

Observed and Estimated Total Discard of Pacific Halibut in the 2002-2008
U.S. West Coast Groundfish Non-Nearshore Fixed Gear Fishery

Eliza Heery and Marlene A. Bellman

Pacific States Marine Fisheries Commission
Fishery Resource Analysis and Monitoring Division
Northwest Fisheries Science Center
2725 Montlake Blvd E
Seattle, Washington 98112

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INTRODUCTION

The primary objective of this report is to provide estimates of Pacific halibut (*Hippoglossus stenolepis*) discard in the U.S. west coast groundfish non-nearshore fixed gear fishery from 2002-2008. We present discard estimates for all non-nearshore fixed gear sectors observed by the West Coast Groundfish Observer Program (WCGOP). These include vessels that fish in the federal groundfish fishery as:

- Commercial limited entry (LE) sablefish-endorsed primary season, April-October
- Commercial LE non-sablefish-endorsed vessels, year-round
- Commercial open access (OA) fixed gear vessels, year-round

Each of these observed sectors is described in more detail in the report “Data Report and Summary Analyses of the West Coast Non-nearshore Fixed Gear Fishery” (NMFS 2008). Previous estimates of Pacific halibut discard in the non-nearshore fixed gear fisheries were calculated using methodology developed for groundfish total fishing mortality estimation (Hastie and Bellman 2007, Bellman et al. 2008). The current analysis is an attempt to estimate Pacific halibut discard mortality outside of the context of discard estimation for species included in the Pacific Coast Groundfish Fishery Management Plan (PFMC 2008).

Data sources

Data sources for this analysis include onboard observer data (from the WCGOP) and landing receipt data (referred to as fish tickets). 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. 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 2008).

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 amounts recorded by WCGOP observers are reconciled with trip-level fish ticket records. This process is described in further detail in annual reports produced by the WCGOP (www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/index.cfm) and was conducted prior to the analyses presented in this report.

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. 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 Pacific Fisheries Information Network (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.

Annual fish ticket landings data were retrieved from the PacFIN database and subsequently divided into various sectors of the groundfish fishery as indicated in Figure 1. All additional data processing steps that were applied during the discard estimation process are described in the Methods Section below.

When Pacific halibut are encountered on an observed vessel, WCGOP observers select a random sample of specimens and record length and viability. Viabilities are collected according to a protocol laid out by the International Pacific Halibut Commission (IPHC), which is utilized by the North Pacific Observer Program as well. Unfortunately, due to difficulties of collecting viabilities on fixed gear vessels, there is some concern that viability collection is non-random (see next section). Therefore, these data were not used in this analysis. However, fish length values, which are collected for all randomly selected specimens either by visual estimation or physically measured, were incorporated into this analysis to evaluate the proportion of fixed gear discard that was of legal and sublegal size. A fish may be visually estimated for length when a physical measurement is not possible, such as if the fish is very large in size, the crew returns it quickly overboard, etc.

Pacific Halibut Viability Sampling in Hook-and-Line Gear Fisheries

In order for observer viability sampling data to be used in these analyzes, the WCGOP would need to be confident that they are unbiased and representative of normal fleet behavior. To understand the reasons the WCGOP is not currently using observer viability data, it is necessary to understand the complications of halibut sampling on hook-and-line vessels.

When Pacific halibut are caught on trawl vessels, they are always brought on-board the vessel, ensuring the observer can randomly select a subsample for length and viability sampling. On hook-and-line vessels, crew members have the ability to “shake” or use other means (cutting of gangions, straightening of hooks) to discard the halibut without having to bring it onboard. This type of crew behavior normally occurs before or as the Pacific halibut reaches the “roller”, which prevents the fish from hitting the “crucifier” (being torn from the hook) and laying on deck for any period of time. This is generally considered good handling practice that reduces potential mortality. To sample under these conditions, the observer would need to ask that selected Pacific halibut be brought on-board, which in itself changes the normal behavior of the crew. In addition, since the

crew knows beforehand which Pacific halibut will be sampled by the observer, they would most likely choose to be more careful in releasing the fish from the hook. These factors lead to concerns about whether the Pacific halibut viabilities collected are unbiased.

In addition to considering how observer sampling of Pacific halibut could be biased on an individual vessel basis, it is also important to consider whether the observed fleet behavior is representative of the fleet as a whole. The North Pacific hook-and line fisheries, off the Alaskan Coast, have specific Pacific halibut handling techniques defined in regulation (CFR 679.7), which state:

(13) *Halibut*. With respect to halibut caught with hook-and-line gear deployed from a vessel fishing for groundfish, except for vessels fishing for halibut as prescribed in the annual management measures published in the Federal Register pursuant to §300.62 of chapter III of this title, the following actions are prohibited:

(i) Fail to release the halibut outboard a vessel's rails.

(ii) Release the halibut by any method other than—

(A) Cutting the gangion.

(B) Positioning the gaff on the hook and twisting the hook from the halibut.

(C) Straightening the hook by using the gaff to catch the bend of the hook and bracing the gaff against the vessel or any gear attached to the vessel.

(iii) Puncture the halibut with a gaff or other device.

(iv) Allow the halibut to contact the vessel, if such contact causes, or is capable of causing, the halibut to be stripped from the hook.

These regulations ensure consistent handling practices by the North Pacific hook-and-line fleet and therefore increase the likelihood that observed vessels are operating in a manner similar to the unobserved fleet. No such regulations exist for the Pacific Coast groundfish fisheries. Although adding similar language to the Pacific groundfish regulations would not guarantee observed vessels will behave similar to unobserved vessels, the WCGOP would be more confident in making this assumption. However, even if this regulatory change was made, overcoming the issues of observer bias stated previously would be difficult.

