfish
UDW1	SHORTRAKER+ROUGHEYE	Other slope rockfish
UECH	UNSPECIFIED ECHINODERM	Other nongroundfish
UFL1	FLOUNDERS (NO FSOL)	Other flatfish
UFLT	UNSP. FLATFISH	Other flatfish
UGRN	UNSP. GROUND FISH	Other groundfish

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

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YTRK	YELLOWTAIL ROCKFISH	Yellowtail rockfish (Remaining rockfish)