Observed and Estimated Total Bycatch of Salmon in the 2007 U.S. West Coast Groundfish Fisheries

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INTRODUCTION

The primary objective of this report is to provide estimates of salmon bycatch in U.S. West Coast groundfish fisheries for the calendar year of 2007. We present observer discard ratios and estimated catch amounts for two species: Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*Oncorhynchus kisutch*). This report includes estimates for all fisheries observed by the West Coast Groundfish Observer Program (WCGOP) that were recorded to have caught salmon during the 2007 calendar year. These include:

- Commercial limited-entry (LE) bottom trawl
- Commercial LE bottom trawl - targeting California halibut
- Commercial fixed-gear state-permitted nearshore (Oregon)
- Commercial fixed-gear LE sablefish primary (endorsed)

Data sources

Data sources for this analysis include onboard observer data (from the WCGOP), trawl logbook data, and landing receipt data (referred to as fish tickets). Discard estimation analyses focused on commercial groundfish fishery sectors in which the WCGOP has conducted scientific at-sea observation of discards.

The WCGOP was established in 2001 by NOAA Fisheries (National Marine Fisheries Service, NMFS) (66 FR 20609). All commercial vessels that land groundfish caught in the United States Exclusive Economic Zone (EEZ) from 3-200 miles offshore are required to carry an observer when notified to do so by NMFS or its designated agent. Subsequent Oregon and California state rule-making also requires vessels that fish for groundfish within 3 miles of shore or participate in other state-managed fisheries to carry WCGOP observers when notified. 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 WCGOP coverage plan details program goals, vessel selection, observer coverage, and basic data collection (NWFSC 2006). A list of fisheries in order of coverage priority and detailed information on data collection methods employed in each observed fishery can be found in the WCGOP manual (NWFSC 2007).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. In order to ensure that the recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch recorded by WCGOP observers are reconciled with trip-level fish ticket records. The WCGOP data are linked to fish tickets by fish ticket number(s) obtained by the observer and are adjusted so that the total trip pounds of retained fish equals the total trip pounds on the fish ticket. This is done because the fish ticket weight is more accurate and fish tickets are legally binding documents. These steps are described in further detail in annual reports produced by the WCGOP (www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/index.cfm) and were conducted prior to the analyses presented in this report.

When salmon are encountered on an observed vessel, WCGOP observers document total weight and numbers for each species. In addition, they record length, weight, and sex for all or a subsample of individuals, note presence or absence of an adipose fin, and collect scales and snouts. Biological data for salmon have previously been summarized in WCGOP data reports for each fishery, which are available at: http://www.nwfsc.noaa.gov/research/divisions/fram/ observer/datareport/index.cfm. WCGOP data employed in this report are limited to observed salmon numbers, as well as total weights of groundfish species.

Logbook record-keeping is a state-mandated requirement for the LE groundfish trawl sector in Washington, Oregon, and California. A common-format logbook is used by all three states and completed logbook information is entered into state agency databases. The electronic logbook data are then submitted by state agencies to the Pacific Coast Fisheries Information Network (PacFIN) regional database, which is maintained by the Pacific States Marine Fisheries Commission (PSMFC).

Trawl logbook data for the calendar year 2007 were retrieved from the PacFIN database and divided into various sectors of the groundfish fishery as indicated in Figure 1. All additional data processing steps that were applied during the discard estimation process are described in the methods section below. Logbook data from the open-access groundfish trawl sector were not included in our analyses, as no salmon were observed as bycatch in this sector.

Landing receipts, known as fish tickets, are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are trip-aggregated sales receipts for market categories that may represent single or multiple species. They are issued to fish-buyers by a state agency and must be returned to the agency for processing. Fish tickets are designed by the individual states, and Washington, Oregon, and California each have a slightly different format of receipt. In addition, each state conducts species-composition sampling for numerous market categories that are reported on fish tickets. Fish ticket and species-composition data are submitted by state agencies to the PacFIN regional database. Percentages for the species composition within market categories were applied to the fish ticket data used in our analyses. As such, landed weights from sampled market categories were distributed to individual species to the greatest extent possible.

Fish ticket landings data for the calendar year of 2007 were retrieved from the PacFIN database and subsequently divided into various sectors of the groundfish fishery as indicated in Figure 1. All additional data processing steps that were applied during the discard estimation process are described in the methods section below.

METHODS

A deterministic approach was used to estimate salmon discard for all sectors of the groundfish fishery for which WCGOP observer data were available. Through this approach, observed discard rates for each salmon species were directly expanded to the fleet-wide level. First, discard ratios were computed from observer data as the discarded number of each salmon species divided by the weight of retained catch of either all

groundfish (except Pacific hake), sablefish, or some other target species, depending on the sector. Denominators differed for each sector of the fishery based on targeting behavior of that sector. Discard ratios were then multiplied by the total fleet-wide landed weight of either groundfish, sablefish, or other species (depending on the denominator used to compute observed discard ratios). This provided an expanded estimate of fleet-wide discarded numbers for each salmon species. Because of differences in data availability and management structure among the various sectors of the groundfish fishery, this approach was applied with slight modifications for each sector. A more detailed discussion of the methodology used to estimate discard within each sector is presented below.

Limited-Entry Bottom Trawl Fishery

Fleet-wide discard estimates for the LE bottom (non-midwater) trawl fishery were derived from WCGOP observer data, fish ticket landings data, and trawl logbook data. Fish ticket and logbook data were isolated for this sector based on processing steps outlined in Figure 1. A summary of observer data for the 2007 LE bottom (non-midwater) trawl sector is presented in the WCGOP data report and summary analyses of the West Coast limited-entry groundfish bottom trawl fishery published in October 2008 (NWFSC 2008a).

LE bottom trawl vessels that hold a California halibut bottom trawl permit may participate in the state-permitted California halibut fishery. California halibut tows can occur on the same trip as tows targeting groundfish and were identified in logbook and observer data based on the following criteria: 1) the reported tow target was California halibut or 2) the tow target was nearshore mix, sand sole, or other flatfish, and the tow took place in less than 30 fathoms and south of 40°10’ N. latitude. All tows in the observer and logbook data that met at least one of the above requirements were removed from the LE bottom trawl data sets and included as data for the California halibut fishery (see below). Whether in observer or logbook data, tow target was typically determined by the vessel captain.

Several additional filtering steps were then applied to the data in order to ensure that we had distinguished the data set for the LE bottom trawl sector appropriately. First, we searched within the landings data for fish tickets with more than 2 mt of Pacific hake on a given day in order to remove them and exclude effort that was targeted exclusively towards this species. A similar check was then performed on the observer and logbook data, such that tows with more than 2 mt of retained Pacific hake were flagged for removal. Since no data in 2007 met these criteria, these steps did not remove any fish tickets, logbook entries or observer tows from data for the LE bottom trawl sector.

Next, trawl logbook and observer data were filtered to ensure that all spatial and temporal information was complete. To do this, any tows lacking a recorded depth or latitude were removed. None of the tows in the observer data met these criteria. However, 66 tows were removed from the logbook data set because they lacked depth information.

Observer data and trawl logbook data were then stratified by area, season, and depth (Table 1). Records were separated into four areas: 1) north of Cape Falcon, Oregon (45.77° N lat.), 2) Cape Falcon to Cape Blanco, Oregon (42.75° N lat.), 3) Cape Blanco to the groundfish management line near Cape Mendocino, California (40.16° N lat.), and 4) south of Cape Mendocino (Figure 1). Each area was divided into three depth strata (0-125, 126-250, > 251 fathoms). Two-month cumulative trip limit periods were combined to form two seasonal strata: winter (January-April and November-December) and summer (May-October). In some cases, if the numbers of observations in particular strata were too limited, data were aggregated across depth strata. In the area from Cape Flacon to Cape Blanco during the winter, data were combined across the two shallower depth strata (0-125 and 126-250). In the area from Cape Blanco to Cape Mendicino during the summer, data were also combined across the two shallower depth strata. Aggregated strata are shown in Table 1, which presents the spatial and temporal distribution of observer and logbook data in 2007. Distribution of these data are based on the number of tows and the total retained weight of all groundfish species that are included in the Council's Fishery Management Plan (FMP), except Pacific hake.