METHODS

A deterministic approach was used to estimate Pacific halibut bycatch for all sectors of the groundfish fixed gear fishery, excluding state-permitted fisheries targeting nearshore rockfish. Through this approach, observed discard rates for Pacific halibut were directly expanded to the fleet-wide level. First, discard ratios were computed from observer data as the discarded weight of Pacific halibut divided by the retained weight of either sablefish or all FMP groundfish (except Pacific hake), depending on the sector. A complete listing of groundfish species included in the Groundfish Fishery Management Plan and used to compute and expand ratios is provided in Appendix A and B. Discard ratio denominators were identified for each sector of the fishery based on the targeting behavior of that sector. Discard ratios were then multiplied by the total fleet-wide landed weight of either sablefish or groundfish (corresponding with the denominator used to compute the observed discard ratio). This provided an expanded gross estimate of fleet-wide Pacific halibut discard. A discard mortality rate of 16% was then applied to compute estimated discard mortality (personal communication, Greg Williams, IPHC). Previously, a 25% rate of mortality was applied to discarded Pacific halibut estimates (Hastie and Bellman 2007, Bellman et al. 2008), but this was revised to 16% after further discussion with Gregg Williams of the IPHC regarding the most appropriate rate for longline discard estimation in 2009. We have also applied this rate to pot gear and to hook-and-line gears in the open access (OA) fixed gear sector. This approach was supported by the Science and Statistical Committee (SSC) of the Pacific Fishery Management Council (Ancillary B, SSC Minutes, Sep 2009).

The U.S. groundfish fixed gear fishery on the West Coast is comprised of three sectors that target sablefish and other deepwater groundfish species. Two of these are considered limited entry (LE) sectors, while the other is considered an open access (OA) sector from a federal groundfish management perspective. A federal groundfish permit is required to participate in the LE fixed gear fishery. These permits are either sablefish-endorsed or non-sablefish-endorsed. The first of the three fixed gear sectors is therefore the LE sablefish-endorsed sector, or “primary” sector. This sector consists of vessels with LE permits that are sablefish-endorsed, fishing during the primary season from April to October. LE sablefish-endorsed vessels operate primarily off of Washington and Oregon and receive the highest sablefish quota. Second, the LE non-primary sector, or “non-primary” sector, consists of federally permitted (non-sablefish-endorsed) fixed gear vessels that target both sablefish and other deepwater groundfish species but operate under daily/weekly trip limit regulations. In addition to vessels with non-endorsed LE permits, the non-primary sector includes LE sablefish-endorsed vessels that have either reached their tier quota or are fishing outside of the primary season. Once LE sablefish-endorsed vessels meet one of these criteria, they then operate under the daily/weekly trip limits like other non-endorsed vessels (50CFR Part 660, Subpart G, 660.372). Finally, the open access (OA) fixed gear sector includes vessels that are not federally permitted in the groundfish fishery, but that target a similar complex of sablefish and deepwater groundfish. Like the LE non-primary sector, the OA fixed gear sector operates under daily/weekly trip limit regulations.

Fish tickets that caught sablefish using fixed gear were partitioned into these three commercial fixed-gear sectors through the following process. Commercial fixed-gear fish tickets were first divided out by whether the vessel had a federal groundfish permit (limited entry) or no federal groundfish permit (open access). OA fish tickets were placed in the OA fixed gear sablefish sector. Next, LE fish tickets were separated based on whether the vessel's federal groundfish permit(s) had a sablefish endorsement (sablefish-endorsed) with tier quota for the primary season or if it was not endorsed (also referred to as '0' tier). Fish tickets for all LE sablefish vessels with tier endorsements that were operating within this period and within their allotted tier quota were placed in the LE sablefish-endorsed primary sector. If LE sablefish-endorsed vessels fished outside of the primary season (November through March) or made trips within the season after they had reached their tier quota, the fish tickets were placed in the LE sablefish non-primary sector. In addition, fish tickets from non-endorsed LE vessels were also placed in the LE sablefish non-primary sector.

Further processing of fish tickets was then conducted to identify landings from the directed Pacific halibut fishery and remove them from our analysis. The directed Pacific halibut fishery occurs for only a few days each year, during 10-hour openings that are designated by the IPHC. LE and OA fixed gear vessels that typically target groundfish can participate in this fishery. For most fixed gear vessels, this is the only time during which they are allowed to land Pacific halibut. However, LE sablefish-endorsed primary vessels fishing with longline gear north of Pt Chehalis, Washington (46° 53.30' N latitude) are allowed some retention of Pacific halibut during the primary sablefish season (most recent regulation: 74FR Part 19011). For the LE primary sector in this area, fish tickets from the directed Pacific halibut fishery were identified as those on which landings of Pacific halibut were greater than landings of any other groundfish species or market category. For all other sectors, including LE primary longline vessels landing south of Pt Chehalis, any fish ticket with landings of Pacific halibut was designated as part of the directed Pacific halibut fishery and was removed from our analysis.

The WCGOP observes these non-nearshore fixed gear sectors with the following priority: LE sablefish-endorsed primary season, the LE non-sablefish-endorsed ('0' tier) sector, and the OA fixed-gear sector. LE sablefish-endorsed vessels that fish outside of the primary season or that have reached their tier quota in the primary season are not observed. Again, for more information see the most recent WCGOP non-nearshore fixed gear report (NMFS 2008).

WCGOP observer data were stratified according to sector and gear type (longline and pot/trap). One additional latitudinal stratification line at Pt Chehalis, Washington (46° 53.30' N latitude) was used for the LE sablefish-endorsed longline sector. Although additional latitudinal breaks at 40° 10' N and 36° N. latitude have been used for stratification in other discard estimates for this fishery, these lines coincide with regulations in the groundfish fishery and are not relevant in the context of Pacific halibut management. As noted above, some retention of Pacific halibut per fishing trip is allowed in the LE sablefish-endorsed primary season north of Pt Chehalis, Washington (46° 53.30' N latitude) using longline gear only, and it must be landed north of Pt

Chehalis as well (most recently updated regulation 76 FR 19011). The most recent regulation allows retention from May through the end of October. This regulation has been in place for all years for which there is observer coverage, with some slight differences in the weight of Pacific halibut which could be retained. This was the only latitudinal stratification incorporated into our analysis and was only applied to the LE sablefish-endorsed primary sector. Discard amounts provided for the other two fixed gear sectors represent coastwide estimates.

