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NOAA FISHERIES SERVICE

Data Report and Summary Analyses of the California and Oregon Pink Shrimp Trawl Fishery

NOAA



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Introduction

Overview

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

West Coast Pink Shrimp Trawl Fishery

The pink shrimp trawl fishery off the west coast of the United States primarily operates in Washington, Oregon, and Northern California. The WCGOP has observed vessels with Oregon state pink shrimp licenses and California state Northern Pink Shrimp Trawl Vessel licenses since 2004. However, pink shrimp fisheries were not observed by WCGOP in 2006. In 2007, the program combined California and Oregon pink shrimp fisheries into one sampling population for the period Mar-June 2007. Due to differences in regulations between Oregon and California, the pink shrimp trawl fisheries were again split into two sampling populations by state for the period Jul-Dec 2007. Since 2008, Oregon pink shrimp and California pink shrimp licenses have been observed as two separate fisheries. Washington pink shrimp trawlers were not initially observed by the WCGOP, as the state had not issued a ruling allowing federal observer coverage of its state managed fisheries. WCGOP began coverage of Washington pink shrimp licenses in 2010, with the same criteria used for Oregon and California state pink shrimp coverage.

For analysis purposes, only trips by shrimp vessels landing in/returning to a particular state are considered part of that state's pink shrimp fishery. This definition is consistent with state management of the pink shrimp fisheries. For example, Oregon licensed pink shrimp vessels selected by WCGOP can and do fish in waters off Washington state, but only trips which land in/return to Oregon are included in the Oregon pink shrimp analysis.

Pink shrimp trawl vessels range in size from 38 to 105 feet, with an average length of 65 feet, and can use single and double-rigged shrimp trawl gear. The pink shrimp fishery is open April 1 through October 31 and vessels deliver catch to shoreside processors. Vessels generally fish in depths ranging from 50 to 140 fathoms. Pink shrimp trawl vessels retain the portion of their catch that is marketable. The portion of the catch that is not marketable or for which regulations prohibit landing is discarded at-sea.

Oregon and California pink shrimp vessels are required to use bycatch reduction devices (BRDs) when targeting pink shrimp. The primary goal of requiring BRDs is to reduce the incidental take of groundfish species. In addition, both states have a minimum size requirement for pink shrimp of 160 individuals per pound. Vessels are allowed to land up to 500 pounds of groundfish per day multiplied by the number of days fished, but not to exceed 1,500 pounds per trip. However, since the requirements for BRD's were imposed, most groundfish species are rarely landed by pink shrimp trawl vessels.

Commercial Pink Shrimp Fisheries Data

Fisheries managers and enforcement officers use state-issued sales receipts, referred to as fish tickets, to monitor fishery landings. Fish ticket 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 only provide information on the amount of fish 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 and retain 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 Oregon and California vessels that fish in certain state managed fisheries (nearshore, pink shrimp, and California halibut) 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 open access and nearshore fisheries. The observer coverage plan is available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observersamplingplan.pdf>.

Methods

Pink Shrimp Trawl Fishery License Selection

State-issued pink shrimp trawl licenses 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.

California Department of Fish and Game (CDGFG) provided the WCGOP with a list of vessels that participate in the Northern Pink Shrimp Trawl fishery and the Oregon Department of Fish and Wildlife provided the WCGOP with a list of pink shrimp licenses and associated vessels. The data in this report were collected during the selection cycle from March 1, 2009 to October 31, 2009 (selection cycle 5). The initial 2009 list for Oregon pink shrimp vessels had 129 vessels. The initial 2009 list with California Northern Pink Shrimp trawl licenses had 40 vessels. The WCGOP then reduced each list using the following criteria:

- Vessel landed \geq 500 lbs pink shrimp in the previous two year period.
- Vessel is greater than 17 feet in length.

After the criteria were applied, 59 vessels were selected for coverage in Oregon and 8 vessels in California during 2009.

Vessels with pink shrimp permits were assigned to a port group based upon the location of their landings in the previous year. Port groups generally contain one or two major ports and several smaller ports within a contiguous geographic area. Within each port group, permits were randomly selected for coverage. California shrimp vessels were selected for a two-month period in 2009, and for a one-month period in 2010. Oregon pink shrimp vessels were selected for a one-month period but only observed every other trip. In 2010, Oregon pink shrimp vessels were

selected and covered for all trips in a one-month period. Washington pink shrimp vessels were also selected for a one-month period when coverage began in 2010.

After the entire fleet has been selected, a new selection cycle begins. This selection process was 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 pink shrimp permits on an annual basis. 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 Pink Shrimp Trawl Fishery

Nearly all trips taken within a one or two-month period by a vessel whose state pink shrimp permit has been selected are covered by an observer. However, sometimes vessels whose permits are selected for a specific one or two-month period might not be covered by an observer during that period or might not be covered on all trips during that period.

A trip might 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 pink shrimp trawl vessels might be 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.

Some vessels might receive a coverage period waiver. Coverage period waivers allow a vessel to fish all trips during a one or 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 one or two-month period and are added to the selection list for the next one or 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 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/shrimp retained by catch category

- 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 the 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 Oregon and California pink shrimp trawl fisheries; 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 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 catch 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::

$$A_{mk} = \frac{x_{mtk}}{\sum_k x_{mtk}}$$

where:

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

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

The equation used to adjust the WCGOP data is:

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

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:

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

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

where:

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

C_{mk} = 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 pink shrimp trawl fishery are calculated as the proportion of fleet-wide landings of pink shrimp that were observed. Coverage rates were computed based on the complete annual dataset for 2009.

After a coverage rate was 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) were calculated for each species across all data or, when there was a sufficient sample size, by fleet (f) (Oregon or California):

$$R_f = \frac{\sum_t y_{ft}}{\sum_t x_{ft}}$$

where:

y_{ft} = the discarded or total catch pounds of a species in tow t and fleet f
 x_{ft} = the retained pounds of pink shrimp in tow t and fleet f

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

$$\text{Var}(R_f) = \left(\frac{\bar{y}_f}{\bar{x}_f} \right)^2 \left[\frac{s^2(y_{ft})}{\bar{y}_f^2} + \frac{s^2(x_{ft})}{\bar{x}_f^2} - \left(\frac{s^2(y_{ft})}{\bar{y}_f^2} \cdot \frac{s^2(x_{ft})}{\bar{x}_f^2} \right) \right]$$

where:

\bar{x}_f and \bar{y}_f = the means of x_{ft} and y_{ft} over the tows from fleet f
 $s^2(x_{ft})$ and $s^2(y_{ft})$ = the standard errors of x_{ft} and y_{ft} over all tows from fleet f

This variance estimator is consistent with that employed by Pikitch et al. (1998) and is based on methods presented by Cochran (1977). Note that $\text{Var}(R_{jdt})$ cannot be calculated when $x_{jdt} = 0$ or $y_{jdt} = 0$ for all tows and should be considered with extreme caution when R_{jdt} is equal to one. In order to best support fishery management, variance was calculated by year or separately for data from the Oregon and California fleets. 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 retained pink shrimp. Similarly, bycatch ratios were calculated as the observed total catch weight (discarded + retained) divided by the observed weight of retained pink shrimp.

Results and Discussion

Overall Coverage Levels

The total number of observed trips, tows, vessels, and observed and total fleet-wide pink shrimp landings in the California and Oregon pink shrimp trawl fisheries are summarized in Table 1 for 2009. The observed coverage rate, calculated as the proportion of fleet-wide pink shrimp landings that were observed, is provided with summaries for each WCGOP port group, for 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 in the pink shrimp trawl fishery has remained relatively consistent, with 2009 coverage at 7% coastwide. This is slightly higher than the 2008 coastwide coverage rate of 6% (NWFSC 2009b). All observations occurred north of the groundfish management line at 40° 10' N. latitude. The primary port groups observed in this fishery were Astoria, Newport, Coos Bay and Crescent City, with the largest total pink shrimp landings in Astoria during 2009. Total observed landings were similar to 2008. Observer coverage in Astoria was lower than other port groups in 2009, but similar to 2008. Observer coverage in the Newport port group was greater than in 2008. Coos Bay had a similar amount of observer coverage in 2008 and 2009 (Table 1). However, Crescent City had at least three vessels observed during 2009, and was no longer combined with the Coos Bay port group as in 2008.