It should be noted that this stratification scheme is inconsistent with the sampling design employed by the WCGOP. The authors recognize this fact, but used this method in order to provide estimates that were relevant within the spatial and temporal structure of salmon management. While we feel this stratification is most effective in isolating variability and representing trends in the data, measures of uncertainty are not provided within this context, as they would be biased by post-stratification.

Once both data sets had been stratified, discard ratios were computed from the observer data and multiplied by logbook catch weights in each stratum. This was done according to the following equation:

$$\hat{D}_{sxab} = \frac{\sum_t d_{sxt}}{\sum_t r_{xt}} \times \sum_t R_{xabt}$$

where:

s: salmon species
x: index strata (area, season, depth)
a: state of landing (Washington, Oregon or California)
b: bimonthly period (Jan-Feb, Mar-Apr, … , Nov-Dec)
t: tows in observer or logbook data
d: observed number of discarded individuals of species *s*
r: observed retained weight of all FMP groundfish except Pacific hake
R: weight of retained FMP groundfish (except Pacific hake) recorded in logbooks
D: initial discard estimate for species *s* in stratum *x*, state *a* and bimonthly period *b*

Note that the denominator of observed discard ratios and the logbook expansion factor included weight from all FMP groundfish retained weight except Pacific hake. Pacific hake was excluded when using the retained FMP groundfish denominator because vessels that target or land large amounts of this species are considered to be part of Pacific hake sectors, which are distinct from the groundfish bottom trawl sector. A complete listing of groundfish species included in the Groundfish Fishery Management Plan and used to compute and expand discard ratios is provided in Appendix A. Observed numbers and discard ratios for salmon species in the LE bottom trawl fishery are presented in Table 2 by area, season, and depth.

In all cases where a FMP groundfish species grouping was used to compute discard ratios, any retained weights that were recorded by the observer but that did not appear on fish tickets were excluded from the denominator. This was necessary to prevent double-counting associated with differences in the species codes used by observers and processors. For instance, while observers may record rockfish catch at the species level, various species of rockfish are often grouped, weighed, and recorded together on the fish ticket by the processor under a grouped species code such as NUSP - northern unspecified slope rockfish. In some cases, this difference in species coding prevents observer and fish ticket weights from being matched and adjusted properly. Species coding on fish tickets varies considerably between processors and over time, and it is not possible to make assumptions regarding which individual observer-recorded species likely coincide with species grouping codes on fish tickets. Instead, by using only the retained groundfish weight from fish tickets in discard ratio denominators, we prevent double-counting of retained weights. This is not a factor when using a single species in the denominator, such as sablefish in the fixed-gear fisheries (see below), as any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

Retained logbook weights of FMP groundfish (except Pacific hake) were used to conduct the initial expansion of observed discard ratios to the fleet-wide level in this sector. However, logbooks are not submitted for 100% of trawl trips and therefore do not capture all groundfish bottom trawl fishing effort. As a result, it was necessary to adjust initial fleet-level discard estimates to reflect the level of effort indicated by fish ticket landings. To do this, both the fish ticket and logbook data were aggregated by state and bimonthly period, since this duration is the same as most cumulative trip limit periods. An adjustment ratio was then computed for each state and bimonthly period as the weight of FMP groundfish (except Pacific hake) recorded on fish tickets divided by that recorded in logbooks. Each adjustment ratio was multiplied by coinciding discard estimates and then summed across bimonthly periods, states, and spatial-temporal strata to produce coast-wide adjusted discard estimates for each salmon species:

$$adj(\hat{D}_s) = \sum_x \sum_a \sum_b \hat{D}_{sxab} \times \frac{F_{ab}}{R_{ab}}$$

where:

F: weight of retained FMP groundfish (except Pacific hake) recorded on fish tickets

adj(D_s): adjusted discard estimate for species *s*

Adjustment ratios were computed separately for each state and bimonthly period in order to account for differences between individual states' logbook submission rates and fish ticket recording methods. Estimated discard amounts for each salmon species in the 2007 limited-entry bottom trawl fishery are reported in Table 3.

California Halibut Bottom Trawl Fishery

Fleet-wide salmon bycatch estimates in the California halibut bottom trawl fishery were derived from WCGOP observer data and fish ticket landings data. Although all California halibut vessels are permitted by the state of California, we considered this fishery to consist of both a limited-entry and an "open-access" component (vessels that do not have federal limited-entry *groundfish* permits). The WCGOP provides observer coverage for both of these components. Observer data for the LE component of the California halibut fishery were collected as part of the LE groundfish bottom trawl sector. Observer data for the California halibut fishery were then subsequently isolated based on the following criteria: 1) the tow target was California halibut or 2) the tow target was nearshore mix, sand sole or other flatfish, and the tow took place in less than 30 fathoms, south of 40°10' N. latitude. All tows in the observer data set that met at least one of the above requirements were included in the LE California halibut bottom trawl data set. The WCGOP randomly samples the OA California halibut sector separately. This is described further in the WCGOP data report and summary analyses of limited-entry and open-access trawl vessels targeting California halibut, published in December 2008 (NWFSC 2008b). These two components of the California halibut trawl fishery remained separate in this analysis.

This is the first time that observer discard ratios from the California halibut fishery have been used to estimate fleet-wide amounts of salmon bycatch. Discard ratios were computed for this fishery using the retained weight of California halibut in the denominator. The total landed weight of California halibut was then used as a multiplier to expand observed salmon discard ratios to the fleet-wide level. Just as discard ratios were computed separately for the LE and OA observed components of the California halibut fishery, total fleet-wide landings had to be identified separately for each sector as well. For the OA sector, landed California halibut weight was compiled from "non-midwater" OA trawl fish tickets (see Figure 1) for those vessels that had a state-issued California halibut bottom trawl permit. For the LE sector, landed California halibut weight was compiled from non-midwater LE trawl fish tickets (see Figure 1) with more than 150 lbs of California halibut recorded. Vessels landing more than 150 lbs of California halibut are required to have a state-issued California halibut permit. The list of California halibut permit holders was not used to compile LE fish ticket weight because a small number of LE vessels that were not included on the California halibut permit list provided to the WCGOP were recorded to have landed large amounts of California halibut in 2007.

Table 4 presents the total LE and OA landed weights of California halibut that were used as multipliers to expand observer discard ratios to the fleet-wide level. Also summarized

in this table are the numbers of observed trips, tows, and vessels, as well as discard ratios for Chinook salmon. No bycatch of other species of salmon was reported by observers in this fishery during 2007. Discard ratios were calculated by dividing the observed discard (in numbers) of Chinook by the observed retained weight of California halibut. Discard estimates were computed for each sector based on the following equation:

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

where:

s: species or species group
t: observed tows
d: observed discard (number) of salmon species *s*
r: observed retained weight of California halibut
F: weight of retained California halibut recorded on fish tickets
D_s: discard estimate for species *s*

The product of discard ratios and the total fish ticket landed weight of California halibut produced expanded fleet-level discard estimates of Chinook salmon for each fishery component (LE and OA). These estimates are also presented in Table 4.

