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# Estimated Discard and Catch of Groundfish Species in the 2017 U.S. West Coast Fisheries

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Fisheries Science Center

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## Note:

Due to the amount of data they contain, Tables 2c, 2d, 5a, 6, 7, 11, 13, and 15 have been typeset on legal-sized pages. Printing them on regular, letter-sized paper may result in reduced legibility.

NOAA FISHERIES

# Estimated Discard and Catch of Groundfish Species in the 2017 U.S. West Coast Fisheries

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# Acknowledgments

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# Executive Summary

The primary objectives of this report are to estimate fishing mortality of groundfish species in U.S. West Coast fisheries during 2017 and evaluate mortality estimates relative to annual catch limit (ACL), acceptable biological catch (ABC), and overfishing limit (OFL) harvest specifications. These management specifications are published in the federal groundfish regulations for selected groundfish species (USOFR 2017). Based on a recommendation from the Pacific Fishery Management Council's (PFMC) Scientific and Statistical Committee (SSC), we present groundfish mortality estimates by species, whenever possible (PFMC 2014). Our primary findings include that:

- We report mortality estimates from three newly observed fisheries: the directed Pacific halibut fishery (PHLB), the California ridgeback prawn trawl (RBPT), and the California sea cucumber trawl (SCT).[1]
- Three groundfish groupings exceeded 2017 harvest goals by 103% of the ACL for black rockfish (Oregon), 108% of the ACL for cabezon (Oregon), and 102% of the ACL for sablefish north of lat 36°N.
- Additionally, the estimated fishing mortalities of two groundfish species were between 90 and 100% of their ACLs: petrale sole (94%) and yelloweye rockfish (90%).
- All other groundfish species or complexes achieved less than 90% of their ACLs.
- Only two species remain PFMC-defined as rebuilding: cowcod rockfish south of lat 40°10'N, and yelloweye rockfish. The ACL attainment percentage in 2017 was greater than in 2016 for both of these species; cowcod increased from 13 to 17%, while yelloweye rockfish showed a much greater increase, from 50 to 90%.
- Twenty-nine of the groundfish species or complexes (71%) had fishing mortality estimates which were less than 50% of their 2017 ACLs (Table 16).
- Fishing mortality estimates for all groundfish catch combined were higher in 2017 than in 2016 in the at-sea hake catcher–processor (CP) and mothership catcher vessel (MSCV), catch share pot and bottom trawl, and open access (OA) fixed gear sectors (Table 15; Somers et al. 2017). Estimated fishing mortality of all groundfish species and complexes was lower than 2016 levels in the catch share hook-and-line, sablefish primary, nearshore, and pink shrimp sectors.

Summaries of 2017 catch from the following groundfish fishery sectors are included:

1. Commercial:
   a. Limited entry (LE) shorebased individual fishing quota (IFQ) program.*
      - Bottom trawl gear.
      - Fixed gear.
      - Midwater trawl gear, landing 50% or more rockfish.
      - Midwater trawl gear, landing 50% or more hake.
      - Bottom trawl gear and using electronic monitoring (EM).
      - Fixed gear and using EM.

[1] Scientific names of species and/or groups of species mentioned in this report appear in the List of Species.

        - Midwater trawl gear, landing 50% or more rockfish and using EM.
        - Midwater trawl gear, landing 50% or more hake and using EM.
    b. At-sea hake co-ops.*
        - Pacific hake CP.
        - Pacific hake MSCV.
    c. OA fixed gear nearshore (Oregon/California).*
    d. Fixed gear LE sablefish primary season (tier endorsed).*
    e. Fixed gear LE nonprimary sablefish (non-endorsed and daily trip limit [DTL] sectors).*
    f. Directed Pacific halibut fishery.*
    g. Fixed gear OA DTL.*
    h. Exempted fishing permit (EFP), not including EM sectors listed above.*
2. Tribal:
    a. Shoreside hake.
    b. At-sea hake.*
3. Recreational (Washington/Oregon/California).
4. Research.

Other commercial nongroundfish fisheries included with incidental catch of groundfish species:

1. OA pink shrimp trawl (Washington/Oregon/California),*
2. OA ridgeback prawn trawl (California).*
3. OA bottom trawl targeting California halibut.*
4. OA bottom trawl targeting sea cucumber (California).*
5. OA bottom trawl not included above.
6. Other gear groups not included above.
7. Fixed gear targeting nongroundfish.

* Indicates sectors that use federal observer data.

# Data Sources

Data sources used to estimate groundfish fishing mortality include landing receipts, onboard observer records, electronic monitoring (EM) logbooks, and recreational and research catch information.

Fleet-wide landing receipts (a.k.a., fish tickets) are the cornerstone of retained catch information for all shoreside sectors of the commercial groundfish fishery on the U.S. West Coast. Fish tickets are trip-aggregated sales receipts issued to vessels by fish buyers in each port for each delivery of fish and, in most fisheries, are now reported electronically to state agencies. Washington, Oregon, and California each have a slightly different fish ticket format. Each state conducts species-composition sampling for numerous market categories reported on fish tickets. Market categories represent either a single species or a mixture of species. Fish ticket and species-composition data are submitted by state agencies to the Pacific Fisheries Information Network (PacFIN) regional database, which is maintained by the Pacific States Marine Fisheries Commission (PSMFC). For analytical purposes, we used fish ticket data with PacFIN-applied percentages of each species weight within market categories obtained from species composition sampling. Landed weights from sampled market categories were distributed to individual species whenever possible.

Fish ticket landings data for the calendar year 2017 were retrieved from the PacFIN database on 3 May 2018. The allocation of these landings to unique fishery sectors has been improved to better reflect the sectors as defined for observer coverage (Figure 1; Appendix B). Specifically, three sectors were observed for the first time in 2017: the directed Pacific halibut, California ridgeback prawn trawl, and California sea cucumber trawl fisheries.[1] Unlike in previous years, these sectors are now defined separately from "incidental" fisheries. In addition, beginning in 2017, vessels participating in the sablefish primary fishery were, on the trip where they exceeded their annual sablefish tier quota, allowed to land any additional sablefish as part of the daily trip limit (DTL) fishery (NMFS 2018). In 2017, these DTL landings as part of primary trips comprised a total of 6.3 gross metric tons (mt), or ~0.4% of total sablefish landings in the primary fishery. Due to the small magnitude of these landings and the likelihood that this effort was more similar to the sablefish primary sector than to the DTL sector, we considered all fish tickets and observed data associated with those trips as part of the sablefish primary fishery. All additional data processing steps are described in Methods.

The Northwest Fisheries Science Center (NWFSC) West Coast Groundfish Observer Program (WCGOP) was established in 2001 by the National Marine Fisheries Service (NMFS or NOAA Fisheries; USOFR 2001). All commercial vessels that land groundfish caught in the U.S. Exclusive Economic Zone (EEZ) from 3–200 miles offshore are required to carry an observer when notified to do so by NOAA Fisheries or its designated agent. Subsequent state rule-making also requires vessels that fish for groundfish within three miles of shore, or that participate in other state-managed fisheries, to carry federal observers when notified.

[1] Scientific names of species and/or groups of species mentioned in this report appear in the List of Species.