The WCGOP controls only the selection of permits for coverage. Fishing activity of selected vessels is not always

predictable which can lead to variance in the percentage of landings or the number of trips actually observed. As a result, coverage levels could vary from year to year depending on which permits were selected.

Observed Total Catch, Discard Ratios, and Bycatch Ratios

The observed total catch weight (mt), discard weight (mt) and percent discarded from observed vessels in the pink shrimp fishery in 2009 is presented in Table 2. All observations and weights provided are from north of 40° 10' N. latitude, with Oregon and California data combined. Separate reporting for each individual state was not presented to ensure confidentiality. 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 and therefore, the WCGOP 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 butter sole at the species level, processors often report this weight along with other flatfish species as unspecified flatfish.

Similar to the 2008 pink shrimp fishery, observed coastwide total catch (discarded + retained) in the 2009 pink shrimp fishery was largely comprised of pink shrimp, Pacific hake, and flatfish species (Table 2). Of the rebuilding species, darkblotched rockfish was the most commonly observed. Canary rockfish, Pacific ocean perch and widow rockfish were caught in small amounts. The vast majority of catch other than pink shrimp is discarded in this fishery, as demonstrated by the percent discarded in the far right-hand column of Table 2. Non-target groundfish species which were retained in 2009 included sablefish (21%; 16% in 2008), as well as shelf (59%; 0% in 2008) and slope (70% which equaled 2008) rockfish. Pink shrimp and unidentified shrimp were the only non-groundfish species retained. Although there was no pink shrimp discard recorded, observers did record discard of unidentified shrimp. Observers are not required to identify shrimp to species due to time constraints.

Discard and bycatch ratios, as well as standard errors, for the 2009 pink shrimp fishery north of 40° 10' N. latitude are presented in Table 3. Species are grouped for ratio calculations according to Appendix B. All ratios in Table 3 were computed with pink shrimp and unidentified shrimp in the denominator. Discard ratios were relatively low for most species and species groups except for Pacific hake. Discard and bycatch ratios were often identical due to 100% of the observed catch for most species being discarded.

Biological Sampling Data: Length-Frequency Distributions

WCGOP observers primarily collect measurements of fish length, sometimes by sex, 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 pink shrimp fishery for non-protected resources from September 2003 through April 2010 are summarized in Table 4.

The length frequency distributions of discarded rebuilding groundfish species from biological data are provided for the pink shrimp fishery in Figure 1. Figure 2 presents length frequency distributions for other discarded species. Length frequency plots are shown for all species for which greater than 30 observations were available. These include darkblotched rockfish, Pacific ocean perch, arrowtooth flounder, aurora rockfish, dover sole, english sole, greenstriped rockfish, Pacific hake, Pacific sanddab, petrale sole, redbanded rockfish, rex sole, roughey rockfish, sablefish, shortspine thornyhead, spiny dogfish, splitnose rockfish, stripetail rockfish, and yellowtail rockfish.

The only protected fish species observed in the pink shrimp fishery between September 2003 and April 2010 was eulachon (discard of 0.65 mt, Table 2). For protected fish 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 green sturgeon and salmon is available in the WCGOP observer training manual (NWFSC 2009a). During 2009 to April 2010, observers collected the lengths of 237 individual eulachon of unknown sex (Table 4).

Summary

Discard and bycatch rates calculated from observer data collected in the Oregon and California pink shrimp trawl fisheries are now available for use in the management process. The observer data will be used in conjunction with additional commercial pink shrimp fishery landings information to expand discard estimates to the fleet-wide level in order to inform the management process of 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 groundfish rebuilding species observed in the Oregon and California pink shrimp trawl fishery from September 2003 - April 2010. Length frequencies are provided for species with more than 30 observations.

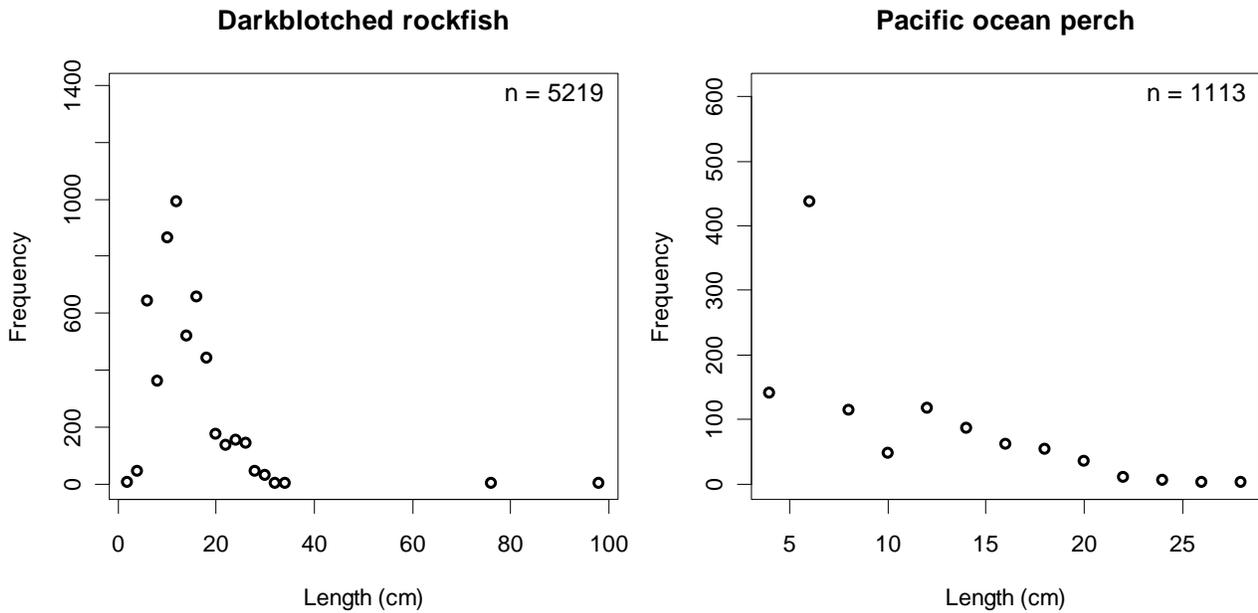


Figure 2. Length frequency distributions of discarded non-rebuilding groundfish species observed in the Oregon and California pink shrimp trawl fishery from September 2003 - April 2010. Length frequencies are provided for species with more than 30 observations.