Limited-Entry Sablefish Primary (Endorsed) Fixed-Gear Fishery

Fleet-wide discard estimates for the LE sablefish primary fishery were derived from WCGOP observer data and fish ticket landings data. A summary of observer data for the 2007 fixed gear fisheries is presented in the WCGOP Data report and summary analyses of west coast non-nearshore fixed-gear fishery published in October 2008 (NWFSC 2008c). Fish ticket data were assigned to this fishery using the classification system outlined in Figure 1. The commercial fixed-gear fish tickets with recorded nearshore species weight were not used in this portion of the analysis, regardless of whether they included recorded weights for sablefish. These fish tickets were instead included in the nearshore fixed-gear groundfish sector (see next section).

Fish tickets for the LE sablefish primary (endorsed) fishery were identified as those from vessels that had a limited entry permit and sablefish endorsement with tier quota for the primary season. The LE sablefish primary season takes place from April through the end of October. Fish tickets for all LE sablefish vessels with tier endorsements that were operating within this period and within their allotted tier quota were placed in the LE sablefish primary subsector. If LE sablefish-endorsed vessels fished outside of the primary season (November through March) or made trips within the season after they had reached their tier poundage, the fish tickets were excluded from this analysis.

The same function presented above was used to compute discard estimates in the sablefish primary fishery, but with sablefish as the discard ratio denominator and expansion factor instead of California halibut. Only one coho salmon was recorded by observers in this fishery during the 2007 calendar year. This record was from the area

north of Cape Falcon. However, sablefish primary vessels fishing in this area landed their catch at various ports in Washington and Oregon, including some that were outside of the latitudinal range where salmon were encountered. Therefore, it was necessary to include data from a wider geographic range in both the discard ratio denominator and fish ticket expansion factor (of retained sablefish). These variables were compiled from observed trips and fish tickets with landings in Washington or Oregon, but final discard estimates were assumed to reflect bycatch in the area north of Cape Falcon. Table 5 presents the total landings of sablefish in Washington and Oregon, along with the total number of observed trips, sets, and vessels in this fishery in 2007 that delivered catch to Washington and Oregon ports. At the bottom of Table 5, we present the total number of coho observed, the discard ratio, and estimated fleet-wide bycatch for this species in the 2007 sablefish primary fishery.

Nearshore Fixed-Gear Groundfish Fishery

Fleet-wide discard estimates for the commercial nearshore fixed-gear groundfish fishery were derived from WCGOP data and fish ticket landings data. Fish ticket data were assigned to this sector using the classification system outlined in Figure 1 and included only those fish tickets with recorded nearshore species weight. A list of nearshore species and associated species groups used in this analysis are found in Appendix B.

The WCGOP provides coverage for the commercial nearshore fisheries in California and Oregon based on a selection process of state-issued nearshore permits/licenses. The state of Washington does not allow commercial fishing within state waters. State regulations in California and Oregon have extended the authority of the WCGOP to require that observers be carried by vessels participating in these state nearshore fisheries. Summaries of observer data for the 2007 nearshore fixed-gear groundfish sector are available in the WCGOP Data report and summary analyses of west coast nearshore fixed-gear fishery, published in October 2008 (NWFSC 2008d).

The same function presented above was used to compute discard estimates in the nearshore fixed-gear fishery, but with nearshore species as the discard ratio denominator and expansion factor instead of California halibut. Only one coho salmon was recorded by observers in this fishery during the 2007 calendar year. This record was from the area between Cape Falcon and Cape Blanco. However, nearshore vessels fishing in this area landed their catch at various ports in Oregon, including some that were outside of the latitudinal range where salmon were encountered. Therefore, it was necessary to include data from a wider geographic range in both the discard ratio denominator and fish ticket expansion factor (of retained nearshore species). These variables were compiled from observed trips and fish tickets with landings at any Oregon port, but final discard estimates were assumed to reflect bycatch in the area between Cape Falcon and Cape Blanco. Table 6 presents the total landings of nearshore species in Oregon, along with the total number of observed trips, sets, and vessels in this fishery in 2007 that delivered catch to Oregon ports. At the bottom of Table 6, we present the total number of coho observed, the discard ratio, and estimated fleet-wide bycatch for this species in the 2007

nearshore fixed-gear fishery.

RESULTS

A summary of estimated salmon bycatch for four distinct areas from the 2007 West Coast groundfish fisheries is provided in Table 7. Salmon discard was estimated for all fisheries observed by the WCGOP in which salmon were reported for the 2007 calendar year. These included the LE bottom trawl fishery, the California halibut trawl fishery, the LE sablefish-primary (fixed-gear) fishery, and the Oregon nearshore fixed-gear fishery. A coast-wide summary of these estimates is provided in Table 8, along with salmon bycatch estimates for the various sectors of the 2007 hake fishery. Values from the hake fishery are those presented by the Northwest Regional Office in the season summary (NWR 2007).

The largest catch amounts of Chinook and coho salmon were estimated in the limited entry bottom trawl fishery. Estimates of salmon catch have been produced and published for this fishery since 2004 based on the methods described above. In the areas north of Cape Mendicino, estimated catch of Chinook salmon was larger in 2007 than in 2006 by a total of 135 individuals. 2007 estimates for this species north of Cape Mendicino remained considerably lower than in 2005, however, when the total estimate for this area was 795 individuals (Bellman and Hastie 2008). In the area south of Cape Mendicino, estimated catch of Chinook salmon in 2007 was zero. This is less than in all previous years.

In the areas north of Cape Mendicino, catch of coho salmon was estimated to be higher than in previous years, although it was still limited to 10 individuals. Coho catch south of Cape Mendicino was zero in 2007, compared with 19 in 2006. As in previous years, no other salmon species were observed in the limited entry bottom trawl or other groundfish fisheries.

The second largest estimates of salmon bycatch occurred in the California halibut trawl fishery, which operates south of Cape Mendicino (Table 4). This is the first time that salmon bycatch estimates have been produced for this fishery. Chinook salmon was the only salmon species observed on California halibut vessels in 2007, and catch occurrences for this species appeared to be limited to the coastal area surrounding the mouth of the San Francisco Bay. This area is fished by California halibut vessels that also hold federal limited entry permits. In total, 2007 Chinook salmon bycatch for this sector was estimated at approximately 47 individuals.

For the two other groundfish fisheries included in this analysis, observer data indicated that salmon bycatch was particularly minimal. The LE sablefish primary (endorsed) fishery, which typically targets sablefish in depths greater than 200 fm, was estimated to have caught 3 coho salmon for the calendar year of 2007 (Table 5). Coho bycatch in the Oregon nearshore fixed-gear fishery, which operates in depths of 30 fm or less, was estimated at 10 individuals (Table 6).

While point estimates presented in this report can provide an approximation of annual trends in salmon bycatch, they are not intended to reflect exact numbers for West Coast groundfish fleets. We recognize that point estimates fluctuate due to a number of non-biological factors, including random annual variation in observer coverage rates, fishing behavior, and various physical characteristics. In addition, we anticipate that several sources of uncertainty, which were not accounted for in this analysis, may influence salmon bycatch estimates. These include uncertainty in logbook spatial and depth information, observed retained weights, fish ticket landings amounts, as well as others. Currently, it is not possible to quantify uncertainty for the salmon bycatch estimates presented in this report, as measures of the variability associated with various data source are not available. As with all point estimates, salmon bycatch values presented here should be considered with caution.

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Figure 1. Fish ticket and logbook data processing for division into groundfish fishery sectors after retrieval of a full calendar year data set from the Pacific Coast Fisheries Information Network (PacFIN) database. Blue sectors indicate sectors for which federal observer data is available.