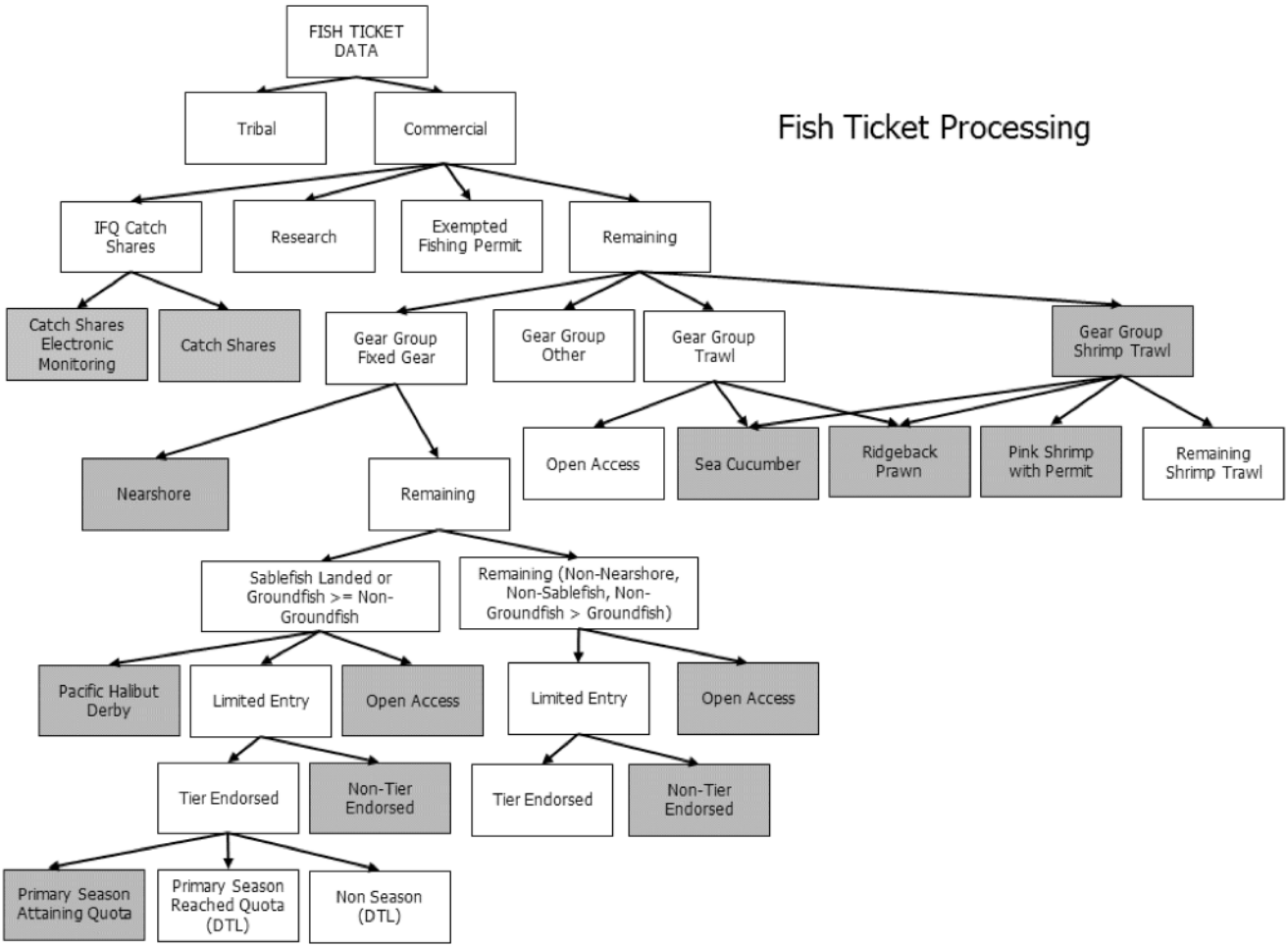


Figure 1. PacFIN fish ticket data processing for division into groundfish fishery sectors after retrieval of a full calendar-year dataset from the PacFIN database (queried 3 May 2018). Gray highlight indicates sectors for which federal observer data are available.

WCGOP's goal is to improve total catch estimates by collecting information on west coast groundfish species discarded at-sea. Detailed information on data collection methods employed in each observed fishery can be found in WCGOP manuals (NWFSC 2018b). The sampling protocol employed by the WCGOP primarily focuses on the discarded portion of catch. To ensure that recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch recorded by WCGOP observers is reconciled with trip-level fish ticket records. The WCGOP data are linked to fish tickets by fish ticket identification numbers obtained by the observer, and are adjusted so that the total trip pounds of retained catch in the WCGOP data equal the total trip pounds on the fish ticket(s). This adjustment is necessary because observer retained catch weight estimates in the trawl sectors often consist of the visual estimate used in the vessel's logbook, while the fish ticket weight is a physical measurement and is legally binding. For more detail, see NWFSC (2019).

The At-Sea Hake Observer Program (A-SHOP) has conducted observations of the U.S. West Coast at-sea hake (a.k.a., Pacific whiting, henceforth referred to as hake) fishery since 2001. Prior to 2001, observer coverage of the west coast at-sea hake fishery was conducted by the North Pacific Observer Program. Current A-SHOP program information and documentation on data collection methods can be found in the observer manual (NWFSC 2018a). The at-sea hake fishery has mandatory observer coverage, with each vessel over 38 m carrying two observers. Beginning in 2011, under individual fishing quota (IFQ)/co-op program management, in addition to A-SHOP observers aboard the motherships, all catcher vessels that deliver catch to them are required to carry WCGOP observers or EM systems.

At-sea discard of IFQ species was recorded by EM systems on those vessels fishing IFQ quota within the EM exempted fishing permit (EFP) sector in 2017. Estimates of discard weight by IFQ species or grouping at the haul level for shoreside vessels were provided by PSMFC and are used in this report.

Discard is defined in this report primarily as catch which is discarded at sea; however, some estimates of additional "discard" occurring shoreside in optimized or maximized retention are included and explicitly labeled. In all other sectors, WCGOP assumed that the small amount of discard at the dock is accounted for in PacFIN fish ticket landings data. Landing weights are presented in round weight (complete weight as caught, prior to any dressing), as any conversion factors (e.g., for at-sea processing) have already been applied by state agencies or in PacFIN.

Discard estimation focused on commercial groundfish fishery sectors with scientific at-sea observations of discards conducted by the Fisheries Observation Science (FOS) Program, Fishery Resource Analysis and Monitoring Division (FRAM), NWFSC. WCGOP and A-SHOP observe distinct sectors of the groundfish fishery. WCGOP observes a number of different sectors of the groundfish fishery, including IFQ shorebased, limited entry (LE) and open access (OA) fixed gear, directed Pacific halibut, and state-permitted nearshore fixed gear sectors. WCGOP also observes several fisheries that incidentally catch groundfish, including the pink shrimp, California halibut, California ridgeback prawn (RBPT), and California sea cucumber trawl (SCT) fisheries. We estimate discards in the directed Pacific halibut (PHLB), RBPT, and SCT fisheries for the first time in this report. WCGOP data from each of these fisheries were used for the purposes of discard estimation. Mortality estimates were summarized from the A-SHOP data for the catcher–processor (CP) and mothership catcher vessel (MSCV) sectors of the at-sea Pacific hake fishery. No tribal fishing in the at-sea hake fishery occurred in 2017.

For all PacFIN, WCGOP, A-SHOP, and PSMFC data, we maintain confidentiality of persons and businesses as required by the Magnuson–Stevens Fishery Conservation and Management Act (MSA), which was most recently reauthorized in 2007 NOAA Fisheries guidance recommends, and the NWFSC FOS Program follows, the "rule of three," which states that "Information from at least three participants in the fishery must be aggregated/summarized at a temporal and spatial level to protect not only the identity of a person or a business, but also any business information" (N. Cyr, 2009 memorandum to NOAA Fisheries on data aggregation and summarization guidelines).

Groundfish species catch data from the recreational fisheries come directly from the Washington Department of Fish and Wildlife (WDFW), the Oregon Department of Fish and Wildlife (ODFW), and the California Department of Fish and Wildlife (CDFW). State agencies provide catch weight (discarded and retained) estimates with PFMC-approved mortality rates applied to account for discard mortality (PFMC 2014). WDFW includes only surface-release mortality rates for released rockfish; ODFW and CDFW apply depth-dependent mortality rates.

Each year, a certain portion of the annual catch limit (ACL) for groundfish species is harvested through research activities. Research programs that caught groundfish included NWFSC's groundfish bottom trawl survey and sablefish tagging and collection research, and the International Pacific Halibut Commission's (IPHC) survey. Total groundfish research catch (discarded and retained) information was provided by NOAA's West Coast Region (WCR) and compiled by FOS analysts. Catch varies by research permit, including but not limited to: catch from permits with only retained catch, tagging study catch where all fish were released alive, and combined discarded and retained catch. In this report, depth-dependent mortality rates (PFMC 2016b) were applied to canary and yelloweye rockfish discards caught using fixed gear and released at depth, where data was available.

In addition to these data sources, estimates of discard mortality rates were provided by PFMC's Groundfish Management Team (GMT; PFMC 2014, PFMC 2016b, PFMC 2017). GMT is an advisory body to PFMC that comprises representatives from federal, state, and tribal agencies and is involved in evaluating management performance and alternatives for groundfish fisheries on the U.S. West Coast, between the Canadian and Mexican borders. For the purposes of this analysis, GMT provided discard mortality rates, which estimate the survival of discarded catch: for big skate, in trawl sectors only; for sablefish, longnose skate, and lingcod, in trawl and fixed gear sectors; for spiny dogfish, in hook-and-line fixed gear sectors only; and for some individual species and major species groups, in the state-permitted fixed gear nearshore sector (for all discard mortality rates, see Tables A-3 and A-4 or PFMC 2016b). Trawl mortality rates have only been generated for bottom trawl gears and therefore were only applied to discard estimates generated from bottom trawl gear. We assume 100% mortality for all species caught with midwater, shrimp, prawn, and sea cucumber trawl gear, because species-specific mortality rates have not been identified for these gear types. Changes to estimation, discard rates, and management are documented in Table A-5.

# Methods

## Discard Estimation Methods Overview

We used a deterministic approach to estimate discard mortality for all WCGOP-observed sectors of the groundfish fishery. Observed discard rates for each species were expanded to the fleet-wide level to estimate total discard amount. Due to differences in data availability and management structure among sectors of the groundfish fishery, expansions were applied with minor differences between fishery sectors, as described below.