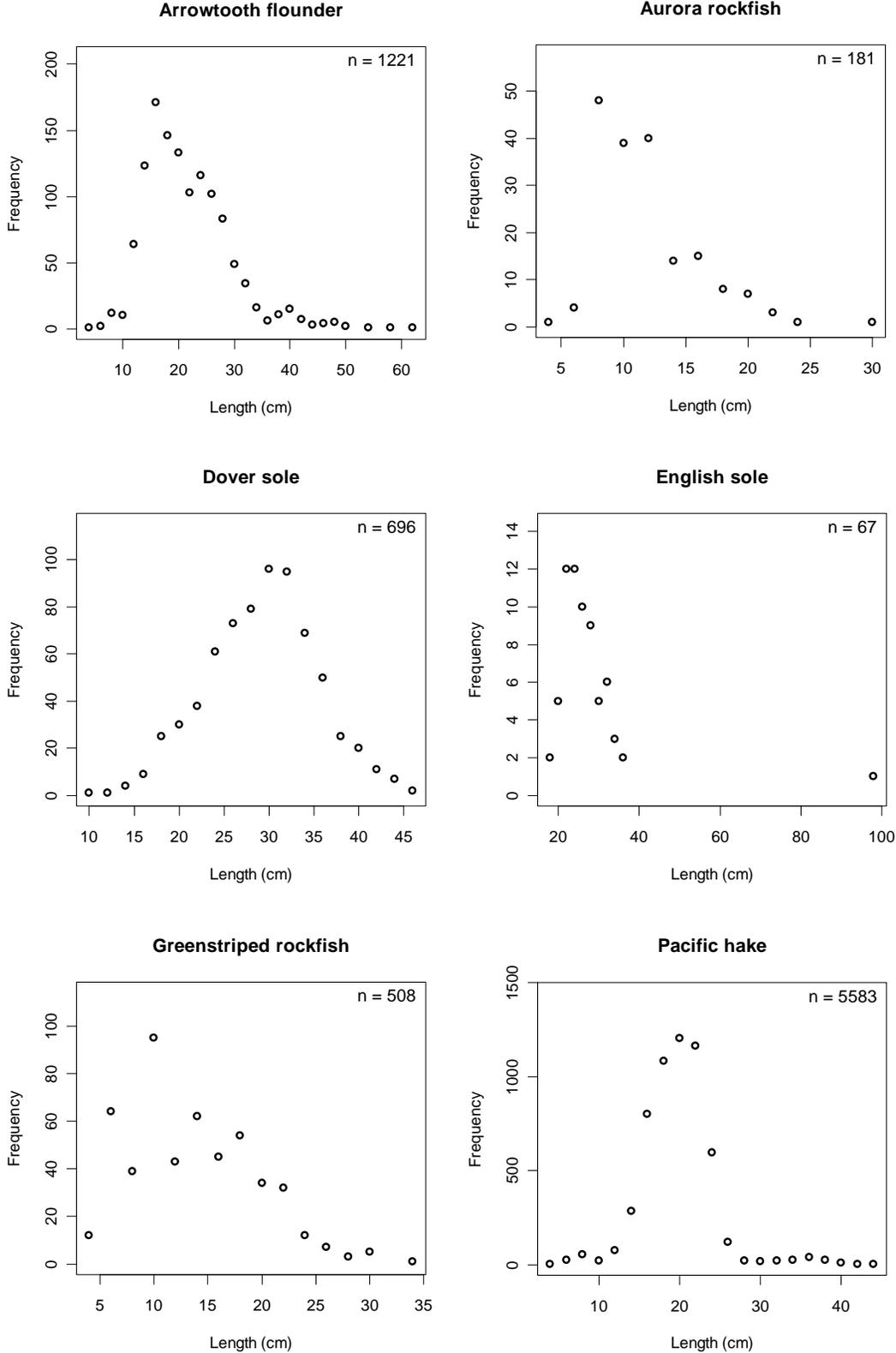


Figure 2 (continued). Length frequency distributions of discarded non-rebuilding groundfish species observed in the Oregon and California pink shrimp trawl fishery from September 2003 - April 2010. Length frequencies are provided for species with more than 30 observations .

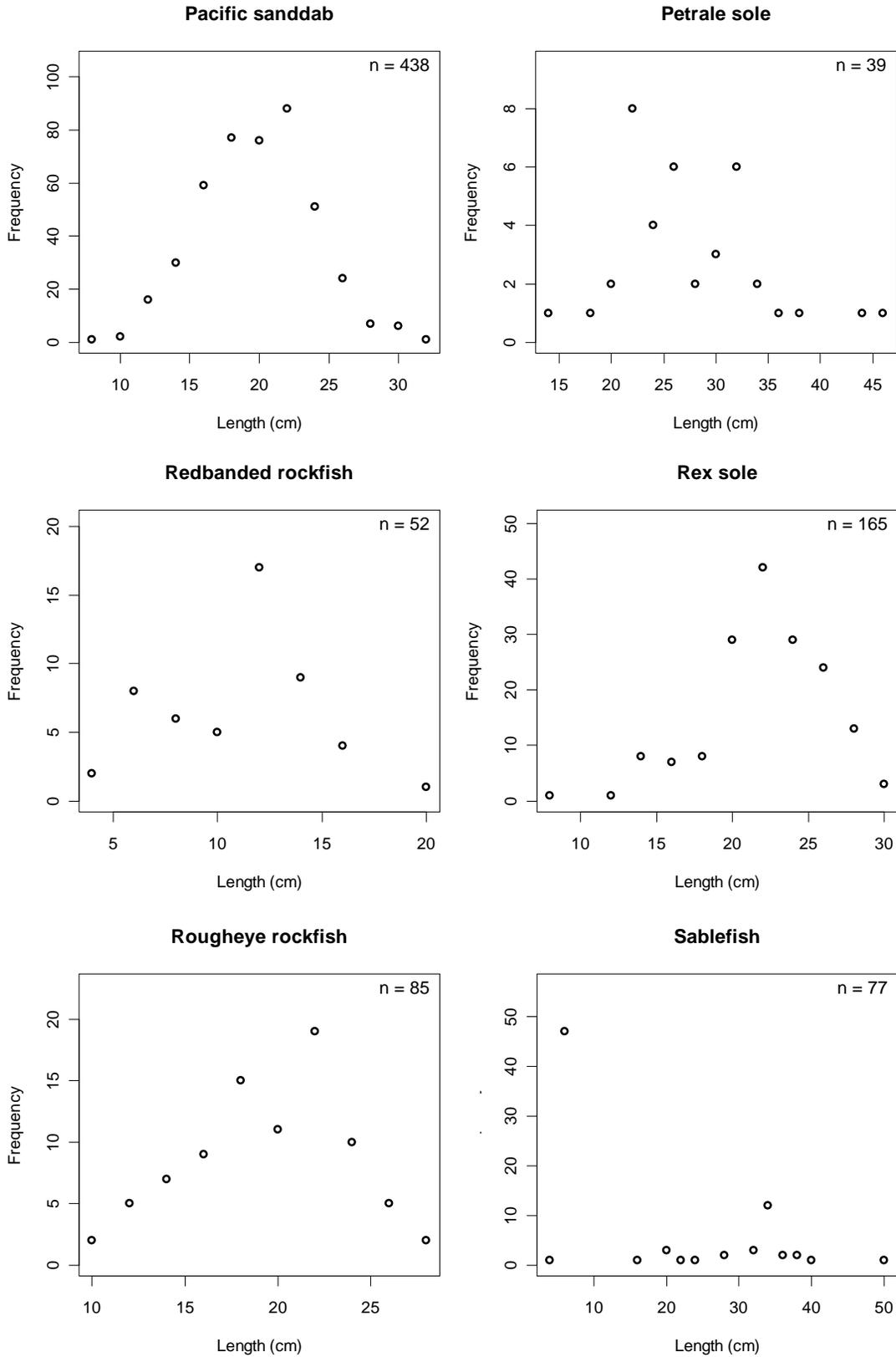
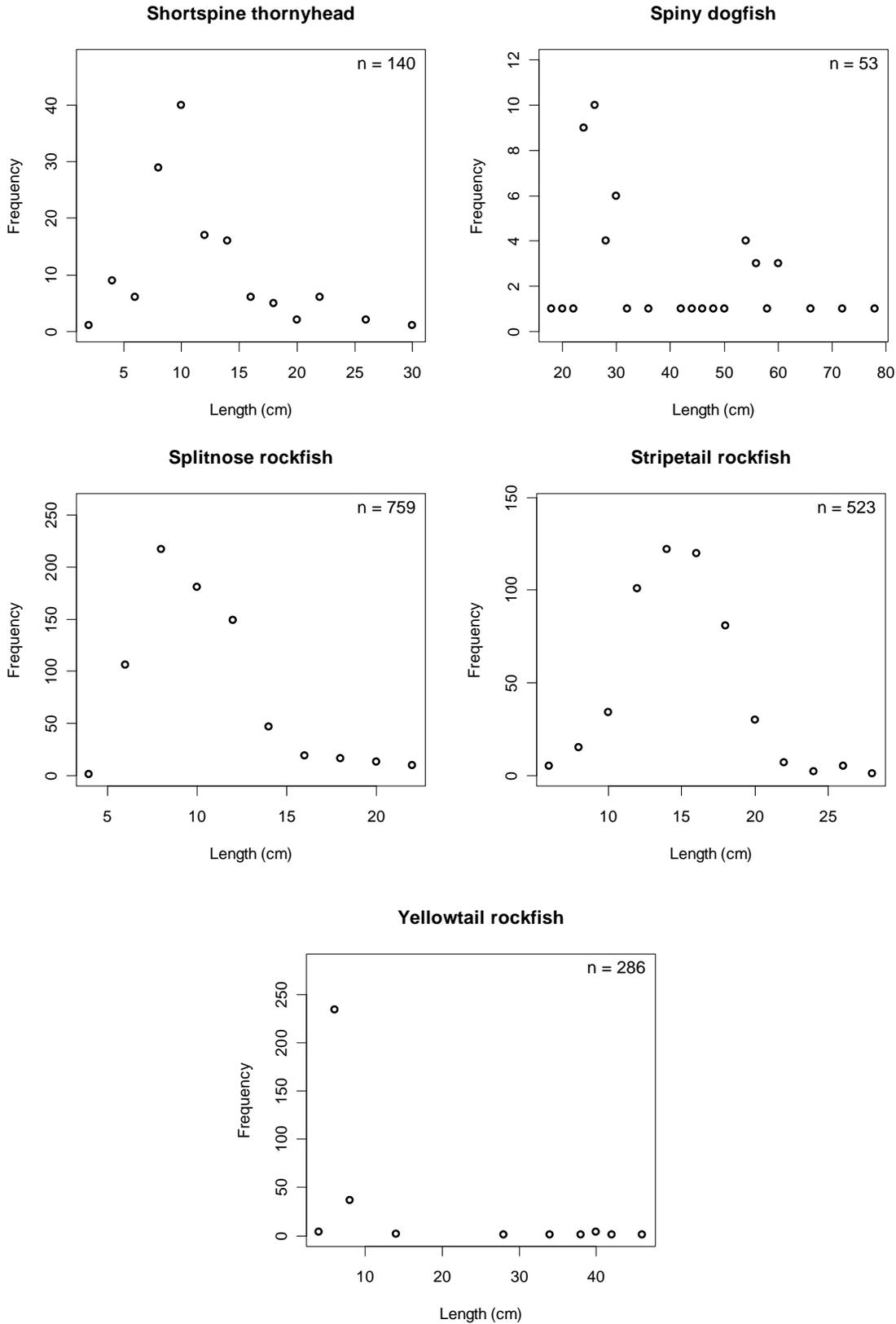