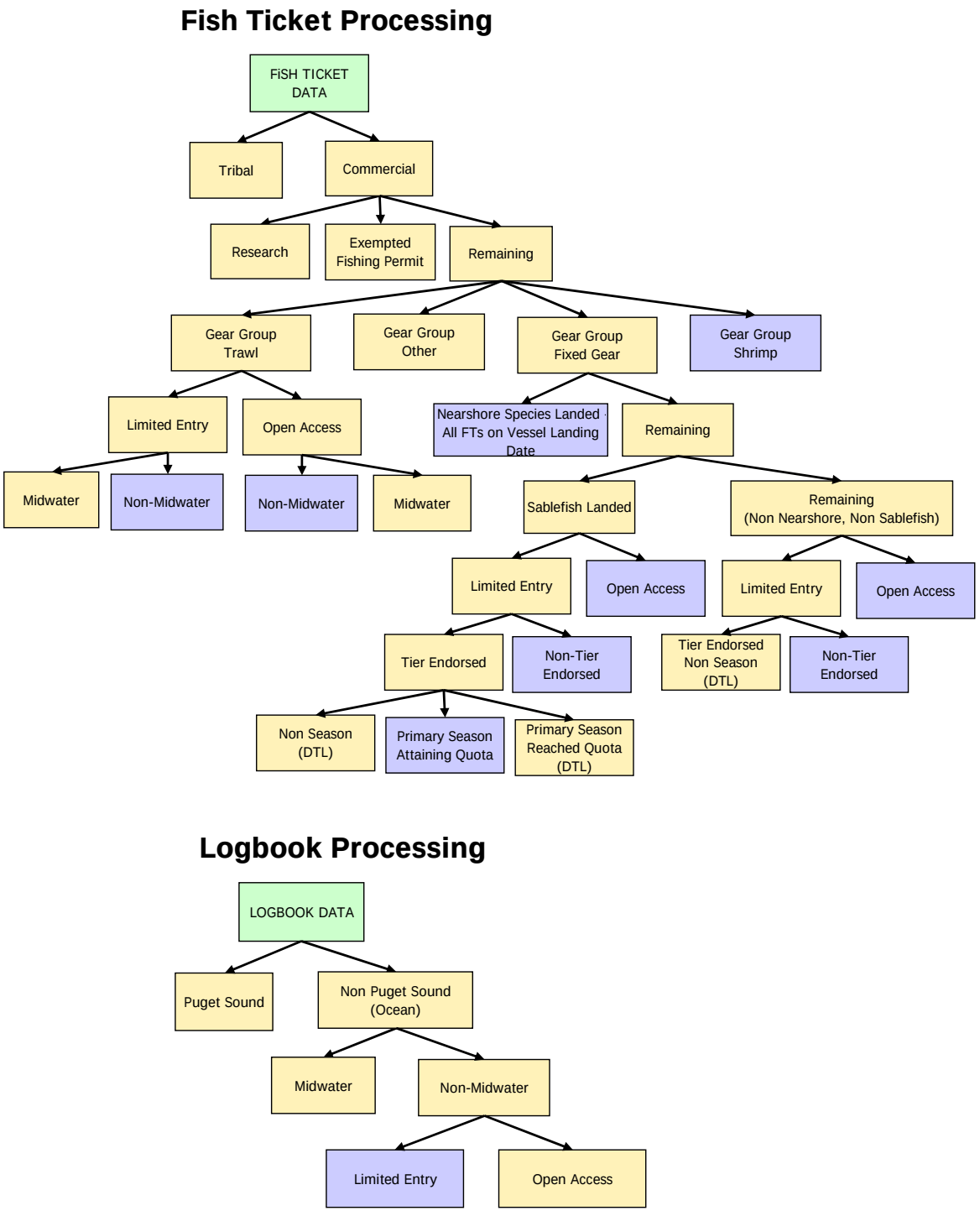

Figure 2. Geographic latitudinal regions and depths utilized in salmon bycatch estimation from the limited-entry bottom trawl groundfish fishery.

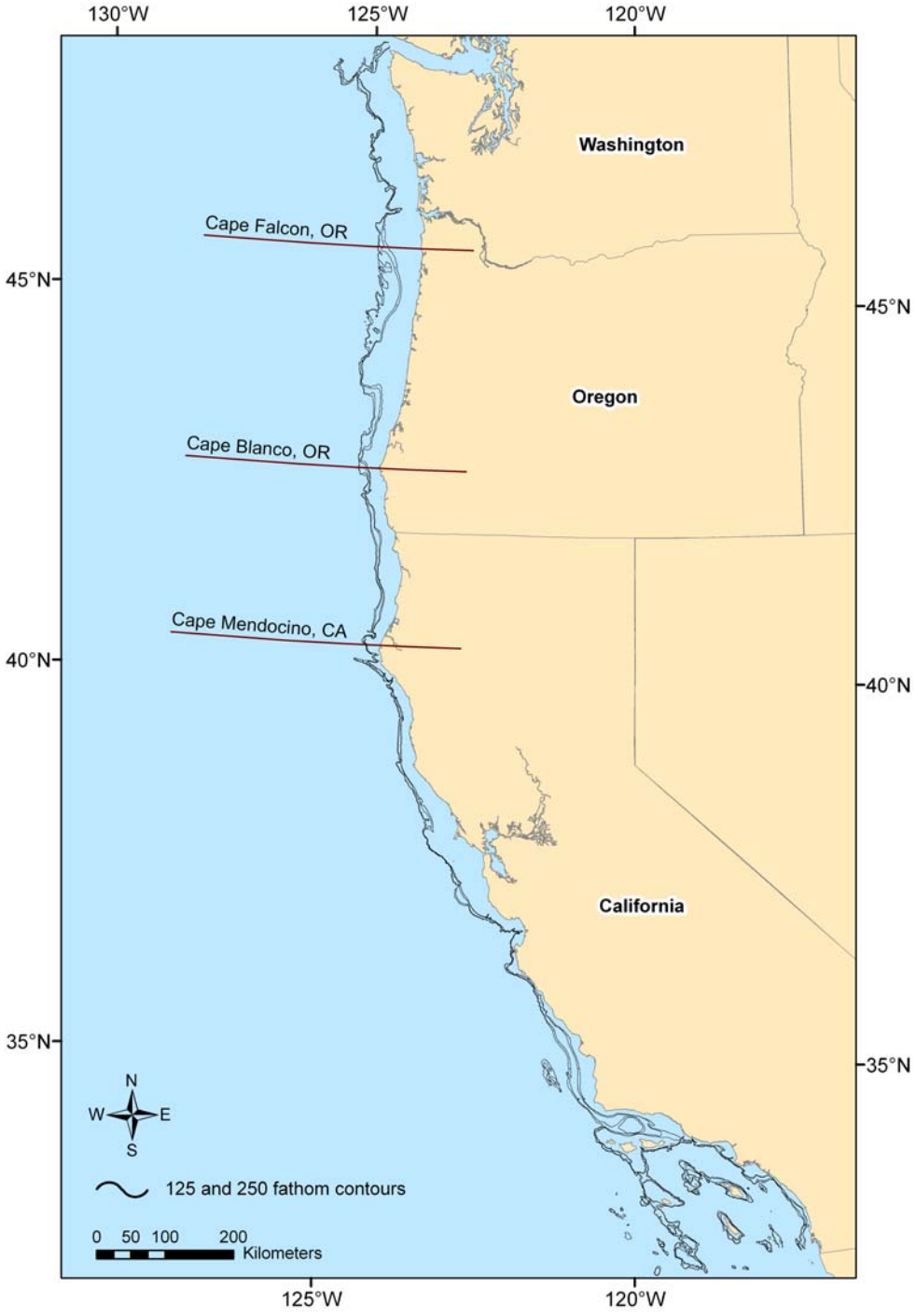

Table 1. Number of tows and retained weight (mt) of FMP groundfish species (excluding Pacific hake) from observer and logbook data for the 2007 limited-entry bottom trawl fishery by management area, depth, and season. Data are combined as needed to ensure adequate sample size. Tows targeting California halibut have been removed from both observer and logbook data. Winter season is January-April and November-December and summer season is May-October.