The stratification scheme used in this analysis is inconsistent with the sampling design employed by WCGOP. The overall WCGOP sampling design is based on a stratified multistage random sampling. This design-based framework distributes observational effort more evenly coastwide than simple random sampling, and uses prior landings information to improve the efficiency of sampling allocation. Strata employed in this report provide mortality estimates that are relevant to the spatial and temporal structure of groundfish management. The validity of stratification in terms of isolating variance in discard has not been rigorously tested. Until more work can be completed to evaluate which strata (area, depth, season, etc.) are most appropriate for discard analyses, broader stratification is often warranted to ensure adequate sample size and/or to meet confidentiality mandates.

In addition to standard error (SE), we have provided the coefficient of variation (CV) of the discard ratio for each species (or species group) as another measurement of statistical uncertainty. Although the confidence intervals (CIs) for the estimated discards can be derived from SEs based on normality assumption, we do not provide these statistics in the current report, because preliminary analyses indicated that the upper bounds of CIs for rare species could be underestimated. We calculated the SE of the observed discard ratio for each fish species, as described in Pikitch et al. (1998). The SE of the discard ratio was then divided by the discard ratio itself to calculate the CV. Within a given stratum, the CV of the discard ratio of a fish species is identical to the CV of the expanded discard estimate of the given species (Lee 2015). Thus, it can serve as a very informative statistic for discard estimates. In addition, the differences in the magnitude of discarded amounts among the species make the CVs, which are unitless, more useful for comparisons when the estimates of many species are presented in one table.

In all cases where a Fishery Management Plan (FMP) groundfish species grouping, nearshore species grouping, or unsampled catch category was used to compute discard ratios, any retained weights that were recorded by the observer but 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 under a grouped species code (e.g., NUSP = Northern Unspecified Slope Rockfish). When using a single species in the denominator (e.g., sablefish in the fixed gear fisheries), any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

Species were defined and grouped for this report according to the WCGOP Data Processing Appendix (Table A-1). The Groundfish FMP provides a complete listing of groundfish species (PFMC 2016a).

As with all point estimates, mortality values presented in Tables 15 and 16 should be considered with caution. Multiple sources of uncertainty that were not accounted for in this analysis might influence mortality estimates, including species composition sampling of landed catch, observed retained weights, and discard mortality rates.

In all tables, (—) was used when there is no actual numeric value (i.e., the species was not caught). Values appear as 0 when a value exists but is smaller than the decimal places allotted. Gray shading indicates that values include estimates of both discard and retained catch. Rebuilding species are CAPITALIZED.

## IFQ Fishery Discard Estimation

The IFQ/co-op managed groundfish catch shares fishery operates with a variety of gear types and target strategies, which depend on where catch is delivered and processed.

1. Catch delivered to shorebased processors (IFQ):
   a. Bottom trawl: Bottom trawl nets used to target a variety of groundfish species.
   b. Midwater rockfish trawl: Midwater trawl nets used to target midwater nonhake species, such as widow and yellowtail rockfish.
   c. Midwater hake trawl: Midwater trawl nets used to target hake.
   d. Pot: Pot or trap gear used to target groundfish species, primarily sablefish.
   e. Hook-and-line: Longlines primarily targeting groundfish species, mainly sablefish.
2. Catch processed at sea (co-op program):
   a. MSCV: Midwater trawl nets used to target hake. Catcher vessels deliver unsorted catch to a mothership, where it is sorted and processed.
   b. CP: Midwater trawl nets used to target hake, which is processed at sea.

In 2011, the implementation of the IFQ management program resulted in changes to fishing regulations which, in turn, resulted in the development of new methods for estimating fishing mortality under the IFQ fishery. In 2015, the addition of EM systems provided another option for 100% monitoring of catch. In the nonhake IFQ sectors, these regulation changes required that:

- Vessels must carry NOAA Fisheries observers or EM systems (if operating with an EM EFP) on all IFQ fishing trips.
- If participating in the EM EFP, vessels must carry NOAA Fisheries observers when notified to do so.
- Observer sampling priorities were shifted to focus more on IFQ and rebuilding groundfish species.
- The use of multiple gear types (trawl or fixed gear) was allowed for fishing under a federal groundfish trawl-endorsed permit, though only one gear type is allowed per trip.
- A limit of one IFQ reporting area could be fished per trip.
- IFQs were established for a subset of groundfish managed under the FMP.

## Shorebased IFQ Sectors

Fleetwide discard estimates for the shorebased IFQ sectors were derived from WCGOP observer data, PSMFC EM data, and PacFIN fish ticket landings data (Figure 1). Fish tickets associated with the IFQ fishery were defined by analysts through an extensive quality control and review process of all available data sources, including those utilized for in-season management.

IFQ bottom trawl vessels can hold a California halibut bottom trawl permit and participate in the state-permitted California halibut fishery. These LE California halibut tows can occur on the same trip as tows targeting IFQ groundfish and were identified at the tow level based on the use of bottom trawl gear and the following criteria: 1) the target was California halibut and more than 150 lb of California halibut were landed, or 2) the target was nearshore mix, sand sole, or other flatfish, and the tow took place in less than 30 fathoms (fth, ~55 m) and south of lat 40°10'N. All IFQ bottom trawl tows that met at least one of the above requirements were analyzed using methods for IFQ discard estimation to reflect the sampling protocol performed by observers on the boat. Tow targets are typically determined by the vessel captain. In 2017, however, no LE California halibut tows occurred.

### 100% Observed Shorebased IFQ Sectors

Observer data from the IFQ fishery not participating in the EM EFP were stratified by sector, gear type, and management area to the finest possible level while maintaining confidentiality (Table 1). In 2017, a small amount of effort occurred in an EFP that used EM and an observer on all hauls to explore potential changes to discard handling; these data are included here as 100% observed. When sample size was adequate (10 hauls or more per stratum) and data confidentiality rules could be met, we further stratified by season and depth. Records were separated into two groundfish management areas: north and south of lat 40°10'N. Each management area was divided into three depth strata (0–125, 126–250, >250 fth[2]). These depth strata provide consistency when evaluating discard over time, as depth-based spatial closures change. The fishery was further stratified into two seasonal strata: winter (November–April) and summer (May–October), reflecting seasonal changes in Rockfish Conservation Area (RCA) boundaries, fishing effort, and target species (e.g., winter petrale sole).

On rare occasions (e.g., observer illness), tows or sets are unsampled, although an observer is present on 100% of trips. In some cases, tows or sets may have some portion of unsampled discarded catch recorded in very broad or mixed categories (Table A-2). At the stratum level, we used ratio estimators to apportion any unsampled discard weight to specific species based on the composition of observed catch.

[2] 0–228, 229–457, >457 m.

Table 1. Number of vessels, trips, and hauls from WCGOP observer data for the non-EM IFQ fishery by gear, latitudinal management area (LMA), season, and depth. A small amount of effort occurred in an EFP that used EM and an observer on all hauls to explore potential changes to discard handling; these data are included here as 100% observed. Data are combined as needed to ensure confidentiality requirements and a reasonable number of observations. Note that *Unsampled hauls* are only those with unsampled categories of *All discards*, *All species*, or *FAIL*. See text for category definitions.

| | | | | | | | Number of hauls with unsampled categories | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear[a] | LMA[b] | Season[c] | Depth[d] | Vessels | Trips | Sampled hauls | IFQFF | IFQRF | IFQRD | IFQM | NIFQ | All discards | All species[e] | FAIL | Unsampled hauls | % hauls sampled |
| BT | N | W | 0–125 | 17 | 44 | 179 | — | — | — | — | 2 | — | — | — | — | 100.0% |
| BT | N | W | 126–250 | 40 | 341 | 1,278 | — | — | — | 2 | 27 | 3 | — | — | 3 | 99.8% |
| BT | N | W | >250 | 42 | 314 | 1,190 | — | — | — | — | 38 | — | — | — | — | 100.0% |
| BT | N | S | 0–125 | 28 | 281 | 2,203 | 22 | — | — | 1 | 65 | 1 | 2 | — | 3 | 99.9% |
| BT | N | S | 126–250 | 30 | 140 | 555 | — | — | — | — | 11 | — | 1 | — | 1 | 99.8% |
| BT | N | S | >250 | 29 | 129 | 498 | — | — | — | — | 10 | — | — | — | — | 100.0% |
| BT | S | W | 0–250 | 5 | 23 | 80 | — | — | — | — | — | — | — | — | — | 100.0% |
| BT | S | W | >250 | 4 | 16 | 74 | — | — | — | — | — | — | — | — | — | 100.0% |
| BT | S | S | 0–250 | 5 | 22 | 91 | — | — | — | — | — | 1 | — | — | 1 | 98.9% |
| BT | S | S | >250 | 4 | 25 | 109 | — | — | — | — | 2 | — | — | — | — | 100.0% |
| MWT Hake | N | S | 0–125 | 4 | 112 | 178 | — | — | — | — | — | — | — | — | — | 100.0% |
| MWT Hake | N | S | 126–250 | 3 | 36 | 58 | — | — | — | — | — | — | — | — | — | 100.0% |
| MWT RF | N | A | All | 11 | 131 | 267 | — | — | — | — | — | — | — | — | — | 100.0% |
| H&L | C | S | All | 4 | 13 | 145 | — | — | — | — | — | — | — | 4 | 4 | 97.3% |
| Pot | N | A | 0–250 | 4 | 31 | 270 | — | — | — | — | — | — | — | — | — | 100.0% |
| Pot | N | A | >250 | 4 | 32 | 214 | — | — | — | — | — | — | — | — | — | 100.0% |
| Pot | S | A | All | 3 | 7 | 87 | — | — | — | — | — | — | — | — | — | 100.0% |

[a] *BT* = bottom trawl, *MWT* = midwater trawl, *RF* = rockfish, *H&L* = hook-and-line.
[b] *N* = north of lat 40°10'N, *S* = south of lat 40°10'N, *C* = coastwide.
[c] *W* = winter (November–April), *S* = summer (May–October), *A* = annual.
[d] In fathoms.
[e] Including those typically retained.