Figure 2 (continued). Length frequency distributions of discarded non-rebuilding groundfish species observed in the Oregon and California pink shrimp trawl fishery from September 2003 - April 2010. Length frequencies are provided for species with more than 30 observations.



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 observed trips, hauls, vessels and pink shrimp landings in the pink shrimp trawl fishery in 2009. Coverage rates (far-right column) for each port group and management area are computed as the proportion of total pink shrimp landings that were observed. Data are combined as needed to ensure confidentiality.

	Port Group	Number of observed trips	Number of observed hauls	Number of observed vessels	Observed pink shrimp landings (mt)	Total pink shrimp landings (mt)	% of total pink shrimp landings observed	
2009	Bellingham	--	--	--	--	--	--	
	Neah Bay	--	--	--	--	--	--	
	Astoria	16	232	11	198	5281	4%	
	Newport	16	246	11	276	2990	9%	
	Coos Bay	19	252	13	371	4461	8%	
	Crescent City	8	86	3	140	1681	8%	
	Eureka	--	--	--	--	--	--	
	Fort Bragg	--	--	--	--	--	--	
	San Francisco	--	--	--	--	--	--	
	Monterey	--	--	--	--	--	--	
	Morro Bay	--	--	--	--	--	--	
	Santa Barbara	--	--	--	--	--	--	
	Los Angeles	--	--	--	--	--	--	
		North of 40°10' N	59	816	37	985	14412	7%
		South of 40°10' N	--	--	--	--	--	--
	Coastwide total	59	816	37	985	14412	7%	

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. Observed catch weight (mt), discard weight (mt) and percent discarded from observed 2009 pink shrimp vessels. All data were collected north of 40°10' N. latitude.

North of 40°10' N Lat.	Total catch (mt)	Discard (mt)	Total % discarded
Rebuilding species			
Bocaccio	--	--	--
Canary rockfish	0.0022	0.0022	100.0%
Cowcod	--	--	--
Darkblotched rockfish	1.1011	1.1011	100.0%
Pacific ocean perch	0.0216	0.0216	100.0%
Widow rockfish	0.0030	0.0030	100.0%
Yelloweye rockfish	--	--	--
Non-rebuilding species			
Arrowtooth flounder	1.2506	1.2506	100.0%
Cabazon	0.0003	0.0003	100.0%
Dover sole	0.3983	0.3983	100.0%
English sole	0.0653	0.0653	100.0%
Flatfish	4.5834	4.5834	100.0%
Flathead sole		0.4165	
Pacific sanddab		0.1045	
Sand sole		0.0001	
Slender sole		4.0501	
Unspecified flatfish		0.0122	
Greenspotted rockfish	0.0001	0.0001	100.0%
Greenstriped rockfish	0.0601	0.0601	100.0%
Lingcod	0.0283	0.0283	100.0%
Longnose skate	0.1238	0.1238	100.0%
Other groundfish	0.0000	0.0000	100.0%
Pacific cod	0.0006	0.0006	100.0%
Petrale sole	0.0189	0.0189	100.0%
Rex sole	1.3479	1.3479	100.0%
Sablefish	0.2345	0.0495	21.1%
Shelf rockfish	0.2657	0.1569	59.0%
Redstripe rockfish		0.0016	
Stripetail rockfish		0.0197	
Unspecified shelf rockfish		0.1356	
Skates	0.0030	0.0030	100.0%
Sandpaper skate	0.0030	0.0030	100.0%
Slope rockfish	0.1221	0.1221	100.0%
Aurora rockfish		0.0180	
Blackgill rockfish		0.0001	
Redbanded rockfish		0.0014	
Rougheye rockfish		0.0000	
Sharpchin rockfish		0.0001	

Table 2 continued.

North of 40°10' N Lat.	Total catch (mt)	Discard (mt)	Total % discarded
Non-rebuilding species (cont.)			
Slope rockfish (cont.)			
Splitnose rockfish		0.1025	
Spiny dogfish	0.0270	0.0270	100.0%
Spotted ratfish	0.0098	0.0098	100.0%
Starry flounder	0.0017	0.0017	100.0%
Thornyheads	0.0267	0.0267	100.0%
Shortspine thornyhead	0.0267	0.0267	100.0%
Yellowtail rockfish	0.0163	0.0163	100.0%
Non-groundfish species			
American shad	0.0031	0.0031	100.0%
Anchovy (unidentified)	0.0003	0.0003	100.0%
Bigfin eelpout	0.0056	0.0056	100.0%
Bivalves (unidentified)	0.0001	0.0001	100.0%
Blackedge poacher	0.0023	0.0023	100.0%
Bluebarred prickleback	0.0002	0.0002	100.0%
Brown Irish lord sculpin	0.0008	0.0008	100.0%
Decomposed fish	0.0040	0.0040	100.0%
Dungeness crab	0.0139	0.0139	100.0%
Dwarf wrymouth	0.0004	0.0004	100.0%
Eelpout (unidentified)	0.7218	0.7218	100.0%
Eulachon	0.6509	0.6509	100.0%
Gunnel (unidentified)	0.0016	0.0016	100.0%
Hachetfish (unidentified)	0.0000	0.0000	100.0%
Hagfish (unidentified)	0.0675	0.0675	100.0%
Jellyfish (unidentified)	0.1263	0.1263	100.0%
Lancetfish (unidentified)	0.0000	0.0000	100.0%
Laternfish (unidentified)	0.0041	0.0041	100.0%
Medusafish	0.0001	0.0001	100.0%
Night smelt	0.0485	0.0485	100.0%
Octopus (unidentified)	0.1398	0.1398	100.0%
Pacific argentine	0.0001	0.0001	100.0%
Pacific hagfish	0.0761	0.0761	100.0%
Pacific hake	116.5214	116.5214	100.0%
Pacific herring	0.0991	0.0991	100.0%
Pacific lamprey	0.0035	0.0035	100.0%
Pacific sardine	0.0123	0.0123	100.0%
Pacific staghorn sculpin	0.0015	0.0015	100.0%

Table 2 continued.