The number of observed trips, sets, and vessels are summarized for each sector, gear type and area (where applicable) in Table 1. Table 2 provides the landed weight of sablefish and FMP groundfish (excluding Pacific hake) used as a measure for expanding discard from observed trips to the entire fleet. Observed discard ratios (also in Table 2) were calculated by sector, gear group and area based on the following equation:

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

where:

s: strata (sector / gear group / area)

t: observed tows

d: observed discard (lbs) of Pacific halibut

r: observed retained weight (mt) of sablefish or all FMP groundfish except Pacific hake

F: weight (mt) of retained sablefish or all FMP groundfish excluding Pacific hake recorded on fish tickets in strata *s*

D_s: Discard estimate for strata *s*

For all sector/gear/area strata, except the LE non-primary longline sector, discard ratios were calculated by dividing the stratum discard weight of Pacific halibut by the retained catch weight of sablefish. Retained groundfish was used as the ratio denominator for the LE non-primary longline sector, rather than sablefish weight alone, because this sector targets a wider range of deepwater species. A broader denominator was therefore necessary in order to effectively capture the level of fishing effort in this sector. No pot gear was observed in the LE sablefish non-primary sector. Also, discard ratios from the OA fixed gear sector in 2002-2006 were not used because the WCGOP only covered OA vessels in California during this time and the data set was not considered adequate to represent discard for the entire fishery sector coastwide. Therefore, only 2007 and 2008 discard estimates for the OA fixed gear sector were included in final discard mortality summaries. An averaged discard rate from the 2007 and 2008 OA data was subsequently applied to approximate potential discard amounts in earlier years, however this is only provided for comparison purposes.

Where FMP groundfish (excluding Pacific hake) was used to compute discard ratios, any retained weights that were recorded by the observer but that did not appear on fish tickets were excluded from the denominator. This was necessary to prevent double-counting

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

In each stratum, the observed discard ratio (Table 2) was multiplied by the fish ticket retained weight of sablefish or all FMP groundfish species (excluding Pacific hake) as indicated in Figure 2. Figure 2 demonstrates how each fishery sector/gear, expansion factor, and observed discard rate were used. This provided an expanded fleet-level discard estimate for each stratum. If landings were made by a fixed gear sector for which there were no or very few WCGOP observations, the most appropriate observed discard ratio was selected and applied to those landings based on similarities in the fishery management structure, fishing and discard behavior, and the gear fished. For example, the LE sablefish non-primary sector landed 18 mt of FMP groundfish with pot gear in 2008, but this portion of the fleet was not observed by the WCGOP program. Given similarities in gear type and catch composition, OA fixed gear pot observations were selected as the most appropriate source of information for an observed discard rate to apply to those landings by vessels fishing with pots in the LE sablefish non-primary sector (Figure 2).

RESULTS

Table 3 provides a summary of the percent observed trips that caught Pacific halibut by sector, gear group, and area. Table 3 also includes the observed annual catch (mt) and discard (mt) of Pacific halibut, as well as the percentage of Pacific halibut catch that was discarded. Pacific halibut was most commonly encountered by the LE sablefish primary longline sector fishing north of Pt Chehalis, Washington, with catch occurring during 94-100% of observed trips. Catch of Pacific halibut was much less common in the LE sablefish non-primary sector, which primarily operates off of California and southern Oregon. Although retention of Pacific halibut is prohibited for LE sablefish-endorsed primary vessels fishing with longline gear south of Pt Chehalis, observers did record retained Pacific halibut in this area on a total of 6 trips in 2002, 2003, 2004, and 2006. On 5 of these trips, fishing took place south of Pt Chehalis but the vessel landed their catch in ports north of this line. Sablefish was still the dominant retained species (in weight) on these trips, and they did not, therefore, appear to be part of the directed Pacific halibut fishery.

Annual estimates of Pacific halibut gross discard and discard mortality in the LE sablefish primary, LE sablefish non-primary and OA fixed gear sectors are presented in Table 4. In the LE sablefish primary longline sector, Pacific halibut discard estimates were consistently higher in the area north of Point Chehalis than in the area south. Discard estimates for both areas followed a similar trend across time, with particularly high values in 2006 (Figure 3). Coastwide discard amounts in the LE primary pot sector were considerably less than those associated with longline gear, with estimates of gross discard ranging from 0.3 to 33 mt. Discard in the LE non-primary sector was also found to be quite low, with the largest annual gross discard estimate of 2.6 mt occurring in 2008 with longline gear.

Between 2002 and 2006, the WCGOP only covered OA fixed gear vessels in California. Observer coverage was extended to OA fixed gear vessels in Oregon and Washington in 2007. Because the spatial distribution of Pacific halibut is centered primarily in northern areas off the U.S. west coast, it was deemed inappropriate to use earlier California-only discard ratios to estimate discard in this sector from 2002-2006. Expanded OA discard amounts for this time period were therefore excluded from final discard estimates for the fishery as a whole (Table 5).

However, averaged discard rates from 2007 and 2008 OA data were used to provide expanded 2002-2006 discard estimates for comparison purposes only. These estimates are shown in brackets in Table 4. Discard estimates in the OA hook-and-line sector represented the second largest component of discard mortality in our analysis, after the LE sablefish-endorsed primary longline sector. Assuming a fixed 2007-2008 discard rate for 2002-2006, gross discard in this sector may have been as high as 55 mt in previous years. When using the fixed discard rate in earlier years, trends in discard are a direct result of the level of fishing effort in this sector, as represented by sablefish landings (mt) in Table 2. Far less discard was associated with the OA pot sector in 2002-2006, with annual estimates ranging from 0.2 to 0.9 mt of Pacific halibut.

A final summary of estimated discard mortality from all three non-nearshore fixed gear groundfish sectors is presented in Table 5. Estimated total discard mortality was much larger in 2006 than in any other year. High discard mortality from this year appears to be solely driven by higher encounter rates of Pacific halibut, which were subsequently discarded, particularly on LE sablefish-endorsed primary vessels fishing north of Pt Chehalis, Washington.