To obtain the estimated discard weight of a species ($W$) when the entire haul or set was unsampled, the unsampled discard weight, summed within the stratum, was multiplied by the ratio of the discard weight of the species (summed across sampled hauls within a stratum) divided by the total discard weight of all species in all sampled hauls within a stratum:

$$W = \sum_{p} x_p \times \frac{\sum_f w_f}{\sum_f x_f}$$

where, for each stratum:

- $W$ = estimated unsampled discard weight of a given species in a stratum,
- $p$ = unsampled haul,
- $x$ = total weight of discarded catch of all species,
- $f$ = sampled haul, and
- $w$ = sampled discard weight of a given species.

In hauls with unsampled catch categories, unsampled discard weight was recorded as non-IFQ species (NIFQ) or IFQ species. Unsampled IFQ species weight could be further categorized into IFQ flatfish (IFQFF), IFQ rockfish (IFQRF), IFQ roundfish (IFQRD), and IFQ mixed species (IFQM; Table A-2). IFQM included all 2017 IFQ managed species (see Tables A-1 and A-2, or USOFR 2013), while NIFQ included all other fish species. Observers are instructed that IFQ hauls or sets in which they record unsampled categories cannot also contain sampled species that are within the unsampled category, to avoid double counting. Rarely, observers are unable to sort discard by IFQ status, resulting in unsampled discard that contains both IFQ and non-IFQ species (referred to as ZMIS). Even less often, entire hauls, including species that would have normally been retained, are discarded at sea, due either to errors (e.g., net rips before landed) or operational considerations (e.g., deliberate release of catch from net before landing because of safety or other concerns). In these instances, the observer records a visual estimate as unsorted catch (UNST), including both discarded and retained species. Very infrequently, haul data fail quality control measures. In these cases, observer data for the failed haul were ignored, and discards were estimated based on stratum-level observed discard rates and haul-level estimates of retained values from fish tickets.

To obtain the estimated discard weight of a species ($W$) in strata that include unsampled categories, the unsampled discard weight, summed within the stratum, was multiplied by the ratio of the sampled discard weight of the species to the sampled weight of all species included in an unsampled category (NIFQ, IFQFF, IFQRF, IFQRD, IFQM, or ZMIS) within a stratum. When entire hauls, including species that are typically retained, were unsampled (UNST), the same formula was applied, but included both discarded and retained weight for all species. Data was failed (FAIL) when errors occurred consistently throughout an observer's sampling of a haul or trip. In these cases, discard is estimated using the ratio of sampled discarded to retained weight for each species in the stratum, multiplied by the known retained weight from the fish tickets associated with the failed trip. Estimated discard weight of the species was calculated and summed across unsampled categories:

$$W = \sum_{y} \left( \sum_{p} x_{p,y} \times \frac{\sum_f w_{f,y}}{\sum_f x_{f,y}} \right)$$

where, for each stratum:

- $W$ = estimated unsampled discard weight of a given species within a stratum,
- $y$ = unsampled catch category (NIFQ, IFQFF, IFQRF, IFQRD, IFQM, ZMIS, UNST, or FAIL),
- $p$ = unsampled catch,
- $x$ = catch weight,
- $f$ = sampled catch, and
- $w$ = sampled discard weight of a given species.

Expanded discard weights of a particular species obtained using the equations above for unsampled hauls or partially unsampled hauls (those containing both sampled and unsampled catch categories) were then added to the sampled discard weight of that species within each stratum to obtain the total species-specific discard weight per stratum (Tables 2a and 2b).

For the 2017 shorebased midwater hake and rockfish fisheries, discard was estimated in the same manner as described above. Prior to 2011, the shorebased midwater hake fishery was conducted under an EFP. It continues to operate as a "maximum retention" fishery, where minor amounts of operational discard at sea are permissible provided the observer accounts for the discard weight. Prior to 2015, this fishery was defined based on the species targeted by the captain and recorded in the logbook and observer notes and divided into the IFQ nonhake midwater trawl and the shoreside hake sector. With new regulations (USOFR 2015), this fishery is now defined and managed based on percentage of hake landings for each vessel per landing day, so that the fishery now consists of the shoreside midwater hake (landing ≥50% hake) and the shoreside midwater rockfish sectors (landing <50% hake).

## Electronically Monitored Shorebased IFQ Sectors

For those IFQ vessels participating in the IFQ EM EFP fishery, discard rules and observer requirements varied by gear. EM systems use video recordings to estimate weights of certain IFQ species (see Table 2d) that are allowed to be discarded at sea. In 2015, the first year of this EFP, both WCGOP and fishing crews worked to implement and improve procedures for sorting catch into 1) at-sea discard, 2) retained and expected to be landed for revenue, and 3) retained but expected to be discarded shoreside. In 2017, these refined protocols provided more accurate discard estimation, as described below.

Vessels fishing using pot or bottom trawl gear could discard only certain species; on those vessels, observer coverage was targeted at a random sample of 30% of trips to result in 25–30% of landings. In 2017, seemingly primarily due to misunderstandings of observer coverage requirements, only 16% of landings were observed. For non-IFQ species, total at-sea discard estimates were calculated in the same manner described below for non-catch share fisheries. A ratio estimator of observed discard rates from the EM fleet was applied to the total amount of groundfish retained by this fleet, with rates and total landings stratified by gear (pot or bottom trawl) and by area, where possible, while maintaining confidentiality (Table 2c). In addition, observers and fishers worked together to sort non-IFQ species that were not discarded at sea, but were expected to be discarded shoreside (Table 2c). The only species consistently recorded both by observers (as likely shoreside discard)

and by shoreside processors (on fish tickets) were longnose skate, Pacific grenadier, and spiny dogfish. For all other species, we calculated a "shoreside discard" rate, following the procedures described above for at-sea discard, and multiplied this rate by total groundfish landings. We are confident that very little double-counting between observed estimated shoreside discard and landings on fish ticket receipts occurred, as we specifically excluded species where the possibility was likely. For at-sea IFQ species, we chose to use EM video reviewer data as the most accurate record, as it provides 100% coverage of at-sea discard for this subset of species (Table 2d). However, a small amount of unmonitored at-sea discard occurs, due to spillage or lost gear; in these cases, we expanded the estimated amount of lost catch based on the composition of known landings and at-sea discard.

The midwater hake sector operates under maximized retention, so no observer coverage was required on any trips where EM systems were in place (Table 2e). Instead, the small amount of at-sea discard of IFQ species recorded by EM logbooks was provided by PSMFC and included in the report. Similar to the EM pot and bottom trawl sectors, a small amount of unmonitored at-sea discard was expanded at the haul level, based on the composition of shoreside landings.

As with all other sectors, fleetwide landing data for the EM sector were acquired from PacFIN fish tickets. Data from observer records and from the EM systems via PSMFC enabled the identification of all fish tickets associated with EM trips.