North of 40°10' N Lat.	Total catch (mt)	Discard (mt)	Total % discarded
Non-groundfish species (cont.)			
Pink shrimp	861.9239	--	0.0%
Poacher (unidentified)	0.0663	0.0663	100.0%
Prickleback (unidentified)	0.0007	0.0007	100.0%
Ragfish	0.0000	0.0000	100.0%
Scaleless dragonfish (unidentified)	0.0001	0.0001	100.0%
Sculpin (unidentified)	0.0242	0.0242	100.0%
Sea cucumber (unidentified)	0.0210	0.0210	100.0%
Shrimp (unidentified)	31.4222	26.4326	84.1%
Slim sculpin	0.0007	0.0007	100.0%
Smelt (unidentified)	0.0346	0.0346	100.0%
Snailfish (unidentified)	0.0025	0.0025	100.0%
Spiky king crab	0.0000	0.0000	100.0%
Spotted cusk-eel	0.0017	0.0017	100.0%
Squid (unidentified)	0.0733	0.0733	100.0%
Surfperch (unidentified)	0.0009	0.0009	100.0%
Threadfin Sculpin	0.0001	0.0001	100.0%
Urchin (unidentified)	0.0259	0.0259	100.0%
Unspecified fish	0.0150	0.0575	100.0%
Walleye pollock	0.0001	0.0001	100.0%
Whitebait smelt	0.4073	0.4073	100.0%
Whitebarred prickleback	0.0016	0.0016	100.0%
Wrymouth (unidentified)	0.0024	0.0024	100.0%

Table 3. Discard ratios, bycatch ratios and standard errors from observed trips in the 2009 pink shrimp trawl fishery. All data were collected north of 40°10' N. latitude. Discard ratios are computed as the observed discard weight divided by the retained weight of pink shrimp. Bycatch ratios are computed as the observed total catch weight divided by the retained weight of pink shrimp. Species are grouped according to Appendix B.

North of 40°10' N Lat.	Discard ratio	SE	Bycatch ratio	SE
Rebuilding species				
Bocaccio	--	--	--	--
Canary rockfish	0.0000	0.0012	0.0000	0.0012
Cowcod	--	--	--	--
Darkblotched rockfish	0.0013	0.0003	0.0013	0.0003
Pacific ocean perch	0.0000	0.0001	0.0000	0.0001
Widow rockfish	0.0000	0.0001	0.0000	0.0001
Yelloweye rockfish	--	--	--	--
Non-rebuilding species				
Arrowtooth flounder	0.0014	0.0003	0.0014	0.0003
Cabezon - Oregon	0.0000	0.0001	0.0000	0.0001
Dover sole	0.0005	0.0002	0.0005	0.0002
English sole	0.0001	0.0013	0.0001	0.0013
Greenspotted rockfish	0.0000	--	0.0000	--
Greenstriped rockfish	0.0001	0.0001	0.0001	0.0001
Lingcod (Washington/Oregon)	0.0000	0.0010	0.0000	0.0010
Lingcod (California)	0.0000	0.0008	0.0000	0.0008
Longnose skate	0.0001	0.0017	0.0001	0.0017
Other flatfish	0.0022	0.0003	0.0022	0.0003
Other groundfish	0.0000	0.0001	0.0000	0.0001
Other shelf rockfish	0.0002	0.0004	0.0003	0.0009
Other slope rockfish	0.0000	0.0002	0.0000	0.0002
Pacific hake	0.1344	0.0146	0.1344	0.0146
Petrale sole	0.0000	0.0001	0.0000	0.0001
Redstripe rockfish	0.0000	--	0.0000	--
Sablefish	0.0001	0.0006	0.0003	0.0067
Sharpchin rockfish	0.0000	--	0.0000	--
Shortspine thornyhead	0.0000	0.0001	0.0000	0.0001
Spiny dogfish	0.0000	0.0003	0.0000	0.0003
Splitnose rockfish	0.0001	0.0002	0.0001	0.0002
Starry flounder	0.0000	0.0001	0.0000	0.0001
Yellowtail rockfish	0.0000	0.0008	0.0000	0.0008
Non-groundfish species				
Dungeness crab	0.0000	0.0003	0.0000	0.0003
Eulachon	0.0008	0.0010	0.0008	0.0010
Other non-FMP flatfish	0.0047	0.0007	0.0047	0.0007
Other non-FMP skate	0.0000	0.0001	0.0000	0.0001
Other nongroundfish	0.0024	0.0002	0.0024	0.0002
Pink shrimp + Unidentified shrimp	0.0305	0.0098	1.0305	0.0615

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 - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude
ALBC	ALBACORE	Other nongroundfish	Other nongroundfish
AKSK	ALASKA SKATE	Other non-FMP skate	Other non-FMP skate
AMCK	ATKA MACKEREL	Other nongroundfish	Other nongroundfish
APLC	ALASKA PLAICE	Other non-FMP flatfish	Other non-FMP flatfish
ARR1	NOM. AURORA ROCKFISH	Other slope rockfish	Other slope rockfish
ARRA	AURORA ROCKFISH	Other slope rockfish	Other slope rockfish
ART1	NOM. ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder
ARTH	ARROWTOOTH FLOUNDER	Arrowtooth flounder	Arrowtooth flounder
ASKT	ALEUTIAN SKATE	Other 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)
BCAC	BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio
BCC1	NOM. BOCACCIO	Bocaccio (Remaining rockfish)	Bocaccio
BCLM	BUTTER CLAM	Other nongroundfish	Other nongroundfish
BGL1	NOM. BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)
BHAG	BLACK HAGFISH	Other nongroundfish	Other nongroundfish
BISC	BROWN IRISH LORD	Other nongroundfish	Other nongroundfish
BKCR	BLUE KING CRAB	Other nongroundfish	Other nongroundfish
BLCK	BLACK ROCKFISH	Black rockfish	Black rockfish
BLGL	BLACKGILL ROCKFISH	Other slope rockfish	Blackgill (Remaining rockfish)
BLK1	NOM. BLACK ROCKFISH	Black rockfish	Black rockfish
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
BLUR	BLUE ROCKFISH	Blue rockfish	Blue rockfish
BMCK	BULLET MACKEREL	Other nongroundfish	Other nongroundfish
BMRL	BLUE MARLIN	Other nongroundfish	Other nongroundfish
BMSL	BLUE OR BAY MUSSEL	Other nongroundfish	Other nongroundfish
BNK1	NOM. BANK ROCKFISH	Other slope rockfish	Bank rockfish (Remaining rockfish)
BRNZ	BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish
BRW1	NOM. BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
BRWN	BROWN ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
BRZ1	NOM. BRONZESPOTTED ROCKFISH	Other shelf rockfish	Other shelf rockfish
BSCL	BUFFALO SCULPIN	Other nongroundfish	Other nongroundfish
BSJK	BLACK SKIPJACK	Other nongroundfish	Other nongroundfish
BSKT	BIG SKATE	Big skate	Big skate
BSOL	BUTTER SOLE	Other flatfish	Other flatfish
BSRK	BLUE SHARK	Other nongroundfish	Other nongroundfish
BSRM	UNSP. BAIT SHRIMP	Other nongroundfish	Other nongroundfish
BTCR	BAIRDI TANNER CRAB	Tanner crab	Tanner crab
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
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
CBZ1	NOM. CABEZON	Other groundfish	Cabezon
CBZN	CABEZON	Other groundfish	Cabezon