Estimates provided in this report differ from estimates previously provided in groundfish total mortality estimation for three reasons. First, a new latitudinal stratification line was employed at Pt Chehalis, Washington (46° 53.30' N latitude) in the LE sablefish-endorsed primary longline sector. This change was initially reviewed in response to an outside data request and was adopted into our methodology because it appeared to coincide well with both observed spatial differences in discard behavior in this sector and with management distinctions north and south of this line. In most years, this change had a net effect of increasing estimates slightly, with notable exceptions in 2003 and 2007, for

which gross discard of Pacific halibut decreased by approximately 20 mt. Second, additional work was conducted to isolate fish tickets associated with the LE and OA fixed gear groundfish fishery from those associated with the directed Pacific halibut fishery, a derby fishery that occurs during several 10-hour openings annually, and is managed separately from groundfish. In the LE sablefish-endorsed primary longline sector north of Pt Chehalis, fixed gear fish tickets were identified as part of the directed Pacific halibut fishery if they contained more weight of Pacific halibut than any other species landed. In all other sectors, all fish tickets that contained any landed weight of Pacific halibut were identified and removed, as landings are prohibited in the federal groundfish fixed gear regulations for the remaining sectors analyzed. Finally, a 16% discard mortality rate is now being applied to gross discard estimates rather than the 25% rate used previously. This, of course, reduces the level of discard mortality associated with gross discard estimates.

Point estimates may 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, several sources of uncertainty that were not accounted for in this analysis may influence Pacific halibut discard estimates. These include uncertainty in landings amounts, observed retained catch weight, discard mortality rates, as well as others. Currently, it is not possible to quantify uncertainty for discard estimates presented in this report, as measures of the variability or bias associated with outside data sources are not available. As with all point estimates, Pacific halibut discard mortality values presented in Tables 4 and 5 should be considered with caution.

The Pacific halibut discard mortality values presented in Table 5 provide one component of the data necessary for determining total fishing mortality of Pacific halibut in the non-nearshore fixed gear groundfish fishery. The additional data component, which is not provided in this report, but necessary for calculating final total fishing mortality estimates, is the actual landings of Pacific halibut from the non-nearshore fixed gear groundfish fishery. Although the PacFIN database provides a complete source of landings data for groundfish, landings information for Pacific halibut are considered incomplete. Pacific halibut landings can instead be obtained directly from the IPHC.

For additional context, Table 6 attempts to present the proportion of sampled Pacific halibut discard in the non-nearshore fixed gear groundfish fishery that was of legal (≥ 80 cm) and sublegal (< 80 cm) size. The majority of Pacific halibut lengths recorded in this fishery have been collected through visual length estimation, during which observers round to the nearest 10 cm. In other words, specimens that are 76 cm and 82 cm are both visually estimated to be 80 cm. With this level of resolution, it was not possible to compute the exact proportion of sublegal versus legal Pacific halibut from visually estimated lengths. Visual estimates were instead summarized in the manner in which they are recorded; with sublegal and legal sized Pacific halibut falling within the 75 – 84 cm length bin. Actual length measurements are available for 84 Pacific halibut from September 2003 through December 2008. Although sublegal versus legal percentages were computed from this data, actual lengths do appear to contain a higher frequency of smaller individuals than visual estimates (Figure 4).

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FIGURES

Figure 1. Fish ticket 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. Shaded sectors indicate sectors for which federal observer data is available. ‘DTL’ refers to sectors fishing under daily/weekly trip limit regulations.

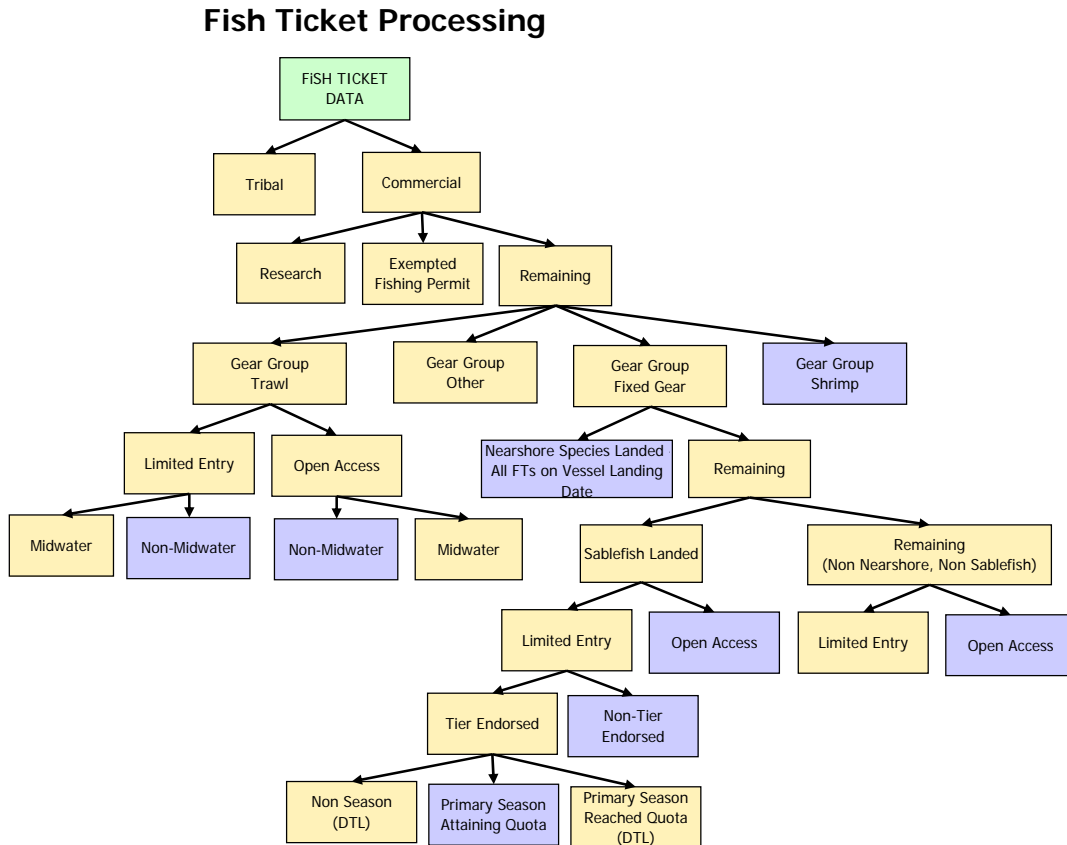


Figure 2. Expansion factors and observed discard rates by gear type for limited entry (LE) and open access (OA) non-nearshore fixed gear sectors used to expand discard estimates of Pacific halibut to the fleet level for each individual year.