Table 2a. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the observed IFQ fishery using bottom trawl gear north of lat 40°10'N. A small amount of effort occurred in an EFP that used EM and an observer on all hauls to explore potential changes to discard handling; these data are included here as 100% observed bottom trawl effort. Expansion factors for each season and depth stratum are shown in the top rows. Discard ratios for each species are presented by season and depth stratum in the rest of the table. *Winter* = November–April; *Summer* = May–October. Only strata with unsampled discard weight are shown. See text for category definitions; see Table A-2 for a list of species included in each unsampled category.

| | Bottom Trawl (N of 40°10'N) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQFF | IFQM | | NIFQ | | | | | | All discards | | All species | |
| Season | Summer | Winter | Summer | Winter | | | Summer | | | Winter | Summer | Summer | |
| Depth (fth) | 0–125 | 126–250 | 0–125 | 0–125 | 126–250 | >250 | 0–125 | 126–250 | >250 | 126–250 | 0–125 | 0–125 | 126–250 |
| Expansion factor (mt) | 7.9039 | 0.1361 | 0.5897 | 0.5176 | 2.1682 | 1.7940 | 4.6256 | 0.8437 | 0.5874 | 1.1045 | 0.3175 | 3.1752 | 0.4536 |
| **Groundfish species** | | | | | | | | | | | | | |
| Arrowtooth flounder | 0.3467 | 0.3689 | 0.2118 | — | — | — | — | — | — | 0.2246 | 0.1095 | 0.0560 | 0.1140 |
| Big skate | — | — | — | 0.0639 | 0.0002 | 0.0000 | 0.0681 | 0.0002 | 0.0006 | 0.0001 | 0.0329 | 0.0435 | 0.0063 |
| Black rf. (OR) | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |
| Black rf. (WA) | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |
| Canary rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0285 | 0.0001 |
| Darkblotched rf. | — | 0.0010 | 0.0047 | — | — | — | — | — | — | 0.0006 | 0.0024 | 0.0013 | 0.0242 |
| Dover sole | 0.0699 | 0.0026 | 0.0427 | — | — | — | — | — | — | 0.0016 | 0.0221 | 0.1923 | 0.3849 |
| ECS | | | | | | | | | | | | | |
| Aleutian skate | — | — | — | — | 0.0013 | 0.0014 | 0.0001 | 0.0027 | 0.0012 | 0.0005 | 0.0001 | 0.0000 | 0.0001 |
| Black skate | — | — | — | — | 0.0013 | 0.0249 | — | 0.0027 | 0.0516 | 0.0005 | — | — | 0.0001 |
| CA grenadier | — | — | — | — | 0.0000 | 0.0000 | — | 0.0000 | 0.0000 | 0.0000 | — | — | 0.0000 |
| CA skate | — | — | — | — | — | — | 0.0002 | — | — | — | 0.0001 | 0.0000 | — |
| Deepsea skate | — | — | — | — | — | 0.0005 | — | — | 0.0000 | — | — | — | — |
| Giant grenadier | — | — | — | — | 0.0034 | 0.1161 | — | 0.0016 | 0.1428 | 0.0013 | — | — | 0.0001 |
| Grenadier, unid. | — | — | — | — | 0.0000 | 0.0016 | — | — | 0.0358 | 0.0000 | — | 0.0000 | 0.0002 |
| Pacific flatnose | — | — | — | — | 0.0000 | 0.0013 | — | 0.0000 | 0.0015 | 0.0000 | — | — | 0.0000 |
| Pacific grenadier | — | — | — | — | 0.0003 | 0.0248 | — | 0.0004 | 0.1094 | 0.0001 | — | — | 0.0000 |
| Popeye grenadier | — | — | — | — | — | — | — | — | 0.0000 | — | — | — | — |
| Sandpaper skate | — | — | — | 0.0223 | 0.1225 | 0.0920 | 0.0224 | 0.1190 | 0.0296 | 0.0479 | 0.0108 | 0.0022 | 0.0042 |
| Smooth grenadier | — | — | — | — | — | 0.0000 | — | — | — | — | — | — | — |
| Soupfin shark | — | — | — | — | — | — | 0.0004 | — | — | — | 0.0002 | 0.0000 | — |
| Spotted ratfish | — | — | — | 0.1377 | 0.0850 | 0.0211 | 0.1056 | 0.0759 | 0.0073 | 0.0333 | 0.0510 | 0.0106 | 0.0027 |

Table 2a (continued). Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the observed IFQ fishery using bottom trawl gear north of lat 40°10'N.

| | Bottom Trawl (N of 40°10'N) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQFF | IFQM | | NIFQ | | | | | | All discards | | All species | |
| Season | Summer | Winter | Summer | Winter | | | Summer | | | Winter | Summer | Summer | |
| Depth (fth) | 0–125 | 126–250 | 0–125 | 0–125 | 126–250 | >250 | 0–125 | 126–250 | >250 | 126–250 | 0–125 | 0–125 | 126–250 |
| Expansion factor (mt) | 7.9039 | 0.1361 | 0.5897 | 0.5176 | 2.1682 | 1.7940 | 4.6256 | 0.8437 | 0.5874 | 1.1045 | 0.3175 | 3.1752 | 0.4536 |
| **Groundfish species** | | | | | | | | | | | | | |
| English sole | 0.0684 | 0.0004 | 0.0418 | — | — | — | — | — | — | 0.0003 | 0.0216 | 0.0309 | 0.0055 |
| Lingcod (N of 40°10'N) | — | 0.0023 | 0.0477 | — | — | — | — | — | — | 0.0014 | 0.0247 | 0.0711 | 0.0130 |
| Longnose skate | — | — | — | 0.1177 | 0.1162 | 0.0787 | 0.0860 | 0.1517 | 0.0370 | 0.0454 | 0.0416 | 0.0405 | 0.0653 |
| LST (N of 34°27'N) | — | 0.0002 | 0.0000 | — | — | — | — | — | — | 0.0001 | 0.0000 | 0.0010 | 0.0069 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | |
| Blue/deacon rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |
| Copper rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 |
| Quillback rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | |
| Bocaccio rf. | — | — | 0.0003 | — | — | — | — | — | — | — | 0.0002 | 0.0052 | 0.0002 |
| Chilipepper rf. | — | 0.0001 | 0.0086 | — | — | — | — | — | — | 0.0001 | 0.0044 | 0.0048 | 0.0006 |
| Cowcod rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |
| Greenblotched rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | — |
| Greenspotted rf. | — | — | 0.0001 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0000 |
| Greenstriped rf. | — | 0.0001 | 0.0491 | — | — | — | — | — | — | 0.0000 | 0.0254 | 0.0093 | 0.0004 |
| Halfbanded rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | — |
| Harlequin rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | — |
| Pygmy rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | — |
| Redstripe rf. | — | 0.0000 | 0.0000 | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0001 | 0.0001 |
| Rosethorn rf. | — | 0.0007 | 0.0003 | — | — | — | — | — | — | 0.0004 | 0.0001 | 0.0002 | 0.0003 |
| Rosy rf. | — | 0.0000 | 0.0000 | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0000 | — |
| Shelf rf., unid. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0119 | 0.0002 |
| Silvergray rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0001 | 0.0001 |
| Starry rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |
| Stripetail rf. | — | 0.0013 | 0.0381 | — | — | — | — | — | — | 0.0008 | 0.0197 | 0.0047 | 0.0001 |
| Tiger rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |

Table 2a (continued). Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the observed IFQ fishery using bottom trawl gear north of lat 40°10'N.

| | Bottom Trawl (N of 40°10'N) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQFF | IFQM | | NIFQ | | | | | | All discards | | All species | |
| Season | Summer | Winter | Summer | Winter | | | Summer | | | Winter | Summer | Summer | |
| Depth (fth) | 0–125 | 126–250 | 0–125 | 0–125 | 126–250 | >250 | 0–125 | 126–250 | >250 | 126–250 | 0–125 | 0–125 | 126–250 |
| Expansion factor (mt) | 7.9039 | 0.1361 | 0.5897 | 0.5176 | 2.1682 | 1.7940 | 4.6256 | 0.8437 | 0.5874 | 1.1045 | 0.3175 | 3.1752 | 0.4536 |
| **Groundfish species** | | | | | | | | | | | | | |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | |
| Aurora rf. | — | 0.0068 | 0.0003 | — | — | — | — | — | — | 0.0041 | 0.0002 | 0.0003 | 0.0044 |
| Bank rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0004 |
| Blackgill rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0003 |
| Redbanded rf. | — | 0.0004 | 0.0002 | — | — | — | — | — | — | 0.0003 | 0.0001 | 0.0001 | 0.0009 |
| Rougheye/blackspotted rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0004 | 0.0046 |
| Sharpchin rf. | — | 0.0001 | 0.0000 | — | — | — | — | — | — | 0.0001 | 0.0000 | 0.0001 | 0.0008 |
| Shortraker rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0002 | 0.0004 |
| Slope rf., unid | — | 0.0023 | — | — | — | — | — | — | — | 0.0014 | — | 0.0005 | 0.0173 |
| Splitnose rf. | — | 0.0207 | 0.0022 | — | — | — | — | — | — | 0.0126 | 0.0011 | 0.0003 | 0.0014 |
| Yellowmouth rf. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0004 |
| Mixed thornyheads | | | | | | | | | | | | | |
| SST/LST | — | — | — | — | — | — | — | — | — | — | — | — | 0.0002 |
| Other flatfish | | | | | | | | | | | | | |
| Butter sole | 0.0001 | 0.0000 | 0.0001 | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Curlfin sole | 0.0002 | — | 0.0001 | — | — | — | — | — | — | — | 0.0001 | 0.0001 | 0.0000 |
| Flatfish, unid. | 0.0001 | — | 0.0001 | — | — | — | — | — | — | — | 0.0000 | 0.0005 | — |
| Flathead sole | 0.0644 | 0.0004 | 0.0393 | — | — | — | — | — | — | 0.0002 | 0.0203 | 0.0077 | 0.0010 |
| Pacific sanddab | 0.1108 | 0.0004 | 0.0677 | — | — | — | — | — | — | 0.0003 | 0.0350 | 0.0144 | 0.0001 |
| Rex sole | 0.2492 | 0.0009 | 0.1522 | — | — | — | — | — | — | 0.0006 | 0.0787 | 0.0499 | 0.0341 |
| Rock sole | 0.0005 | 0.0001 | 0.0003 | — | — | — | — | — | — | 0.0000 | 0.0001 | 0.0002 | 0.0000 |
| Sand sole | 0.0014 | 0.0000 | 0.0008 | — | — | — | — | — | — | 0.0000 | 0.0004 | 0.0005 | 0.0000 |
| Sanddab, unid. | 0.0004 | — | 0.0002 | — | — | — | — | — | — | — | 0.0001 | 0.0001 | — |
| Other groundfish | | | | | | | | | | | | | |
| Kelp greenling (OR) | — | — | — | 0.0000 | — | — | 0.0000 | — | — | — | 0.0000 | 0.0000 | 0.0000 |
| Kelp greenling (WA) | — | — | — | 0.0004 | — | — | 0.0002 | 0.0000 | — | — | 0.0001 | 0.0000 | 0.0000 |
| Other rockfish | | | | | | | | | | | | | |
| Rockfish, unid. | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — |

Table 2a (continued). Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in the observed IFQ fishery using bottom trawl gear north of lat 40°10'N.

| | Bottom Trawl (N of 40°10'N) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQFF | IFQM | | NIFQ | | | | | | All discards | | All species | |
| Season | Summer | Winter | Summer | Winter | | | Summer | | | Winter | Summer | Summer | |
| Depth (fth) | 0–125 | 126–250 | 0–125 | 0–125 | 126–250 | >250 | 0–125 | 126–250 | >250 | 126–250 | 0–125 | 0–125 | 126–250 |
| Expansion factor (mt) | 7.9039 | 0.1361 | 0.5897 | 0.5176 | 2.1682 | 1.7940 | 4.6256 | 0.8437 | 0.5874 | 1.1045 | 0.3175 | 3.1752 | 0.4536 |
| **Groundfish species** | | | | | | | | | | | | | |
| Pacific cod | — | — | 0.0002 | — | — | — | — | — | — | — | 0.0001 | 0.0085 | 0.0003 |
| Pacific hake | — | 0.4609 | 0.1720 | — | — | — | — | — | — | 0.2807 | 0.0889 | 0.0199 | 0.0373 |
| Pacific ocean perch (N of 40°10'N) | — | 0.0018 | 0.0003 | — | — | — | — | — | — | 0.0011 | 0.0002 | 0.0005 | 0.0042 |
| Petrale sole | 0.0276 | 0.0170 | 0.0169 | — | — | — | — | — | — | 0.0103 | 0.0087 | 0.2046 | 0.0378 |
| Sablefish (N of 36°N) | — | 0.0114 | 0.0643 | — | — | — | — | — | — | 0.0069 | 0.0332 | 0.0207 | 0.0961 |
| Shortbelly rf. | — | — | — | — | 0.0000 | — | 0.0001 | 0.0000 | — | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| SST (N of 34°27'N) | — | 0.0035 | 0.0002 | — | — | — | — | — | — | 0.0021 | 0.0001 | 0.0032 | 0.0901 |
| Spiny dogfish | — | — | — | 0.2556 | 0.3948 | 0.0944 | 0.1188 | 0.2427 | 0.0158 | 0.1544 | 0.0574 | 0.0119 | 0.0086 |
| Starry flounder | 0.0001 | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0005 | 0.0000 |
| Widow rf. | — | — | 0.0002 | — | — | — | — | — | — | — | 0.0001 | 0.0060 | 0.0014 |
| Yelloweye rf. | — | — | 0.0000 | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0000 |
| Yellowtail rf. (N of 40°10'N) | — | — | 0.0001 | — | — | — | — | — | — | — | 0.0000 | 0.0383 | 0.0006 |
| **Nongroundfish species** | | | | | | | | | | | | | |
| Dungeness crab | — | — | — | 0.2267 | 0.0028 | 0.0003 | 0.3422 | 0.0092 | 0.0015 | 0.0011 | 0.1653 | 0.0343 | 0.0003 |
| Non-FMP flatfish | | | | | | | | | | | | | |
| Deepsea sole | — | — | — | — | 0.0007 | 0.0135 | 0.0002 | 0.0011 | 0.0268 | 0.0003 | 0.0001 | 0.0000 | 0.0000 |
| Slender sole | — | — | — | 0.1176 | 0.0025 | 0.0011 | 0.1232 | 0.0005 | 0.0001 | 0.0010 | 0.0595 | 0.0123 | 0.0000 |
| Other nongroundfish | | | | | | | | | | | | | |
| Sculpin, unid. | — | — | — | 0.0007 | 0.0000 | 0.0000 | 0.0015 | 0.0000 | — | 0.0000 | 0.0007 | 0.0002 | 0.0000 |
| Skate, unid. | — | — | — | — | 0.0001 | 0.0001 | 0.0008 | 0.0003 | 0.0011 | 0.0000 | 0.0004 | 0.0317 | 0.0070 |
| Squid, unid. | — | — | — | — | — | 0.0000 | — | 0.0010 | — | — | — | 0.0000 | 0.0001 |
| Starry skate | — | — | — | — | 0.0006 | — | — | — | — | 0.0002 | — | — | — |
| Shared ECS | | | | | | | | | | | | | |
| Bristlemouth, unid. | — | — | — | — | — | — | — | — | 0.0000 | — | — | — | — |
| Lanternfish, unid. | — | — | — | — | 0.0000 | 0.0000 | — | — | 0.0000 | 0.0000 | — | — | — |
| Lightfish, unid. | — | — | — | — | — | 0.0000 | — | 0.0000 | — | — | — | — | 0.0000 |
| Noneulachon squid, unid. | — | — | — | — | — | — | 0.0000 | — | 0.0001 | — | 0.0000 | 0.0000 | — |
| Non-Humboldt squid, unid. | — | — | — | 0.0005 | 0.0220 | 0.0283 | 0.0011 | 0.0400 | 0.0201 | 0.0086 | 0.0005 | 0.0001 | 0.0014 |
| Pacific saury | — | — | — | — | 0.0000 | 0.0000 | — | 0.0000 | — | 0.0000 | — | — | 0.0000 |

Table 2b. Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in observed IFQ fisheries: bottom trawl gear south of lat 40°10'N and hook and line coastwide. A small amount of effort occurred in an EFP that used EM and an observer on all hauls to explore potential changes to discard handling; these data are included here as 100% observed bottom trawl effort. Expansion factors for each season and depth stratum are shown in the top rows. Discard ratios for each species are presented by season and depth stratum in the rest of the table. *Summer* = May–October. Only strata with unsampled discard weight are shown. See text for category definitions; see Table A-2 for a list of species included in each unsampled category.

| | **Bottom Trawl (S of 40°10'N)** | | **Hook and Line (Coastwide)** | |
|---|---|---|---|---|
| | **NIFQ** | **All discards** | **All discards** | **FAIL** |
| Season | **Summer** | **Summer** | **Summer** | **Summer** |
| Depth (fth) | **>250** | **0–250** | **All depths** | **All depths** |
| Expansion factor (mt) | **0.0345** | **0.0499** | **0.0121** | **0.4747** |
| **Groundfish species** | | | | |
| Arrowtooth flounder | — | 0.1515 | 0.1275 | 0.0298 |
| Big skate | — | 0.0020 | 0.0002 | 0.0000 |
| Bocaccio rf. (S of 40°10'N) | — | 0.0010 | — | — |
| Chilipepper rf. (S of 40°10'N) | — | 0.1160 | — | — |
| Dover sole | — | 0.0227 | 0.0001 | 0.0000 |
| ECS | | | | |
| Black skate | 0.0236 | 0.0002 | 0.0061 | 0.0014 |
| CA grenadier | 0.0011 | — | — | — |
| CA skate | — | 0.0062 | — | — |
| Deepsea skate | 0.0007 | — | — | — |
| Giant grenadier | 0.1590 | — | 0.0048 | 0.0011 |
| Grenadier, unid. | 0.0003 | — | — | — |
| Pacific flatnose | 0.0000 | — | — | — |
| Pacific grenadier | 0.1179 | 0.0003 | 0.0004 | 0.0001 |
| Sandpaper skate | 0.0085 | 0.0029 | 0.0087 | 0.0020 |
| Spotted ratfish | 0.0050 | 0.0526 | 0.0028 | 0.0007 |
| English sole | — | 0.0642 | — | — |
| Lingcod (S of 40°10'N) | — | 0.0164 | 0.0003 | 0.0001 |
| Longnose skate | 0.1128 | 0.0914 | 0.0186 | 0.0044 |
| LST (N of 34°27'N) | — | 0.0007 | — | — |
| Minor ns. rf. (S of 40°10'N) | | | | |
| Copper rf. | — | — | 0.0001 | 0.0000 |
| Minor sh. rf. (N of 40°10'N) | | | | |
| Rosethorn rf. | — | — | 0.0000 | 0.0000 |
| Minor sl. rf. (S of 40°10'N) | | | | |
| Greenspotted rf. | — | 0.0001 | — | — |
| Greenstriped rf. | — | 0.0021 | — | — |
| Halfbanded rf. | — | 0.0000 | — | — |
| Rosethorn rf. | — | 0.0000 | — | — |
| Stripetail rf. | — | 0.0160 | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | |
| Redbanded rf. | — | — | 0.0003 | 0.0001 |
| Rougheye/blackspotted rf. | — | — | 0.0031 | 0.0007 |
| Shortraker rf. | — | — | 0.0005 | 0.0001 |
| Shortraker/rougheye/blackspotted rf. | — | — | 0.0012 | 0.0003 |