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude
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
CHNA	CHINA ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
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
CLCO	CALICO ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
CLP1	NOM. CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper rockfish
CLPR	CHILIPEPPER	Chilipepper (Remaining rockfish)	Chilipepper rockfish
CMCK	CHUB MACKEREL	Other nongroundfish	Other nongroundfish
CMEL	CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish
CML1	NOM. CHAMELEON ROCKFISH	Other shelf rockfish	Other shelf rockfish
CMSL	CALIFORNIA MUSSEL	Other nongroundfish	Other nongroundfish
CNR1	NOM. CANARY ROCKFISH	Canary rockfish	Canary rockfish
CNRY	CANARY ROCKFISH	Canary rockfish	Canary rockfish
COHO	COHO SALMON	Other nongroundfish	Other nongroundfish
COP1	NOM. COPPER ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
COPP	COPPER ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
CPLN	CAPELIN	Other nongroundfish	Other nongroundfish
CSKT	CALIFORNIA SKATE	California skate	California skate
CSL1	NOM. CURLFIN SOLE	Other flatfish	Other flatfish
CSLK	CALIFORNIA SLICKHEAD	Other nongroundfish	Other nongroundfish
CSRK	BROWN CAT SHARK	Other nongroundfish	Other nongroundfish
CSOL	CURLFIN SOLE	Other flatfish	Other flatfish
CTRB	C-O SOLE	Other non-FMP flatfish	Other non-FMP flatfish
CUDA	PACIFIC BARRACUDA	Other nongroundfish	Other nongroundfish
CWC1	NOM. COWCOD ROCKFISH	Other shelf rockfish	Cowcod
CWCD	COWCOD ROCKFISH	Other shelf rockfish	Cowcod
DARK	DARK ROCKFISH	Other shelf rockfish	Other shelf rockfish
DBR1	NOM. DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish
DBRK	DARKBLOTCHED ROCKFISH	Darkblotched rockfish	Darkblotched rockfish
DCRB	DUNGENESS CRAB	Dungeness crab	Dungeness crab
DFLT	UNSP. DEEP FLOUNDERS	Other flatfish	Other flatfish
DOVR	DOVER SOLE	Dover sole	Dover sole
DRDO	DORADO	Other nongroundfish	Other nongroundfish
DSOL	DEEPSEA SOLE	Other non-FMP flatfish	Other non-FMP flatfish
DSRK	SPINY DOGFISH	Spiny dogfish	Spiny dogfish
DTRB	DIAMOND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish
DUSK	DUSKY ROCKFISH	Other groundfish	Other groundfish
DVR1	NOM. DOVER SOLE	Dover sole	Dover sole
DWRF	DWARF-RED ROCKFISH	Other shelf rockfish	Other shelf rockfish
EELS	UNSPECIFIED EELS	Other nongroundfish	Other nongroundfish
EGL1	NOM. ENGLISH SOLE	English sole	English sole
EGLS	ENGLISH SOLE	English sole	English sole
ESTR	EASTERN OYSTER	Other nongroundfish	Other nongroundfish
ETNA	BIGEYE TUNA	Other nongroundfish	Other nongroundfish
EULC	EULACHON	Eulachon	Eulachon
EURO	EUROPEAN OYSTER	Other nongroundfish	Other nongroundfish
FLAG	FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish
FLG1	NOM. FLAG ROCKFISH	Other shelf rockfish	Other shelf rockfish
FNTS	FANTAIL SOLE	Other non-FMP flatfish	Other non-FMP flatfish
FRCK	FRECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude
FSOL	FLATHEAD SOLE	Other flatfish	Other flatfish
GABL	GREEN ABALONE	Other nongroundfish	Other nongroundfish
GBAS	GIANT SEA BASS	Other nongroundfish	Other nongroundfish
GBL1	NOM. GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish
GBLC	GREENBLOTCHED ROCKFISH	Other shelf rockfish	Other shelf rockfish
GCLM	GAPER CLAM	Other nongroundfish	Other nongroundfish
GDUK	GEODUCK	Other nongroundfish	Other nongroundfish
GGRD	GIANT GRENADIER	Other nongroundfish	Other nongroundfish
GKCR	GOLDEN KING CRAB	Other nongroundfish	Other nongroundfish
GPH1	NOM. GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)
GPHR	GOPHER ROCKFISH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)
GPRW	GOLDEN PRAWN	Other nongroundfish	Other nongroundfish
GRAS	GRASS ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
GRDR	UNSP. GRENADIERS	Grenadiers	Grenadiers
GREN	PACIFIC GRENADIER	Grenadiers	Grenadiers
GRS1	NOM. GRASS ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
GSP1	NOM. GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish
GSPT	GREENSPOTTED ROCKFISH	Greenspotted rockfish	Greenspotted rockfish
GSQD	GIANT SQUID	Other nongroundfish	Other nongroundfish
GSR1	NOM. GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish
GSRK	GREENSTRIPED ROCKFISH	Greenstriped rockfish	Greenstriped rockfish
GSRM	GHOST SHRIMP	Other nongroundfish	Other nongroundfish
GSTG	GREEN STURGEON	Other nongroundfish	Other nongroundfish
GTRB	GREENLAND TURBOT	Other non-FMP flatfish	Other non-FMP flatfish
HBRK	HALFBANDED ROCKFISH	Other shelf rockfish	Other shelf rockfish
HCLM	HORSE CLAMS	Other nongroundfish	Other nongroundfish
HLQN	HARLEQUIN ROCKFISH	Other shelf rockfish	Other shelf rockfish
HNY1	NOM. HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish
HNYC	HONEYCOMB ROCKFISH	Other shelf rockfish	Other shelf rockfish
HTRB	HORNYHEAD TURBOT	Other non-FMP flatfish	Other non-FMP flatfish
ISRK	BIGEYE THRESHER SHARK	Other nongroundfish	Other nongroundfish
JCLM	CALIFORNIA JACKKNIFE CLAM	Other nongroundfish	Other nongroundfish
JMCK	JACK MACKEREL	Other nongroundfish	Other nongroundfish
KFSH	GIANT KELPFISH	Other nongroundfish	Other nongroundfish
KGL1	NOM. KELP GREENLING	Kelp greenling	Kelp greenling
KLP1	NOM. KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
KLPG	KELP GREENLING	Kelp greenling	Kelp greenling
KLPR	KELP ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
KMKA	KAMCHATKA FLOUNDER	Other non-FMP flatfish	Other non-FMP flatfish
KSTR	KUMAMOTO OYSTER	Other nongroundfish	Other nongroundfish
LCD1	NOM. LINGCOD	Lingcod	Lingcod
LCLM	NATIVE LITTLENECK	Other nongroundfish	Other nongroundfish
LCOD	LINGCOD	Lingcod	Lingcod
LDAB	LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish
LDB1	NOM. LONGFIN SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish
LOBS	CALIF. SPINY LOBSTER	Other nongroundfish	Other nongroundfish
LSKT	LONGNOSE SKATE	Longnose skate	Longnose skate
LSP1	NOM. LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead
LSPN	LONGSPINE THORNYHEAD	Longspine thornyhead	Longspine thornyhead
LSRK	LEOPARD SHARK	Other groundfish	Other groundfish
LSTR	OLYMPIA OYSTER	Other nongroundfish	Other nongroundfish
LUVR	LOUVAR	Other nongroundfish	Other nongroundfish
MACL	MUD CLAMS	Other nongroundfish	Other nongroundfish