	Number of tows						Retained groundfish (mt)					
	Observed fleet		All trawl logbooks		Percentage observed		Observed fleet		All trawl logbooks		Percentage observed	
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
North of Cape Falcon												
0-125	33	418	172	2606	19%	16%	9.6	252.6	75.4	1661.6	13%	15%
125-250	116	155	587	715	20%	22%	255.1	224.4	1294.1	1435.4	20%	16%
> 250	140	129	801	601	17%	21%	228.6	128.0	1444.7	719.7	16%	18%
Total	289	702	1560	3922	19%	18%	493.4	605.1	2814.2	3816.7	18%	16%
Cape Falcon - Cape Blanco												
0-125	109	107	869	899	13%	12%	196.0	99.5	1423.7	533.0	14%	19%
125-250		138		796		17%		230.5		1242.9		19%
> 250	145	169	710	609	20%	28%	273.0	250.4	1681.3	840.1	16%	30%
Total	254	414	1579	2304	16%	18%	469.1	580.5	3105.0	2616.0	15%	22%
Cape Blanco - Cape Mendicino												
0-125	0	113	39	988	0%	11%	0.0	213.5	24.8	1421.3	0%	15%
125-250	66		417		16%		88.5		689.8		13%	
> 250	72	145	590	604	12%	24%	180.2	293.2	1418.9	1288.6	13%	23%
Total	138	258	1046	1592	13%	16%	268.7	506.7	2133.4	2710.0	13%	19%
South of Cape Mendicino												
0-125	26	133	150	879	17%	15%	14.0	81.7	44.0	369.9	32%	22%
125-250	68	75	389	344	17%	22%	100.7	110.2	440.2	500.6	23%	22%
> 250	75	83	288	467	26%	18%	150.8	110.4	386.2	696.3	39%	16%
Total	169	291	827	1690	20%	17%	265.5	302.3	870.4	1566.8	31%	19%

Table 2. Number of observed individuals and observed discard ratios for chinook and coho in the limited entry bottom trawl fishery in 2007. Discard ratios were computed as the observed number of individuals divided by the observed weight (mt) of groundfish (except Pacific hake) in each area, season and depth strata. **Columns with darker shading signify that data were combined across more than one depth strata.**

		Number observed			Discard ratio*		
		0-125	126-250	>250	0-125	126-250	>250
Chinook salmon							
North of Cape Falcon	winter	0	12	0	0.00000	0.04732	0.00000
	summer	6	0	0	0.02504	0.00000	0.00000
Cape Falcon - Cape Blanco	winter		8	1		0.04160	0.00370
	summer	0	0	0	0.00000	0.00000	0.00000
Cape Blanco - Cape Mendicino	winter		1	0		0.01145	0.00000
	summer	0	1	0	--	0.004723	0.00000
South of Cape Mendicino	winter	0	0	0	0.00000	0.00000	0.00000
	summer	0	0	0	0.00000	0.00000	0.00000
Coho salmon							
North of Cape Falcon	winter	0	2	0	0.00000	0.00789	0.00000
	summer	0	0	0	0.00000	0.00000	0.00000
Cape Falcon - Cape Blanco	winter		0	0		0.00000	0.00000
	summer	0	0	0	0.00000	0.00000	0.00000
Cape Blanco - Cape Mendicino	winter		0	0		0.00000	0.00000
	summer	0	0	0	--	0	0.00000
South of Cape Mendicino	winter	0	0	0	0.00000	0.00000	0.00000
	summer	0	0	0	0.00000	0.00000	0.00000

* Discard ratio is defined as the number of individuals per metric ton of retained groundfish

Note: Number observed and discard ratios are shown as (--) when there were no observed trips in that strata.

Table 3. Estimated catch (numbers) for chinook and coho salmon in the 2007 limited-entry groundfish bottom trawl fishery. Columns with darker shading signify that data were combined across more than one depth strata.

		Estimated catch (numbers)			
		0-125	126-250	>250	Total
Chinook salmon					
North of Cape Falcon	winter	0	62	0	62
	summer	43	0	0	43
Cape Falcon - Cape Blanco	winter		61	6	67
	summer	0	0	0	0
Cape Blanco - Cape Mendicino	winter		8	0	8
	summer	0	7	0	7
South of Cape Mendicino	winter	0	0	0	0
	summer	0	0	0	0
Coho salmon					
North of Cape Falcon	winter	0	10	0	10
	summer	0	0	0	0
Cape Falcon - Cape Blanco	winter	0	0	0	0
	summer	0	0	0	0
Cape Blanco - Cape Mendicino	winter	0	0	0	0
	summer	0	0	0	0
South of Cape Mendicino	winter	0	0	0	0
	summer	0	0	0	0

Table 4. Total landings of California halibut (mt) and the number of observed trips, tows and vessels in the limited entry and 'open access' sectors of the 2007 California halibut fishery. At the bottom of the table, the number of observed chinook is provided along with a discard ratio and estimated fleet-wide catch for this species. The discard ratio was computed as the number of individuals observed divided by the observed landings of California halibut (mt). Chinook was the only salmon species observed in this fishery and all observations occured in the area south of Cape Mendicino.

	South of Cape Mendicino	
	Limited Entry	**"Open Access"**
Expansion factor		
Total fleet landings of California halibut (Based on fish tickets)	39.2	39.1
Number of observed trips	39	48
Number of observed tows	80	226
Number of observed vessels	5	8
Chinook salmon		
Number of individuals observed	16	0
Discard ratio	2.9525	0
Estimated catch (numbers)	47	0

Note: There were not enough observer data to provide separate discard estimates for winter and summer.

Table 5. Total landings of sablefish (mt) and the number of observed trips, tows, and vessels in the 2007 limited-entry sablefish primary fishery. At the bottom of the table, the number of observed coho is provided along with a discard ratio and estimated fleet-wide catch for this species. The discard ratio was computed as the number of individuals observed divided by the observed landings of sablefish (mt). Coho was the only salmon species observed in this fishery. No salmon were observed in the open acess or DTL sectors of the fixed-gear fishery.

	North of Cape Falcon *
	Limited Entry Sablefish endorsed
Expansion factor	
Total landings of sablefish in Washington and Oregon (Based on fish tickets)	943.2
Number of observed trips	64
Number of observed sets	484
Number of observed vessels	18
Coho salmon	
Number of individuals observed	1
Discard ratio	0.0036
Estimated catch (numbers)	3

* Although discard estimate was computed based on landings in Washington and Oregon, salmon were only observed in the area north of Cape Falcon. The estimate shown here is therefore represents estimated catch of salmon North of Cape Falcon only.

Note: There were not enough observer data to provide separate discard estimates for winter and summer.

Table 6. Total landings (mt) of nearshore species (see Appendix C) and the number of observed trips, tows and vessels in the 2007 Oregon nearshore fixed-gear fishery. At the bottom of the table, the number of observed coho is provided along with a discard ratio and estimated fleet-wide catch for this species. The discard ratio was computed as the number of individuals observed divided by the observed landings of nearshore species (mt). Coho was the only salmon species observed in this fishery and all observations occured in the area between Cape Falcon and Cape Blanco.

	Cape Falcon - Cape Blanco *
	Nearshore fixed-gear fishery
Expansion factor	
Total fleet landings of nearshore species in Oregon (Based on fish tickets)	180.4
Number of observed trips	164
Number of observed to sets	242
Number of observed vessels	35
Coho salmon	
Number of individuals observed	1
Discard ratio	0.0584
Estimated catch (numbers)	10

* Although discard estimate was computed based on landings in Oregon, salmon were only observed in the area between Cape Falcon and Cape Blanco. The estimate shown here is therefore represents estimated catch of salmon in this area only.

Note: There were not enough observer data to provide separate discard estimates for winter and summer.

Table 7. Estimated catch (numbers) of chinook and coho salmon in the 2007 West Coast groundfish fisheries.