Table 2b (continued). Values used to calculate the expanded weight of groundfish species from each WCGOP unsampled catch category in observed IFQ fisheries: bottom trawl gear south of lat 40°10'N and hook and line coastwide.

| | Bottom Trawl (S of 40°10'N) | | Hook and Line (Coastwide) | |
|---|---|---|---|---|
| | **NIFQ** | **All discards** | **All discards** | **FAIL** |
| Season | **Summer** | **Summer** | **Summer** | **Summer** |
| Depth (fth) | **>250** | **0–250** | **All depths** | **All depths** |
| Expansion factor (mt) | **0.0345** | **0.0499** | **0.0121** | **0.4747** |
| **Groundfish species** | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | |
| Aurora rf. | — | 0.0185 | — | — |
| Bank rf. | — | 0.0002 | — | — |
| Blackgill rf. | — | 0.0000 | — | — |
| Redbanded rf. | — | 0.0015 | — | — |
| Other flatfish | | | | |
| Curlfin sole | — | 0.0009 | — | — |
| Pacific sanddab | — | 0.0984 | — | — |
| Rex sole | — | 0.0139 | — | — |
| Rock sole | — | 0.0011 | — | — |
| Pacific cod | — | — | 0.0001 | 0.0000 |
| Pacific hake | — | 0.1631 | — | — |
| Petrale sole | — | 0.0122 | 0.0001 | 0.0000 |
| Sablefish (N of 36°N) | — | 0.0027 | 0.0684 | 0.0160 |
| Shortbelly rf. | — | 0.0013 | — | — |
| SST (N of 34°27'N) | — | 0.0000 | 0.0009 | 0.0002 |
| Spiny dogfish | 0.0012 | 0.0044 | 0.4947 | 0.1158 |
| Splitnose rf. (S of 40°10'N) | — | 0.0097 | — | — |
| Widow rf. | — | 0.0002 | — | — |
| Yellowtail rf. (N of 40°10'N) | — | — | 0.0001 | 0.0000 |
| **Nongroundfish species** | | | | |
| Dungeness crab | — | 0.0682 | 0.0000 | 0.0000 |
| Non-FMP flatfish | | | | |
| Deepsea sole | 0.0379 | — | — | — |
| Slender sole | — | 0.0000 | — | — |
| Other nongroundfish | | | | |
| Sculpin, unid. | — | 0.0003 | — | — |
| Squid, unid. | 0.0014 | 0.0034 | — | — |
| Starry skate | — | 0.0003 | — | — |
| Shared ECS | | | | |
| Non-Humboldt squid, unid. | 0.0063 | 0.0046 | — | — |
| Pacific saury | 0.0000 | — | — | — |

Table 2c. Observed at-sea and shoreside discard ratios and standard errors thereof, at-sea and shoreside discard coefficients of variations, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of non-IFQ species in the electronically monitored (EM) catch share fishery using bottom trawl and pot gear. Ratios are computed as the observed at-sea or estimated shoreside discard weight divided by the observed weight of retained groundfish (adjusted to fish tickets) in the EM catch share fishery. Discard ratios were multiplied by landings of groundfish in the EM fleet to generate estimated discard. Estimates for IFQ species come directly from the EM systems and are in Table 2d. Discard mortality rates were provided by GMT.

| Non-IFQ species in EM catch chares | Bottom Trawl (N of 40°10'N) | | | | | | | | | | Bottom Trawl (S of 40°10'N) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed | | | | | | Expansion factor: | | | | Observed | | | | | | Expansion factor: | | | |
| | Vessels | | Trips | | Hauls | | Fleet landings of groundfish (mt) | | | | Vessels | | Trips | | Hauls | | Fleet landings of groundfish (mt) | | | |
| | 5 | | 11 | | 63 | | 1,503 | | | | 3 | | 14 | | 87 | | 550 | | | |
| | At-sea | | | | Estimated shoreside | | | | | | At-sea | | | | Estimated shoreside | | | | | |
| | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Big skate | — | — | — | — | — | — | — | — | 1.61 | 1.61 | 0.0033 | 0.0011 | 0.3407 | 1.83 | — | — | — | — | 1.75 | 3.57 |
| ECS | | | | | | | | | | | | | | | | | | | | |
| Black skate | 0.0014 | 0.0003 | 0.1931 | 2.07 | — | — | — | — | — | 2.07 | 0.0007 | 0.0002 | 0.2505 | 0.41 | — | — | — | — | — | 0.41 |
| CA grenadier | 0.0000 | 0.0000 | 0.3377 | 0.01 | — | — | — | — | — | 0.01 | 0.0000 | 0.0000 | 0.5686 | 0.02 | — | — | — | — | — | 0.02 |
| CA skate | — | — | — | — | — | — | — | — | — | — | 0.0006 | 0.0001 | 0.2287 | 0.31 | — | — | — | — | 0.25 | 0.57 |
| Giant grenadier | 0.0055 | 0.0015 | 0.2725 | 8.20 | — | — | — | — | — | 8.20 | 0.0098 | 0.0030 | 0.3091 | 5.36 | — | — | — | — | — | 5.36 |
| Grenadier, unid. | — | — | — | — | — | — | — | — | 2.26 | 2.26 | — | — | — | — | — | — | — | — | 0.03 | 0.03 |
| Pacific flatnose | 0.0000 | 0.0000 | 0.2267 | 0.00 | — | — | — | — | — | 0.00 | 0.0000 | 0.0000 | 0.0898 | 0.00 | — | — | — | — | — | 0.00 |
| Pacific grenadier | 0.0013 | 0.0003 | 0.2177 | 1.98 | — | — | — | — | — | 1.98 | 0.0004 | 0.0002 | 0.3887 | 0.21 | — | — | — | — | 0.14 | 0.36 |
| Popeye grenadier | 0.0000 | 0.0000 | 0.0781 | 0.00 | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — |
| Sandpaper skate | 0.0011 | 0.0002 | 0.2156 | 1.69 | — | — | — | — | — | 1.69 | 0.0007 | 0.0002 | 0.2057 | 0.41 | — | — | — | — | — | 0.41 |
| Soupfin shark | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| Spotted ratfish | 0.0010 | 0.0005 | 0.4612 | 1.58 | — | — | — | — | — | 1.58 | 0.0050 | 0.0015 | 0.3005 | 2.76 | — | — | — | — | 0.11 | 2.87 |
| Longnose skate | 0.0014 | 0.0004 | 0.2596 | 2.17 | — | — | — | — | 60.51 | 61.60 | 0.0115 | 0.0018 | 0.1587 | 6.34 | — | — | — | — | 10.60 | 13.78 |
| 50% discard mortality (trawl) | | | | 1.09 | | | | | | | | | | 3.17 | | | | | | |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Brown rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Shortbelly rf. | — | — | — | — | — | — | — | — | 0.09 | 0.09 | 0.0000 | 0.0000 | 0.0898 | 0.00 | — | — | — | — | 0.35 | 0.35 |
| Spiny dogfish | 0.0000 | 0.0000 | 0.0781 | 0.02 | — | — | — | — | 0.00 | 0.02 | 0.0053 | 0.0018 | 0.3427 | 2.92 | — | — | — | — | 0.01 | 2.93 |

Table 2c (continued). Observed at-sea and shoreside discard ratios and standard errors thereof, at-sea and shoreside discard coefficients of variations, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of non-IFQ species in the electronically monitored (EM) catch share fishery using bottom trawl and pot gear.