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude
MAKO	SHORTFIN MAKO SHARK	Other nongroundfish	Other nongroundfish
MCLM	MANILA CLAM	Other nongroundfish	Other nongroundfish
MEEL	MONKEYFACE EEL	Other nongroundfish	Other nongroundfish
MISC	MISC. FISH/ANIMALS	Other nongroundfish	Other nongroundfish
MOLA	COMMON MOLA	Other nongroundfish	Other nongroundfish
MRLN	STRIPED MARLIN	Other nongroundfish	Other nongroundfish
MSC2	MISCELLANEOUS FISH	Other nongroundfish	Other nongroundfish
MSHP	PLAINFIN MIDSHIPMAN	Other nongroundfish	Other nongroundfish
MSQD	MARKET SQUID	Other nongroundfish	Other nongroundfish
MSRM	MUD SHRIMP	Other nongroundfish	Other nongroundfish
MXR1	NOM. MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish
MXRF	MEXICAN ROCKFISH	Other shelf rockfish	Other shelf rockfish
NANC	NORTHERN ANCHOVY	Other nongroundfish	Other nongroundfish
NRCK	NORTHERN ROCKFISH	Other groundfish	Other groundfish
NSHR	NORTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
NSLF	NORTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish
NSLP	NORTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish
NUSF	NOR. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish
NUSP	NOR. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish
NUSR	NOR. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
OABL	OTHER ABALONE	Other nongroundfish	Other nongroundfish
OANC	OTHER ANCHOVY	Other nongroundfish	Other nongroundfish
OBAS	OTHER BASS	Other nongroundfish	Other nongroundfish
OCLM	OTHER CLAM	Other nongroundfish	Other nongroundfish
OCRB	OTHER CRAB	Other nongroundfish	Other nongroundfish
OCRK	OTHER CROAKER	Other nongroundfish	Other nongroundfish
OCTP	UNSP. OCTOPUS	Other nongroundfish	Other nongroundfish
ODSR	OTHER DEMERSAL RKFSH	Other groundfish	Other groundfish
OECH	OTHER ECHINODERM	Other nongroundfish	Other nongroundfish
OFLT	OTHER FLATFISH	Other flatfish	Other flatfish
OGRN	OTHER GROUND FISH	Other groundfish	Other groundfish
OLV1	NOM. OLIVE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
OLVE	OLIVE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
OMSK	OTHER MOLLUSKS	Other nongroundfish	Other nongroundfish
OPLG	OTHER PELAGIC RKFSH	Other groundfish	Other groundfish
ORCK	OTHER ROCKFISH	Other slope rockfish (>150 fm)	Other slope rockfish (>150 fm)
ORCK	OTHER ROCKFISH	Other shelf rockfish (<150 fm)	Other shelf rockfish (<150 fm)
ORND	OTHER ROUND FISH	Other groundfish	Other groundfish
OSCL	OTHER SCALLOP	Other nongroundfish	Other nongroundfish
OSKT	OTHER SKATES	Unspecified skate	Unspecified skate
OSLR	OTHER SLOPE RKFSH	Other slope rockfish	Other slope rockfish
OSRK	OTHER SHARK	Other nongroundfish	Other nongroundfish
OSRM	OTHER SHRIMP	Other nongroundfish	Other nongroundfish
OSTR	OTHER OYSTER	Other nongroundfish	Other nongroundfish
OTCR	OPILIO TANNER CRAB	Tanner crab	Tanner crab
OTNA	OTHER TUNA	Other nongroundfish	Other nongroundfish
OURC	OTHER SEA URCHINS	Other nongroundfish	Other nongroundfish
OWFS	OCEAN WHITEFISH	Other nongroundfish	Other nongroundfish
PABL	PINK ABALONE	Other nongroundfish	Other nongroundfish
PBNT	PACIFIC BONITO	Other nongroundfish	Other nongroundfish
PBTR	PACIFIC BUTTERFISH	Other nongroundfish	Other nongroundfish
PCLM	PISMO CLAM	Other nongroundfish	Other nongroundfish
PCOD	PACIFIC COD	Pacific cod	Other groundfish

PacFIN Species ID	PacFIN Common Name	Species Group - North of 40° 10' N latitude	Species Group - South of 40° 10' N latitude
PDAB	PACIFIC SANDDAB	Other flatfish	Other flatfish
PDB1	NOM. PACIFIC SANDDAB	Other flatfish	Other flatfish
PFNS	PACIFIC FLATNOSE	Other groundfish	Other groundfish
PGMY	PYGMY ROCKFISH	Other shelf rockfish	Other shelf rockfish
PHAG	PACIFIC HAGFISH	Other nongroundfish	Other nongroundfish
PHLB	PACIFIC HALIBUT	Other nongroundfish	Other nongroundfish
PHRG	PACIFIC HERRING	Other nongroundfish	Other nongroundfish
PINK	PINK SALMON	Other nongroundfish	Other nongroundfish
PLCK	WALLEYE POLLOCK	Other groundfish	Other groundfish
PNK1	NOM. PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish
PNKR	PINK ROCKFISH	Other shelf rockfish	Other shelf rockfish
POMF	PACIFIC POMFRET	Other nongroundfish	Other nongroundfish
POP	PACIFIC OCEAN PERCH	Pacific ocean perch	Other slope rockfish
POP1	GEN. SHELF/SLOPE RF	Other slope rockfish	Other slope rockfish
POP2	NOMINAL POP	Pacific ocean perch	Other slope rockfish
PRCL	PURPLE CLAM	Other nongroundfish	Other nongroundfish
PROW	PROWFISH	Other nongroundfish	Other nongroundfish
PRR1	NOM. PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish
PRRK	PINKROSE ROCKFISH	Other shelf rockfish	Other shelf rockfish
PSDN	PACIFIC SARDINE	Other nongroundfish	Other nongroundfish
PSHP	PINK SHRIMP	Other nongroundfish	Other nongroundfish
PSRK	PELAGIC THRESHER SHARK	Other nongroundfish	Other nongroundfish
PSTR	PACIFIC OYSTER	Other nongroundfish	Other nongroundfish
PTR1	NOM. PETRALE SOLE	Petrale sole	Petrale sole
PTRL	PETRALE SOLE	Petrale sole	Petrale sole
PUGT	PUGET SOUND ROCKFISH	Other shelf rockfish	Other shelf rockfish
PWHT	PACIFIC WHITING	Pacific hake	Pacific hake
QCLM	NORTHERN QUAHOG CLAM	Other nongroundfish	Other nongroundfish
QFSH	QUEENFISH	Other nongroundfish	Other nongroundfish
QLB1	NOM. QUILLBACK ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
QLBK	QUILLBACK ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
RABL	RED ABALONE	Other nongroundfish	Other nongroundfish
RATF	SPOTTED RATFISH	Other groundfish	Other groundfish
RCK1	BOCACIO+CHILIPEPPER RCKFSH	Other shelf rockfish	Other shelf rockfish
RCK2	UNSP. BOLINA RCKFSH	Other nearshore rockfish	Other nearshore rockfish
RCK3	UNSP. DPWTR REDS RCKFSH	Other slope rockfish	Other slope rockfish
RCK4	UNSP. REDS RCKFSH	Other groundfish	Other groundfish
RCK5	UNSP. SMALL REDS RCKFSH	Other groundfish	Other groundfish
RCK6	UNSP. ROSEFISH RCKFSH	Other groundfish	Other groundfish
RCK7	UNSP. GOPHER RCKFSH	Other nearshore rockfish	Gopher rockfish (Remaining rockfish)
RCK8	CANARY+VERMILION RCKFSH	Canary rockfish	Canary rockfish
RCK9	BLACK+BLUE ROCKFISH	Black rockfish	Black rockfish
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
RDBD	REDBANDED ROCKFISH	Other slope rockfish	Other slope rockfish
REDS	REDSTRIPE ROCKFISH	Redstripe rockfish (Remaining rockfish)	Other shelf rockfish
REX	REX SOLE	Other flatfish	Other flatfish
REX1	NOM. REX SOLE	Other flatfish	Other flatfish
REYE	ROUGHEYE ROCKFISH	Other slope rockfish	Other slope rockfish
RFLT	REMAINING FLATFISH	Other flatfish	Other flatfish
RGL1	NOM. ROCK GREENLING	Other nongroundfish	Other nongroundfish