	LE Trawl	CA Halibut	LE Sablefish Primary	Nearshore fixed-gear	TOTAL
Chinook					
North of Cape Falcon	105	--	--	--	105
Cape Falcon - Cape Blanco	67	--	--	--	67
Cape Blanco - Cape Mendicino	15	--	--	--	15
South of Cape Mendicino	0	47	--	--	47
Coastwide	187	47	0	0	234
Coho					
North of Cape Falcon	10	--	3	--	13
Cape Falcon - Cape Blanco	--	--	--	10	10
Cape Blanco - Cape Mendicino	--	--	--	--	0
South of Cape Mendicino	--	--	--	--	0
Coastwide	10	0	3	10	23

Table 8. Coastwide estimated bycatch of salmon in all groundfish fishery sectors where salmon species were observed, including at-sea and shoreside hake. Estimates from the hake fishery were provided by the Northwest Regional Office.

	Species				
	Chinook	Coho	Chum	Pink	Sockeye
2007 Non-hake fishery sectors					
LE groundfish bottom trawl	187	10	0	0	0
California halibut trawl (LE/OA)	47	0	0	0	0
Pink shrimp trawl (OA)	0	0	0	0	0
LE sablefish primary	0	3	0	0	0
LE sablefish non-primary	0	0	0	0	0
OA non-nearshore fixed gear	0	0	0	0	0
Nearshore	0	10	0	0	0
Total	234	23	0	0	0
2007 Hake fishery sectors					
Tribal - Mothership	710	9	0	0	0
Tribal - Shoreside	1690	98	8	513	0
Mothership	591	139	97	16	0
Catcher/Processors	733	88	73	19	0
Shorebased (EFP)	2462	141	113	47	0
Total	6186	475	291	595	0
Total (all sectors)	6420	498	291	595	0

APPENDIX A.

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

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

RATFISH
Ratfish, *Hydrolagus colliei*

MORIDS
Finescale codling, *Antimora microlepis*

GRENADIERS
Pacific rattail, *Coryphaenoides acrolepis*

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

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

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

Aurora, *Sebastes. aurora*

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

Starry, *S. constellatus*
Stripetail, *S. saxicola*
Swordspine, *S. ensifer*
Tiger, *S. nigorcinctus*
Treefish, *S. serriceps*
Vermilion, *S. miniatus*
Widow, *S. entomelas*
Yelloweye, *S. ruberrimus*
Yellowmouth, *S. reedi*
Yellowtail, *S. flavidus*

APPENDIX B

Species identification codes used in the Pacific Coast Fisheries Information Network (PacFIN) database and assigned to WCGOP observer data. Columns on the far right specify which species were included in discard ratio denominators and expansion factors as FMP groundfish or nearshore species.

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
ALBC	ALBACORE		
AMCK	ATKA MACKEREL		
APLC	ALASKA PLAICE		
ARR1	NOM. AURORA ROCKFISH	yes	
ARRA	AURORA ROCKFISH	yes	
ART1	NOM. ARROWTOOTH FLOUNDER	yes	
ARTH	ARROWTOOTH FLOUNDER	yes	
ASRK	PACIFIC ANGEL SHARK		
BABL	BLACK ABALONE		
BANK	BANK ROCKFISH	yes	
BCAC	BOCACCIO	yes	
BCC1	NOM. BOCACCIO	yes	
BCLM	BUTTER CLAM		
BGL1	NOM. BLACKGILL ROCKFISH	yes	
BKCR	BLUE KING CRAB		
BLCK	BLACK ROCKFISH	yes	yes
BLGL	BLACKGILL ROCKFISH	yes	
BLK1	NOM. BLACK ROCKFISH	yes	yes
BLU1	NOM. BLUE ROCKFISH	yes	yes
BLUR	BLUE ROCKFISH	yes	yes
BMCK	BULLET MACKEREL		
BMRL	BLUE MARLIN		
BMSL	BLUE OR BAY MUSSEL		
BNK1	NOM. BANK ROCKFISH	yes	
BRNZ	BRONZESPOTTED ROCKFISH	yes	
BRW1	NOM. BROWN ROCKFISH	yes	yes
BRWN	BROWN ROCKFISH	yes	yes
BRZ1	NOM. BRONZESPOTTED ROCKFISH	yes	
BSJK	BLACK SKIPJACK		
BSKT	BIG SKATE	yes	
BSOL	BUTTER SOLE	yes	
BSRK	BLUE SHARK		
BSRM	UNSP. BAIT SHRIMP		
BTCR	BAIRDI TANNER CRAB		
BTNA	BLUEFIN TUNA		
BTRY	BAT RAY		
BYEL	BLACK-AND-YELLOW ROCKFISH	yes	yes
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	yes	yes
CBZ1	NOM. CABEZON	yes	yes

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
CBZN	CABEZON	yes	yes
CEEL	SPOTTED CUSK-EEL		
CHL1	NOM. CALIFORNIA HALIBUT		
CHLB	CALIFORNIA HALIBUT		
CHN1	NOM. CHINA ROCKFISH	yes	yes
CHNA	CHINA ROCKFISH	yes	yes
CHNK	CHINOOK SALMON		
CHUM	CHUM SALMON		
CKLE	BASKET COCKLE		
CLC1	NOM. CALICO ROCKFISH	yes	yes
CLCO	CALICO ROCKFISH	yes	yes
CLP1	NOM. CHILIPEPPER	yes	
CLPR	CHILIPEPPER	yes	
CMCK	CHUB MACKEREL		
CMEL	CHAMELEON ROCKFISH	yes	
CML1	NOM. CHAMELEON ROCKFISH	yes	
CMSL	CALIFORNIA MUSSEL		
CNR1	NOM. CANARY ROCKFISH	yes	
CNRY	CANARY ROCKFISH	yes	
COHO	COHO SALMON		
COP1	NOM. COPPER ROCKFISH	yes	yes
COPP	COPPER ROCKFISH	yes	yes
CPLN	CAPELIN		
CSKT	CALIFORNIA SKATE	yes	
CSOL	CURLFIN SOLE	yes	
CTRB	C-O SOLE		
CUDA	PACIFIC BARRACUDA		
CWC1	NOM. COWCOD ROCKFISH	yes	
CWCD	COWCOD ROCKFISH	yes	
DBR1	NOM. DARKBLOTCHED ROCKFISH	yes	
DBRK	DARKBLOTCHED ROCKFISH	yes	
DCRB	DUNGENESS CRAB		
DFLT	UNSP. DEEP FLOUNDERS	yes	
DOVR	DOVER SOLE	yes	
DRDO	DORADO		
DSOL	DEEPSEA SOLE		
DSRK	SPINY DOGFISH	yes	
DTRB	DIAMOND TURBOT		
DUSK	DUSKY ROCKFISH	yes	
DVR1	NOM. DOVER SOLE	yes	
DWRF	DWARF-RED ROCKFISH	yes	
EELS	UNSPECIFIED EELS		
EGL1	NOM. ENGLISH SOLE	yes	
EGLS	ENGLISH SOLE	yes	
ESTR	EASTERN OYSTER		
ETNA	BIGEYE TUNA		
EULC	EULACHON		
EURO	EUROPEAN OYSTER		