Fishery		Expansion Factor	Observed Discard Rate Applied	
LE Sablefish Primary	Longline Pot	Retained Sablefish	LE Sablefish Primary	Longline Pot
LE Sablefish Non-Primary	Longline Pot	Retained Groundfish Retained Sablefish	LE Sablefish Non-Primary OA Fixed Gear *	Longline Pot
OA Fixed Gear	Hook-and-line Pot	Retained Sablefish	OA Fixed Gear *	Hook-and-line Pot

* No discard ratio or discard estimate was computed in the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time.

Figure 3. Estimated discard mortality of Pacific halibut in the non-nearshore groundfish fixed gear fishery from 2002 through 2008. Estimates are presented for all components of the limited entry (LE) sablefish primary sector (longline (LL) north and south of Pt Chehalis and pot coastwide), for the open access (OA) sector using hook-and-line gears, and for all other non-nearshore fixed gear sectors combined (‘Other fixed gear sectors’ includes LE non-primary and OA pot estimates). Although OA 2002-2006 discard estimates are not included in final discard mortality summaries, they are shown here in light gray for comparison purposes. The OA fixed gear sector was only observed in California in 2003-2006 and was not covered in 2002. A fixed average discard rate from 2007 and 2008 data was applied to generate 2002-2006 discard estimates for the OA sector.

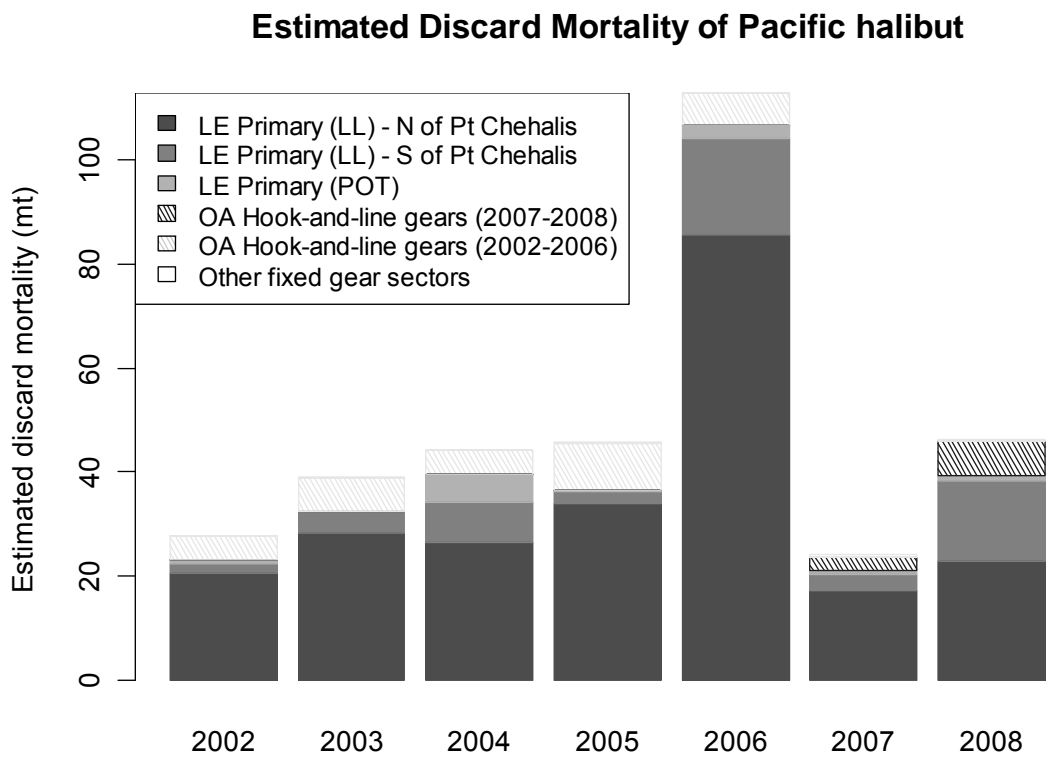
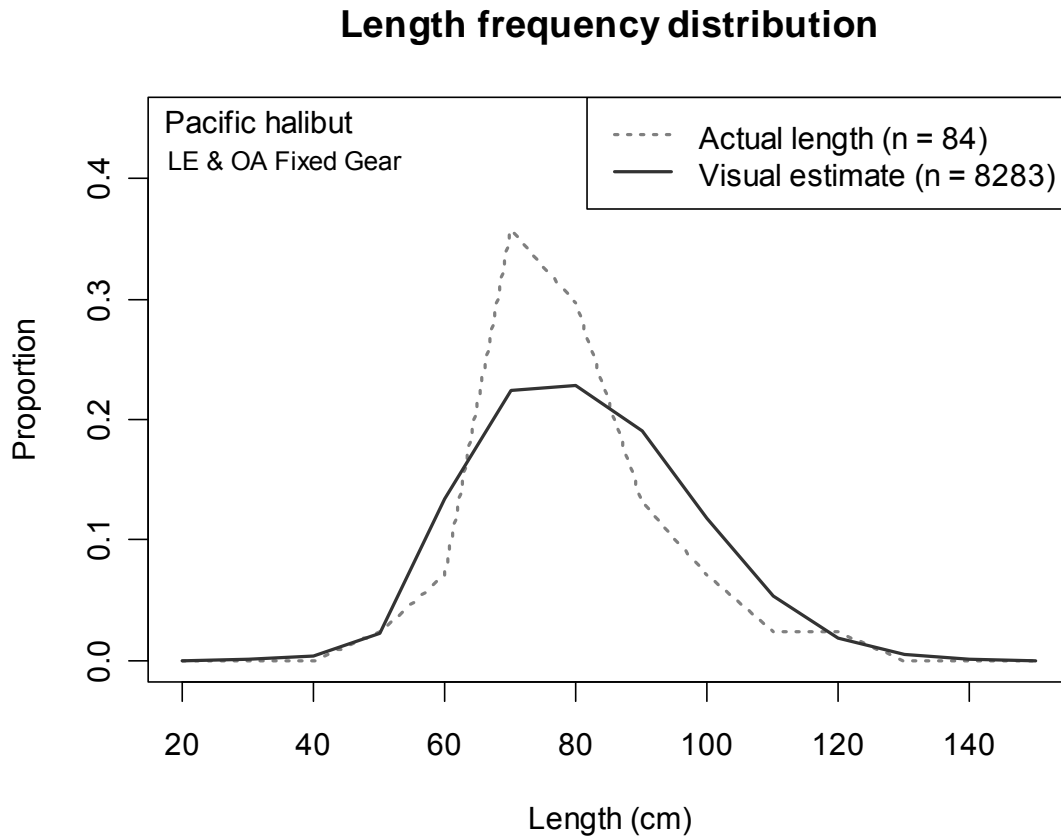