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RGRN	REMAINING GROUND FISH	Other groundfish	Other groundfish
RHRG	ROUND HERRING	Other nongroundfish	Other nongroundfish
RKCR	RED KING CRAB	Other nongroundfish	Other nongroundfish
ROS1	NOM. ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish
ROSY	ROSY ROCKFISH	Other shelf rockfish	Other shelf rockfish
RPRW	RIDGEBACK PRAWN	Other nongroundfish	Other nongroundfish
RRCK	REMAINING ROCKFISH	Other groundfish	Other groundfish
RRND	REMAINING ROUND FISH	Other groundfish	Other groundfish
RSCL	RED IRISH LORD	Other nongroundfish	Other nongroundfish
RSL1	NOM. ROCK SOLE	Other flatfish	Other flatfish
RSOL	ROCK SOLE	Other flatfish	Other flatfish
RSRM	GRASS SHRIMP	Other nongroundfish	Other nongroundfish
RST1	NOM. ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish
RSTN	ROSETHORN ROCKFISH	Other shelf rockfish	Other shelf rockfish
RURC	RED SEA URCHIN	Other nongroundfish	Other nongroundfish
RZCL	ROSY RAZOR CLAM	Other nongroundfish	Other nongroundfish
SABL	SABLEFISH	Sablefish	Sablefish
SAIL	SAILFISH	Other nongroundfish	Other nongroundfish
SARY	PACIFIC SAURY	Other nongroundfish	Other nongroundfish
SBL1	NOM. SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish
SBLY	SHORTBELLY ROCKFISH	Shortbelly rockfish	Shortbelly rockfish
SCLM	SOFT-SHELLED CLAM	Other nongroundfish	Other nongroundfish
SCLP	UNSP. SCULPIN	Other nongroundfish	Other nongroundfish
SCOR	CALIFORNIA SCORPIONFISH	Other groundfish	Other groundfish
SCR1	NOM. CALIF. SCORPIONFISH	Other groundfish	Other groundfish
SDB1	NOM. SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish
SFL1	NOM. STARRY FLOUNDER	Starry flounder	Starry flounder
SFLT	UNSP. SHALLOW FLOUNDERS	Other flatfish	Other flatfish
SHAD	UNSPECIFIED SHAD	Other nongroundfish	Other nongroundfish
SHP1	NOM. CALIFORNIA SHEEPHEAD	Other nongroundfish	Other nongroundfish
SHPD	CALIFORNIA SHEEPHEAD	Other nongroundfish	Other nongroundfish
SHRP	SHARPCHIN ROCKFISH	Sharpchin rockfish	Sharpchin rockfish
SKCR	SCARLET KING CRAB	Other nongroundfish	Other nongroundfish
SLGR	SILVERGREY ROCKFISH	Silvergrey rockfish (Remaining rockfish)	Other shelf rockfish
SLNS	SLENDER SOLE	Other non-FMP flatfish	Other non-FMP flatfish
SMLT	UNSP. SMELT	Other nongroundfish	Other nongroundfish
SNOS	SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish
SNS1	NOM. SPLITNOSE ROCKFISH	Splitnose rockfish (Remaining rockfish)	Splitnose rockfish
SOCK	SOCKEYE SALMON	Other nongroundfish	Other nongroundfish
SPK1	NOM. SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish
SPKL	SPECKLED ROCKFISH	Other shelf rockfish	Other shelf rockfish
SPRW	SPOTTED PRAWN	Other nongroundfish	Other nongroundfish
SPSK	SANDPAPER SKATE	Other non-FMP skate	Other non-FMP skate
SQID	UNSP. SQUID	Other nongroundfish	Other nongroundfish
SQR1	NOM. SQUARESPOT	Other shelf rockfish	Other shelf rockfish
SQRS	SQUARESPOT ROCKFISH	Other shelf rockfish	Other shelf rockfish
SRFP	SURFPERCH SPP.	Other nongroundfish	Other nongroundfish
SRKR	SHORTRAKER ROCKFISH	Other slope rockfish	Other slope rockfish
SSCL	SHARPNOSE SCULPIN	Other nongroundfish	Other nongroundfish
SSDB	SPECKLED SANDDAB	Other non-FMP flatfish	Other non-FMP flatfish
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
SSKT	STARRY SKATE	Other non-FMP skate	Other non-FMP skate

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SSLF	SOUTHERN SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish
SSLP	SOUTHERN SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish
SSO1	NOM. SAND SOLE	Other flatfish	Other flatfish
SSOL	SAND SOLE	Other flatfish	Other flatfish
SSP1	NOM. SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead
SSPF	SHORTBILL SPEARFISH	Other nongroundfish	Other nongroundfish
SSPN	SHORTSPINE THORNYHEAD	Shortspine thornyhead	Shortspine thornyhead
SSRD	Deep So. Near-shore RF	Other nearshore rockfish	Other nearshore rockfish
SSRK	SOUPFIN SHARK	Other groundfish	Other groundfish
SSRS	Shallow So. Near-shore RF	Other nearshore rockfish	Other nearshore rockfish
STAR	STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish
STL1	NOM. STRIPETAILED ROCKFISH	Other shelf rockfish	Other shelf rockfish
STLH	STEELHEAD	Other nongroundfish	Other nongroundfish
STNA	SKIPJACK TUNA	Other nongroundfish	Other nongroundfish
STR1	NOM. STARRY ROCKFISH	Other shelf rockfish	Other shelf rockfish
STRK	STRIPETAILED ROCKFISH	Other shelf rockfish	Other shelf rockfish
STRY	STARRY FLOUNDER	Starry flounder	Starry flounder
SUSF	SOU. UNSP. SHELF ROCKFISH	Other shelf rockfish	Other shelf rockfish
SUSP	SOU. UNSP. SLOPE ROCKFISH	Other slope rockfish	Other slope rockfish
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	Other nearshore rockfish	Other nearshore rockfish
SWRD	SWORDFISH	Other nongroundfish	Other nongroundfish
SWS1	NOM. SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish
SWSP	SWORDSPINE ROCKFISH	Other shelf rockfish	Other shelf rockfish
TCOD	PACIFIC TOMCOD	Other nongroundfish	Other nongroundfish
TGR1	NOM. TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish
THD1	NOM. THORNYHEADS	Mixed thornyheads	Mixed thornyheads
THDS	THORNYHEADS (MIXED)	Mixed thornyheads	Mixed thornyheads
TIGR	TIGER ROCKFISH	Other shelf rockfish	Other shelf rockfish
TRE1	NOM. TREEFISH	Other nearshore rockfish	Other nearshore rockfish
TREE	TREEFISH	Other nearshore rockfish	Other nearshore rockfish
TSRK	COMMON THRESHER SHARK	Other nongroundfish	Other nongroundfish
UABL	UNSPECIFIED ABALONE	Other nongroundfish	Other nongroundfish
UCLM	UNSPECIFIED CLAM	Other nongroundfish	Other nongroundfish
UCRB	UNSPECIFIED CRAB	Other nongroundfish	Other nongroundfish
UDAB	UNSP. SANDDABS	Other flatfish	Other flatfish
UDF1	UNSP. DEEP-91 FLOUNDERS	Other flatfish	Other flatfish
UDF2	UNSP. DEEP-95 FLOUNDERS	Other flatfish	Other flatfish
UDM1	UNSP. DEMERSAL-91	Other groundfish	Other groundfish
UDNR	UNSP. DEEP NEAR-SHORE RF	Other nearshore rockfish	Other nearshore rockfish
UDSR	UNSP. DEMERSAL RKFSH	Other groundfish	Other groundfish
UDW1	SHORTTRAKER+ROUGHEYE	Other slope rockfish	Other slope rockfish
UECH	UNSPECIFIED ECHINODERM	Other nongroundfish	Other nongroundfish
UFL1	FLOUNDERS (NO FSOL)	Other flatfish	Other flatfish
UFLT	UNSP. FLATFISH	Other flatfish	Other flatfish
UGLG	UNSP. GREENLING	Other nongroundfish	Other nongroundfish
UGRN	UNSP. GROUND FISH	Other groundfish	Other groundfish
UHAG	UNSPECIFIED HAGFISH	Other nongroundfish	Other nongroundfish
UHLB	UNSPECIFIED HALIBUT	Other nongroundfish	Other nongroundfish
UJEL	UNSP. JELLYFISH	Other nongroundfish	Other nongroundfish
UKCR	UNSP. KING CRAB	Other nongroundfish	Other nongroundfish
UMCK	UNSP. MACKEREL	Other nongroundfish	Other nongroundfish
UMSK	UNSPECIFIED MOLLUSKS	Other nongroundfish	Other nongroundfish
UPLG	UNSP. PELAGIC RKFSH	Other groundfish	Other groundfish
UPOP	UNSP. POP GROUP	Pacific ocean perch	Other slope rockfish

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