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
FLAG	FLAG ROCKFISH	yes	
FLG1	NOM. FLAG ROCKFISH	yes	
FNTS	FANTAIL SOLE		
FRCK	FRECKLED ROCKFISH	yes	
FSOL	FLATHEAD SOLE	yes	
GABL	GREEN ABALONE		
GBAS	GIANT SEA BASS		
GBL1	NOM. GREENBLOTCHED ROCKFISH	yes	
GBLC	GREENBLOTCHED ROCKFISH	yes	
GCLM	GAPER CLAM		
GDUK	GEODUCK		
GKCR	GOLDEN KING CRAB		
GPH1	NOM. GOPHER ROCKFISH	yes	yes
GPHR	GOPHER ROCKFISH	yes	yes
GPRW	GOLDEN PRAWN		
GRAS	GRASS ROCKFISH	yes	yes
GRDR	UNSP. GRENADIERS	yes	
GRS1	NOM. GRASS ROCKFISH	yes	yes
GSP1	NOM. GREENSPOTTED ROCKFISH	yes	
GSPT	GREENSPOTTED ROCKFISH	yes	
GSQD	GIANT SQUID		
GSR1	NOM. GREENSTRIPED ROCKFISH	yes	
GSRK	GREENSTRIPED ROCKFISH	yes	
GSRM	GHOST SHRIMP		
GSTG	GREEN STURGEON		
GTRB	GREENLAND TURBOT		
HBRK	HALFBANDED ROCKFISH	yes	
HCLM	HORSE CLAMS		
HLQN	HARLEQUIN ROCKFISH	yes	
HNY1	NOM. HONEYCOMB ROCKFISH	yes	
HNYC	HONEYCOMB ROCKFISH	yes	
HTRB	HORNYHEAD TURBOT		
ISRK	BIGEYE THRESHER SHARK		
JCLM	CALIFORNIA JACKKNIFE CLAM		
JMCK	JACK MACKEREL		
KFSH	GIANT KELPFISH		
KGL1	NOM. KELP GREENLING	yes	yes
KLP1	NOM. KELP ROCKFISH	yes	yes
KLPG	KELP GREENLING	yes	yes
KLPR	KELP ROCKFISH	yes	yes
KMKA	KAMCHATKA FLOUNDER		
KSTR	KUMAMOTO OYSTER		
LCD1	NOM. LINGCOD	yes	yes
LCLM	NATIVE LITTLENECK		
LCOD	LINGCOD	yes	yes
LDAB	LONGFIN SANDDAB		
LDB1	NOM. LONGFIN SANDDAB		
LOBS	CALIF. SPINY LOBSTER		

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
LSKT	LONGNOSE SKATE	yes	
LSP1	NOM. LONGSPINE THORNYHEAD	yes	
LSPN	LONGSPINE THORNYHEAD	yes	
LSRK	LEOPARD SHARK	yes	
LSTR	OLYMPIA OYSTER		
LUVR	LOUVAR		
MACL	MUD CLAMS		
MAKO	SHORTFIN MAKO SHARK		
MCLM	MANILA CLAM		
MEEL	MONKEYFACE EEL		
MISC	MISC. FISH/ANIMALS		
MOLA	COMMON MOLA		
MRLN	STRIPED MARLIN		
MSC2	MISCELLANEOUS FISH		
MSHP	PLAINFIN MIDSHIPMAN		
MSQD	MARKET SQUID		
MSRM	MUD SHRIMP		
MXR1	NOM. MEXICAN ROCKFISH	yes	
MXRF	MEXICAN ROCKFISH	yes	
NANC	NORTHERN ANCHOVY		
NRCK	NORTHERN ROCKFISH	yes	
NSHR	NORTHERN NEAR-SHORE ROCKFISH	yes	yes
NSLF	NORTHERN SHELF ROCKFISH	yes	
NSLP	NORTHERN SLOPE ROCKFISH	yes	
NUSF	NOR. UNSP. SHELF ROCKFISH	yes	
NUSP	NOR. UNSP. SLOPE ROCKFISH	yes	
NUSR	NOR. UNSP. NEAR-SHORE ROCKFISH	yes	yes
OABL	OTHER ABALONE		
OANC	OTHER ANCHOVY		
OBAS	OTHER BASS		
OCLM	OTHER CLAM		
OCRB	OTHER CRAB		
OCRK	OTHER CROAKER		
OCTP	UNSP. OCTOPUS		
ODSR	OTHER DEMERSAL RKFSH	yes	
OECH	OTHER ECHINODERM		
OFLT	OTHER FLATFISH	yes	
OGRN	OTHER GROUNDFISH	yes	
OLV1	NOM. OLIVE ROCKFISH	yes	yes
OLVE	OLIVE ROCKFISH	yes	yes
OMSK	OTHER MOLLUSKS		
OPLG	OTHER PELAGIC RKFSH	yes	
ORCK	OTHER ROCKFISH	yes	
ORCK	OTHER ROCKFISH	yes	
ORND	OTHER ROUNDFISH	yes	
OSCL	OTHER SCALLOP		
OSKT	OTHER SKATES	yes	
OSLR	OTHER SLOPE RKFSH	yes	

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
OSRK	OTHER SHARK		
OSRM	OTHER SHRIMP		
OSTR	OTHER OYSTER		
OTCR	OPILIO TANNER CRAB		
OTNA	OTHER TUNA		
OURC	OTHER SEA URCHINS		
OWFS	OCEAN WHITEFISH		
PABL	PINK ABALONE		
PBNT	PACIFIC BONITO		
PBTR	PACIFIC BUTTERFISH		
PCLM	PISMO CLAM		
PCOD	PACIFIC COD	yes	
PDAB	PACIFIC SANDDAB	yes	
PDB1	NOM. PACIFIC SANDDAB	yes	
PGMY	PYGMY ROCKFISH	yes	
PHLB	PACIFIC HALIBUT		
PHRG	PACIFIC HERRING		
PINK	PINK SALMON		
PLCK	WALLEYE POLLOCK	yes	
PNK1	NOM. PINK ROCKFISH	yes	
PNKR	PINK ROCKFISH	yes	
POMF	PACIFIC POMFRET		
POP	PACIFIC OCEAN PERCH	yes	
POP1	GEN. SHELF/SLOPE RF	yes	
POP2	NOMINAL POP	yes	
PRCL	PURPLE CLAM		
PROW	PROWFISH		
PRR1	NOM. PINKROSE ROCKFISH	yes	
PRRK	PINKROSE ROCKFISH	yes	
PSDN	PACIFIC SARDINE		
PSHP	PINK SHRIMP		
PSRK	PELAGIC THRESHER SHARK		
PSTR	PACIFIC OYSTER		
PTR1	NOM. PETRALE SOLE	yes	
PTRL	PETRALE SOLE	yes	
PUGT	PUGET SOUND ROCKFISH	yes	
PWHT	PACIFIC WHITING	yes	
QCLM	NORTHERN QUAHOG CLAM		
QFSH	QUEENFISH		
QLB1	NOM. QUILLBACK ROCKFISH	yes	yes
QLBK	QUILLBACK ROCKFISH	yes	yes
RABL	RED ABALONE		
RATF	SPOTTED RATFISH	yes	
RCK1	BOCACCIO+CHILIPEPPER RCKFSH	yes	
RCK2	UNSP. BOLINA RCKFSH	yes	yes
RCK3	UNSP. DPWTR REDS RCKFSH	yes	
RCK4	UNSP. REDS RCKFSH	yes	
RCK5	UNSP. SMALL REDS RCKFSH	yes	