Figure 4. Length frequency distribution of discarded Pacific halibut on observed limited entry (LE) and open access (OA) groundfish fixed gear vessels from September 2003 through December 2008. The majority of Pacific halibut lengths collected in this fishery were from visual estimates (solid dark line). Actual length measurements (dashed gray line) were available for far fewer specimens.



TABLES

Table 1. Number of annual observed trips, sets, and vessels in the limited entry (LE) sablefish-endorsed primary, LE sablefish non-primary, and open access (OA) fixed gear groundfish sectors from 2002-2008. The OA fixed gear sector was not observed in 2002 and only observed in California from 2003-2006 (numbers in italics).

	LE Sablefish Primary			LE Sablefish Non-Primary	OA Fixed Gear	
	Longline		Pot	Longline	Hook-and-line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis				
Number of observed trips						
2002	23	47	23	11	0	0
2003	25	25	35	130	41	16
2004	13	35	13	62	43	96
2005	31	73	39	35	34	43
2006	31	34	39	121	11	38
2007	36	40	30	158	50	45
2008	17	60	24	122	58	55
Number of observed sets						
2002	207	181	247	22	0	0
2003	191	158	362	219	49	50
2004	115	205	139	130	53	182
2005	388	275	491	60	37	50
2006	291	159	288	196	12	39
2007	381	136	154	303	66	72
2008	194	345	329	220	68	74
Number of observed vessels						
2002	9	18	6	4	0	0
2003	8	8	6	17	13	7
2004	6	13	3	14	15	17
2005	10	18	7	11	10	14
2006	9	10	7	21	8	15
2007	9	14	4	36	25	20
2008	6	13	6	32	33	20

Table 2. Total sablefish and groundfish landings (mt) with observed Pacific halibut discard ratios for each non-nearshore fixed gear groundfish sector and gear type. Sablefish landings were used as the discard ratio denominator and expansion factor in all cases, except for the limited entry sablefish non-primary sector, where target species include a variety of deepwater groundfish species.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
Expansion factor				<i>Groundfish</i>	<i>Sablefish</i>		
Total fleet landings <i>(Based on fish tickets)</i>	<i>Sablefish landings (mt)</i>			<i>landings (mt)</i>	<i>landings (mt)</i>	<i>Sablefish landings (mt)</i>	
2002	390	407	354	452	6	266	109
2003	499	569	604	485	7	375	187
2004	698	654	626	377	6	272	182
2005	641	676	615	519	7	518	374
2006	684	708	611	441	4	347	435
2007	489	607	426	462	9	203	244
2008	385	663	421	652	18	326	235
Observed Pacific halibut discard ratios							
2002	0.3297	0.0283	0.0114	0.0000	*	*	*
2003	0.3532	0.0467	0.0005	0.0003	*	*	*
2004	0.2369	0.0746	0.0526	0.0000	*	*	*
2005	0.3318	0.0204	0.0043	0.0000	*	*	*
2006	0.7827	0.1636	0.0271	0.0000	*	*	*
2007	0.2184	0.0334	0.0092	0.0032	(0.0035)	0.0839	0.0035
2008	0.3715	0.1453	0.0151	0.0041	(0.0010)	0.1259	0.0010

* No discard ratio is provided for the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California from 2003-2006 and no observations were made in 2002. Since 2007-2008 OA pot discard rates were used to estimate LE non-primary discard, discard ratios for this sector were also excluded from 2002-2006.

Table 3. Summary of the percent of observed trips that caught Pacific halibut by non-nearshore fixed gear groundfish sector, gear type, and area (where applicable). Observed average, minimum and maximum annual catch and annual discard weights of Pacific halibut are also provided, along with the percent of Pacific halibut catch weight that was discarded by year.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
% of observed trips that caught Pacific halibut							
2002	95.7%	46.8%	17.4%	0.0%	--	--	--
2003	100.0%	52.0%	8.6%	0.8%	--	0.0%	0.0%
2004	100.0%	71.4%	38.5%	0.0%	--	0.0%	0.0%
2005	96.8%	58.9%	33.3%	0.0%	--	0.0%	0.0%
2006	100.0%	76.5%	56.4%	0.0%	--	9.1%	0.0%
2007	94.4%	47.5%	33.3%	1.9%	--	26.0%	6.7%
2008	100.0%	78.3%	83.3%	3.3%	--	34.5%	5.5%
Observed annual catch (mt) of Pacific halibut							
Mean	54.9	13	2.4	0.1	--	0.8	0.0
Min	12.1	3.1	0.1	0.0	--	0.1	0.0
Max	117.2	36.6	5.4	0.1	--	1.6	0.0
Observed annual discard (mt) of Pacific halibut							
Mean	47.4	12.8	2.4	0.1	--	0.8	0.0
Min	9.5	2.9	0.1	0.0	--	0.1	0.0
Max	109.6	36.6	5.4	0.1	--	1.6	0.0
% of Pacific halibut catch that was discarded							
2002	80.1%	95.5%	100.0%	*	--	--	--
2003	82.5%	99.5%	100.0%	100.0%	--	*	*
2004	79.0%	97.7%	100.0%	*	--	*	*
2005	84.8%	100.0%	100.0%	*	--	*	*
2006	93.5%	97.9%	100.0%	*	--	100.0%	*
2007	80.6%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2008	87.4%	100.0%	100.0%	100.0%	--	100.0%	100.0%

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

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

Table 4. Estimated gross discard (mt) and discard mortality (mt) in the limited entry (LE) sablefish primary, LE sablefish non-primary, and open access (OA) fixed gear sectors. Estimated discard mortality (mt) was computed by applying a 16% discard mortality rate to gross discard estimates. Discard estimates were not initially computed for the 2002 - 2006 OA fixed gear sector because the WCGOP only observed OA fixed gear vessels off of California from 2003-2006 and no observations were made in 2002. However, in order to produce potential values for these years, a combined discard rate from 2007 and 2008 (during which there were coastwide observations) was subsequently applied. The resulting estimates using the assumed 2007-2008 discard rate are shown in brackets.

	2002	2003	2004	2005	2006	2007	2008
LE Sablefish Primary (mt)							
<i>Longline</i>							
<u>North of Pt Chehalis</u>							
Gross discard estimate	128.7	176.2	165.3	212.6	535.5	106.8	143.2
Estimated discard mortality (16%)	20.6	28.2	26.5	34.0	85.7	17.1	22.9
<u>South of Pt Chehalis</u>							
Gross discard estimate	11.5	26.6	48.7	13.8	115.9	20.3	96.3
Estimated discard mortality (16%)	1.8	4.3	7.8	2.2	18.5	3.2	15.4
<u>Coastwide</u>							
Gross discard estimate	140.2	202.7	214.1	226.4	651.4	127.1	239.5
Estimated discard mortality (16%)	22.4	32.4	34.3	36.2	104.2	20.3	38.3
<i>Pot</i>							
<u>Coastwide</u>							
Gross discard estimate	4.1	0.3	33.0	2.6	16.5	3.9	6.4
Estimated discard mortality (16%)	0.6	0.0	5.3	0.4	2.6	0.6	1.0
LE Sablefish Non-Primary (mt)							
<i>Longline</i>							
<u>Coastwide</u>							
Gross discard estimate	0.0	0.1	0.0	0.0	0.0	1.5	2.6
Estimated discard mortality (16%)	0.0	0.0	0.0	0.0	0.0	0.2	0.4
<i>Pot</i>							
<u>Coastwide</u>							
Gross discard estimate	*	*	*	*	*	0.03	0.02
Assuming OA fixed gear 07-08 pot discard rate for 2002 - 2006 *	[0.0]	[0.0]	[0.0]	[0.0]	[0.0]		
Estimated discard mortality (16%)	*	*	*	*	*	0.0	0.0
OA Fixed Gear (mt)							
<i>Hook-and-line Gears</i>							
<u>Coastwide</u>							
Gross discard estimate	*	*	*	*	*	17.0	41.1
Assuming 07-08 discard rate for 2002 - 2006	[28.7]	[40.3]	[29.3]	[55.8]	[37.4]		
Estimated discard mortality (16%)	*	*	*	*	*	2.7	6.6
<i>Pot</i>							
<u>Coastwide</u>							
Gross discard estimate	*	*	*	*	*	0.8	0.2
Assuming 07-08 discard rate for 2002 - 2006	[0.2]	[0.4]	[0.4]	[0.8]	[0.9]		
Estimated discard mortality (16%)	*	*	*	*	*	0.1	0.0

* The LE sablefish non-primary pot sector has not been observed by the WCGOP and therefore estimates are based on discard rates from observed OA fixed gear pot vessels. Because the OA fixed gear pot sector was only observed on a coastwide basis in 2007 and 2008, estimates for LE sablefish non-primary pot are only available in these years as well.

Table 5. Estimated discard mortality (mt) from each sector of the non-nearshore fixed gear fishery from 2002 through 2008.

	Estimated discard mortality (mt)			
	LE Sablefish Primary	LE Sablefish Non-Primary	OA Fixed Gear	All Sectors
2002	23.1	0.0	0.0	23.1
2003	32.5	0.0	0.0	32.5
2004	39.5	0.0	0.0	39.5
2005	36.6	0.0	0.0	36.6
2006	106.9	0.0	0.0	106.9
2007	21.0	0.2	2.9	24.1
2008	39.3	0.4	6.6	46.4

Table 6. Number and percentage of sampled Pacific halibut lengths by size. Individuals less than 80 cm are considered to be of sublegal size. While it is possible to compute the percentage of sublegal versus legal individuals from actual length measurements, the majority of observed Pacific halibut length data were acquired through visual length estimation, during which observers round to the nearest 10 cm. With this level of resolution, it was not possible to compute the exact percentage of sublegal versus legal Pacific halibut from visually estimated lengths. Visual estimates were instead summarized in the manner in which they are recorded; with sublegal and legal sized individuals falling within the 75 – 84 cm length bin.

	Pacific halibut lengths	
	Number	Percentage
Actual length		
< 80 cm	56	66.7%
≥ 80 cm	28	33.3%
Visual estimate		
0 - 74 cm	3196	38.6%
75 - 84 cm	1887	22.8%
85 - 150 cm	3200	38.6%

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*, *Sebastobus*, 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 codes were included in discard ratio denominators and expansion factors as FMP groundfish species.