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
RCK6	UNSP. ROSEFISH RCKFSH	yes	
RCK7	UNSP. GOPHER RCKFSH	yes	yes
RCK8	CANARY+VERMILION RCKFSH	yes	
RCK9	BLACK+BLUE ROCKFISH	yes	yes
RCKG	ROCK GREENLING		
RCLM	RAZOR CLAM		
RCRB	ROCK CRAB		
RDB1	NOM. REDBANDED ROCKFISH	yes	
RDBD	REDBANDED ROCKFISH	yes	
REDS	REDSTRIPE ROCKFISH	yes	
REX	REX SOLE	yes	
REX1	NOM. REX SOLE	yes	
REYE	ROUGHEYE ROCKFISH	yes	
RFLT	REMAINING FLATFISH	yes	
RGL1	NOM. ROCK GREENLING		
RGRN	REMAINING GROUNDFISH	yes	
RHRG	ROUND HERRING		
RKCR	RED KING CRAB		
ROS1	NOM. ROSY ROCKFISH	yes	
ROSY	ROSY ROCKFISH	yes	
RPRW	RIDGEBACK PRAWN		
RRCK	REMAINING ROCKFISH	yes	
RRND	REMAINING ROUNDFISH	yes	
RSOL	ROCK SOLE	yes	
RST1	NOM. ROSETHORN ROCKFISH	yes	
RSTN	ROSETHORN ROCKFISH	yes	
RURC	RED SEA URCHIN		
RZCL	ROSY RAZOR CLAM		
SABL	SABLEFISH	yes	
SAIL	SAILFISH		
SARY	PACIFIC SAURY		
SBL1	NOM. SHORTBELLY ROCKFISH	yes	
SBLY	SHORTBELLY ROCKFISH	yes	
SCLM	SOFT-SHELLED CLAM		
SCLP	UNSP. SCULPIN		
SCOR	CALIFORNIA SCORPIONFISH	yes	yes
SCR1	NOM. CALIF. SCORPIONFISH	yes	yes
SDB1	NOM. SPECKLED SANDDAB		
SFL1	NOM. STARRY FLOUNDER	yes	
SFLT	UNSP. SHALLOW FLOUNDERS	yes	
SHAD	UNSPECIFIED SHAD		
SHP1	NOM. CALIFORNIA SHEEPHEAD		yes
SHPD	CALIFORNIA SHEEPHEAD		yes
SHRP	SHARPCHIN ROCKFISH	yes	
SKCR	SCARLET KING CRAB		
SLGR	SILVERGREY ROCKFISH	yes	
SLNS	SLENDER SOLE		
SMLT	UNSP. SMELT		

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
SNOS	SPLITNOSE ROCKFISH	yes	
SNS1	NOM. SPLITNOSE ROCKFISH	yes	
SOCK	SOCKEYE SALMON		
SPK1	NOM. SPECKLED ROCKFISH	yes	
SPKL	SPECKLED ROCKFISH	yes	
SPRW	SPOTTED PRAWN		
SQID	UNSP. SQUID		
SQR1	NOM. SQUARESPOT	yes	
SQRS	SQUARESPOT ROCKFISH	yes	
SRFP	SURFPERCH SPP.		
SRKR	SHORTRAKER ROCKFISH	yes	
SSCL	SHARPNOSE SCULPIN		
SSDB	SPECKLED SANDDAB		
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	yes	yes
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	yes	yes
SSLF	SOUTHERN SHELF ROCKFISH	yes	
SSLP	SOUTHERN SLOPE ROCKFISH	yes	
SSO1	NOM. SAND SOLE	yes	
SSOL	SAND SOLE	yes	
SSP1	NOM. SHORTSPINE THORNYHEAD	yes	
SSPN	SHORTSPINE THORNYHEAD	yes	
SSRD	Deep So. Near-shore RF	yes	yes
SSRK	SOUPFIN SHARK	yes	
SSRS	Shallow So. Near-shore RF	yes	yes
STAR	STARRY ROCKFISH	yes	
STL1	NOM. STRIPETAIL ROCKFISH	yes	
STLH	STEELHEAD		
STNA	SKIPJACK TUNA		
STR1	NOM. STARRY ROCKFISH	yes	
STRK	STRIPETAIL ROCKFISH	yes	
STRY	STARRY FLOUNDER	yes	
SUSF	SOU. UNSP. SHELF ROCKFISH	yes	
SUSP	SOU. UNSP. SLOPE ROCKFISH	yes	
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	yes	yes
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	yes	yes
SWRD	SWORDFISH		
SWS1	NOM. SWORDSPINE ROCKFISH	yes	
SWSP	SWORDSPINE ROCKFISH	yes	
TCOD	PACIFIC TOMCOD		
TGR1	NOM. TIGER ROCKFISH	yes	
THD1	NOM. THORNYHEADS	yes	
THDS	THORNYHEADS (MIXED)	yes	
TIGR	TIGER ROCKFISH	yes	
TRE1	NOM. TREEFISH	yes	yes
TREE	TREEFISH	yes	yes
TSRK	COMMON THRESHER SHARK		
UABL	UNSPECIFIED ABALONE		
UCLM	UNSPECIFIED CLAM		

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
UCRB	UNSPECIFIED CRAB		
UDAB	UNSP. SANDDABS	yes	
UDF1	UNSP. DEEP-91 FLOUNDERS	yes	
UDF2	UNSP. DEEP-95 FLOUNDERS	yes	
UDM1	UNSP. DEMERSAL-91	yes	
UDNR	UNSP. DEEP NEAR-SHORE RF	yes	yes
UDSR	UNSP. DEMERSAL RKFSH	yes	
UDW1	SHORTRAKER+ROUGHEYE	yes	
UECH	UNSPECIFIED ECHINODERM		
UFL1	FLOUNDERS (NO FSOL)	yes	
UFLT	UNSP. FLATFISH	yes	
UGRN	UNSP. GROUNDFISH	yes	
UHAG	UNSPECIFIED HAGFISH		
UHLB	UNSPECIFIED HALIBUT		
UJEL	UNSP. JELLYFISH		
UKCR	UNSP. KING CRAB		
UMCK	UNSP. MACKEREL		
UMSK	UNSPECIFIED MOLLUSKS		
UPLG	UNSP. PELAGIC RKFSH	yes	
UPOP	UNSP. POP GROUP	yes	
URCK	UNSP. ROCKFISH	yes	
URCK	UNSP. ROCKFISH	yes	
URK1	SRKR+REYE+NRCK+SHRP	yes	
URND	UNSP. ROUNDFISH	yes	
USCL	UNSPECIFIED SCALLOP		
USCU	UNSP. SEA CUCUMBERS		
USF1	UNSP. SHALLOW-91 FLOUNDERS	yes	
USHR	UNSP. NEAR-SHORE ROCKFISH	yes	yes
USHR	UNSP. NEAR-SHORE ROCKFISH	yes	yes
USKT	UNSP. SKATE	yes	
USLF	UNSP. SHELF ROCKFISH	yes	
USLP	UNSP. SLOPE ROCKFISH	yes	
USLR	UNSP. SLOPE RKFSH	yes	
USMN	UNSP. SALMON		
USR1	UNSP. SLOPE-91	yes	
USR2	UNSP. SLOPE-93	yes	
USRK	UNSP. SHARK		
USRM	UNSP. OCEAN SHRIMP		
USTG	UNSP. STURGEON		
USTR	UNSPECIFIED OYSTER		
UTCR	UNSP. TANNER CRAB		
UTNA	UNSPECIFIED TUNA		
UTRB	UNSP. TURBOTS	yes	
UURC	UNSP. SEA URCHINS		
VRM1	NOM. VERMILLION ROCKFISH	yes	
VRML	VERMILION ROCKFISH	yes	
WABL	WHITE ABALONE		
WBAS	WHITE SEABASS		

PacFIN Species ID	PacFIN Common Name	FMP groundfish	Nearshore species
WCLM	WASHINGTON CLAM		
WCRK	WHITE CROAKER		
WDOW	WIDOW ROCKFISH	yes	
WDW1	NOM. WIDOW ROCKFISH	yes	
WEEL	WOLF EEL		
WHOO	WAHOO		
WSTG	WHITE STURGEON		
YEY1	NOM. YELLOWEYE ROCKFISH	yes	
YEYE	YELLOWEYE ROCKFISH	yes	
YLTL	YELLOWTAIL		
YMTH	YELLOWMOUTH ROCKFISH	yes	
YSOL	YELLOWFIN SOLE		
YTNA	YELLOWFIN TUNA		
YTR1	NOM. YELLOWTAIL ROCKFISH	yes	
YTRK	YELLOWTAIL ROCKFISH	yes	