PacFIN Species ID	PacFIN Common Name	FMP groundfish
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
BLGL	BLACKGILL ROCKFISH	yes
BLK1	NOM. BLACK ROCKFISH	yes
BLU1	NOM. BLUE ROCKFISH	yes
BLUR	BLUE ROCKFISH	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
BRWN	BROWN ROCKFISH	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
BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	yes
CBZ1	NOM. CABEZON	yes
CBZN	CABEZON	yes
CEEL	SPOTTED CUSK-EEL	
CHL1	NOM. CALIFORNIA HALIBUT	
CHLB	CALIFORNIA HALIBUT	
CHN1	NOM. CHINA ROCKFISH	yes
CHNA	CHINA ROCKFISH	yes
CHNK	CHINOOK SALMON	
CHUM	CHUM SALMON	
CKLE	BASKET COCKLE	

PacFIN Species ID	PacFIN Common Name	FMP groundfish
CLC1	NOM. CALICO ROCKFISH	yes
CLCO	CALICO ROCKFISH	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
COPP	COPPER ROCKFISH	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	
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
GPHR	GOPHER ROCKFISH	yes
GPRW	GOLDEN PRAWN	
GRAS	GRASS ROCKFISH	yes
GRDR	UNSP. GRENADIERS	yes
GRS1	NOM. GRASS ROCKFISH	yes
GSP1	NOM. GREENSPOTTED ROCKFISH	yes
GSPT	GREENSPOTTED ROCKFISH	yes
GSQD	GIANT SQUID	
GSR1	NOM. GREENSTRIPED ROCKFISH	yes
GSRK	GREENSTRIPED ROCKFISH	yes

PacFIN Species ID	PacFIN Common Name	FMP groundfish
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
KLP1	NOM. KELP ROCKFISH	yes
KLPG	KELP GREENLING	yes
KLPR	KELP ROCKFISH	yes
KMKA	KAMCHATKA FLOUNDER	
KSTR	KUMAMOTO OYSTER	
LCD1	NOM. LINGCOD	yes
LCLM	NATIVE LITTLENECK	
LCOD	LINGCOD	yes
LDAB	LONGFIN SANDDAB	
LDB1	NOM. LONGFIN SANDDAB	
LOBS	CALIF. SPINY LOBSTER	
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
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
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

PacFIN Species ID	PacFIN Common Name	FMP groundfish
OGRN	OTHER GROUND FISH	yes
OLV1	NOM. OLIVE ROCKFISH	yes
OLVE	OLIVE ROCKFISH	yes
OMSK	OTHER MOLLUSKS	
OPLG	OTHER PELAGIC RKFSH	yes
ORCK	OTHER ROCKFISH	yes
ORCK	OTHER ROCKFISH	yes
ORND	OTHER ROUND FISH	yes
OSCL	OTHER SCALLOP	
OSKT	OTHER SKATES	yes
OSLR	OTHER SLOPE RKFSH	yes
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
QLBK	QUILLBACK ROCKFISH	yes
RABL	RED ABALONE	
RATF	SPOTTED RATFISH	yes
RCK1	BOCACCI+CHILIPEPPER RCKFSH	yes
RCK2	UNSP. BOLINA RCKFSH	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
RCK6	UNSP. ROSEFISH RCKFSH	yes
RCK7	UNSP. GOPHER RCKFSH	yes
RCK8	CANARY+VERMILION RCKFSH	yes
RCK9	BLACK+BLUE ROCKFISH	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 GROUND FISH	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 ROUND FISH	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
SCR1	NOM. CALIF. SCORPIONFISH	yes
SDB1	NOM. SPECKLED SANDDAB	
SFL1	NOM. STARRY FLOUNDER	yes
SFLT	UNSP. SHALLOW FLOUNDERS	yes
SHAD	UNSPECIFIED SHAD	
SHP1	NOM. CALIFORNIA SHEEPHEAD	
SHPD	CALIFORNIA SHEEPHEAD	
SHRP	SHARPCHIN ROCKFISH	yes
SKCR	SCARLET KING CRAB	
SLGR	SILVERGREY ROCKFISH	yes
SLNS	SLENDER SOLE	
SMLT	UNSP. SMELT	
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	SHORTTRAKER ROCKFISH	yes
SSCL	SHARPNOSE SCULPIN	
SSDB	SPECKLED SANDDAB	
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	yes

PacFIN Species ID	PacFIN Common Name	FMP groundfish
SSHR	SOUTHERN NEAR-SHORE ROCKFISH	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
SSRK	SOUPFIN SHARK	yes
SSRS	Shallow So. Near-shore RF	yes
STAR	STARRY ROCKFISH	yes
STL1	NOM. STRIPETAILED ROCKFISH	yes
STLH	STEELHEAD	
STNA	SKIPJACK TUNA	
STR1	NOM. STARRY ROCKFISH	yes
STRK	STRIPETAILED 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
SUSR	SOU. UNSP. NEAR-SHORE ROCKFISH	yes
SWRD	SWORDFISH	
SWS1	NOM. SWORDSPINE ROCKFISH	yes
SWSP	SWORDFISH	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
TREE	TREEFISH	yes
TSRK	COMMON THRESHER SHARK	
UABL	UNSPECIFIED ABALONE	
UCLM	UNSPECIFIED CLAM	
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
UDSR	UNSP. DEMERSAL RKFSH	yes
UDW1	SHORTRAKER+ROUGHEYE	yes
UECH	UNSPECIFIED ECHINODERM	
UFL1	FLOUNDERS (NO FSOL)	yes
UFLT	UNSP. FLATFISH	yes
UGRN	UNSP. GROUND FISH	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. ROUND FISH	yes
USCL	UNSPECIFIED SCALLOP	
USCU	UNSP. SEA CUCUMBERS	
USF1	UNSP. SHALLOW-91 FLOUNDERS	yes
USHR	UNSP. NEAR-SHORE ROCKFISH	yes

PacFIN Species ID	PacFIN Common Name	FMP groundfish
USHR	UNSP. NEAR-SHORE ROCKFISH	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	
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