| Non-IFQ species in EM catch chares | Bottom Trawl (N of 40°10'N) | | | | | | | | | | Bottom Trawl (S of 40°10'N) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed | | | | Expansion factor: Fleet landings of groundfish (mt) | | | | | | Observed | | | | Expansion factor: Fleet landings of groundfish (mt) | | | | | |
| | Vessels | Trips | Hauls | | | | | | | | Vessels | Trips | Hauls | | | | | | | |
| | 5 | 11 | 63 | | 1,503 | | | | | | 3 | 14 | 87 | | 550 | | | | | |
| | At-sea | | | | Estimated shoreside | | | | | | At-sea | | | | Estimated shoreside | | | | | |
| | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | |
| Dungeness crab | 0.0000 | 0.0000 | 0.4712 | 0.03 | — | — | — | — | — | 0.03 | 0.0053 | 0.0017 | 0.3252 | 2.89 | — | — | — | — | — | 2.89 |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | | | |
| Deepsea sole | 0.0003 | 0.0002 | 0.5678 | 0.44 | — | — | — | — | — | 0.44 | 0.0000 | 0.0000 | 0.0898 | 0.00 | — | — | — | — | — | 0.00 |
| Slender sole | 0.0000 | 0.0000 | 0.0781 | 0.01 | — | — | — | — | — | 0.01 | 0.0000 | 0.0000 | 0.4760 | 0.00 | — | — | — | — | 0.11 | 0.11 |
| Other nongroundfish | | | | | | | | | | | | | | | | | | | | |
| Sculpin, unid. | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.1996 | 0.03 | — | — | — | — | 0.00 | 0.03 |
| Skate, unid. | — | — | — | — | — | — | — | — | 0.66 | 0.66 | 0.0005 | 0.0000 | 0.0898 | 0.27 | — | — | — | — | 0.03 | 0.30 |
| Squid, unid. | 0.0001 | 0.0000 | 0.0781 | 0.11 | — | — | — | — | — | 0.11 | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| Shated ECS | | | | | | | | | | | | | | | | | | | | |
| Deepsea smelt, unid. | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0898 | 0.00 | — | — | — | — | — | 0.00 |
| Lanternfish, unid. | 0.0000 | 0.0000 | 0.0781 | 0.00 | — | — | — | — | — | 0.00 | 0.0000 | 0.0000 | 0.2901 | 0.00 | — | — | — | — | — | 0.00 |
| Non-Humboldt squid, unid. | 0.0004 | 0.0001 | 0.1972 | 0.64 | — | — | — | — | — | 0.64 | 0.0007 | 0.0003 | 0.3687 | 0.40 | — | — | — | — | — | 0.40 |
| Pacific saury | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0898 | 0.00 | — | — | — | — | — | 0.00 |

Table 2c (continued). Observed at-sea and shoreside discard ratios and standard errors thereof, at-sea and shoreside discard coefficients of variations, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of non-IFQ species in the electronically monitored (EM) catch share fishery using bottom trawl and pot gear.

| Non-IFQ species in EM catch chares | Pot (N of 40°10'N) | | | | | | | | | | Pot (S of 40°10'N) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed | | | | | | Expansion factor: Fleet landings of groundfish (mt) | | | | Observed | | | | | | Expansion factor: Fleet landings of groundfish (mt) | | | |
| | Vessels | | Trips | | Hauls | | | | | | Vessels | | Trips | | Hauls | | | | | |
| | 4 | | 14 | | 163 | | 279 | | | | 5 | | 8 | | 107 | | 225 | | | |
| | At-sea | | | | Estimated shoreside | | | | | | At-sea | | | | Estimated shoreside | | | | | |
| | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Big skate | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| ECS | | | | | | | | | | | | | | | | | | | | |
| Black skate | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| CA grenadier | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| CA skate | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Giant grenadier | 0.0011 | 0.0003 | 0.2539 | 0.32 | — | — | — | — | — | 0.32 | 0.0002 | 0.0001 | 0.4827 | 0.04 | — | — | — | — | — | 0.04 |
| Grenadier, unid. | 0.0001 | 0.0000 | 0.1892 | 0.03 | — | — | — | — | — | 0.03 | — | — | — | — | — | — | — | — | — | — |
| Pacific flatnose | 0.0001 | 0.0000 | 0.3096 | 0.01 | — | — | — | — | — | 0.01 | — | — | — | — | — | — | — | — | — | — |
| Pacific grenadier | 0.0014 | 0.0003 | 0.2303 | 0.39 | — | — | — | — | — | 0.39 | 0.0001 | 0.0000 | 0.1653 | 0.03 | — | — | — | — | — | 0.03 |
| Popeye grenadier | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sandpaper skate | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0735 | 0.00 | — | — | — | — | — | 0.00 |
| Soupfin shark | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Spotted ratfish | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Longnose skate | 0.0001 | 0.0000 | 0.1358 | 0.02 | — | — | — | — | — | 0.01 | 0.0000 | 0.0000 | 0.0735 | 0.01 | — | — | — | — | — | 0.00 |
| 50% discard mortality (FG) | | | | 0.01 | | | | | | | | | | 0.00 | | | | | | |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Brown rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Shortbelly rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Spiny dogfish | 0.0003 | 0.0001 | 0.3311 | 0.09 | — | — | — | — | — | 0.09 | 0.0000 | 0.0000 | 0.0735 | 0.00 | — | — | — | — | — | 0.00 |

Table 2c (continued). Observed at-sea and shoreside discard ratios and standard errors thereof, at-sea and shoreside discard coefficients of variations, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of non-IFQ species in the electronically monitored (EM) catch share fishery using bottom trawl and pot gear.

| Non-IFQ species in EM catch chares | Pot (N of 40°10'N) | | | | | | | | | | Pot (S of 40°10'N) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed | | | | Expansion factor: Fleet landings of groundfish (mt) | | | | | | Observed | | | | Expansion factor: Fleet landings of groundfish (mt) | | | | | |
| | Vessels | Trips | Hauls | | | | | | | | Vessels | Trips | Hauls | | | | | | | |
| | 4 | 14 | 163 | | 279 | | | | | | 5 | 8 | 107 | | 225 | | | | | |
| | At-sea | | | | Estimated shoreside | | | | | | At-sea | | | | Estimated shoreside | | | | | |
| | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate | Discard ratio | SE | CV | Discard | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | |
| Dungeness crab | 0.0017 | 0.0005 | 0.3011 | 0.48 | — | — | — | — | — | 0.48 | 0.0000 | 0.0000 | 0.1232 | 0.00 | — | — | — | — | — | 0.01 |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | | | |
| Deepsea sole | 0.0000 | 0.0000 | 0.2408 | 0.00 | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — |
| Slender sole | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Other nongroundfish | | | | | | | | | | | | | | | | | | | | |
| Sculpin, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Skate, unid. | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — |
| Squid, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Shared ECS | | | | | | | | | | | | | | | | | | | | |
| Deepsea smelt, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Lanternfish, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Non-Humboldt squid, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Pacific saury | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

Table 2d. Electronically monitored (EM) estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of IFQ species in the EM catch share bottom trawl and pot fisheries. Discard amounts are derived from the EM program and include FOS-estimated expansions of the small amount of unsampled at-sea discard. Discard mortality rates were provided by the GMT.

| IFQ species in EM catch shares | Bottom Trawl (N of 40°10'N) | | | Bottom Trawl (S of 40°10'N) | | | Pot (N of 40°10'N) | | | Pot (S of 40°10'N) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] |
| | 8 | 456 | 1,503 | 3 | 414 | 550 | 5 | 578 | 279 | 6 | 648 | 225 |
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Arrowtooth flounder | 14.22 | 33.83 | 48.06 | 15.87 | 0.18 | 16.05 | 0.13 | 0.05 | 0.18 | 0.00 | 0.00 | 0.00 |
| Bocaccio rf. (S of 40°10'N) | — | — | — | 0.09 | 36.36 | 36.45 | — | — | — | — | — | — |
| Canary rf. | 0.00 | 0.16 | 0.16 | 0.00 | 0.60 | 0.60 | — | — | — | — | — | — |
| Chilipepper rf. (S of 40°10'N) | — | — | — | 0.03 | 22.89 | 22.92 | — | — | — | — | — | — |
| Cowcod rf. (S of 40°10'N) | — | — | — | 0.00 | 0.33 | 0.34 | — | — | — | — | — | — |
| Darkblotched rf. | 0.00 | 4.33 | 4.33 | 0.00 | 0.26 | 0.26 | 0.00 | 0.01 | 0.01 | — | — | — |
| Dover sole | 1.44 | 848.69 | 850.13 | 0.38 | 129.70 | 130.08 | 0.20 | 0.26 | 0.46 | 0.00 | 0.06 | 0.06 |
| English sole | 0.05 | 7.43 | 7.48 | 11.39 | 6.35 | 17.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lingcod (N of 40°10'N) | 0.01 | 3.22 | 3.22 | — | — | — | 0.14 | 0.30 | 0.45 | — | — | — |
| 50% discard mortality | 0.01 | | | | | | | | | | | |
| Lingcod (S of 40°10'N) | — | — | — | 2.69 | 12.37 | 15.06 | — | — | — | 0.05 | 0.06 | 0.11 |
| LST (N of 34°27'N) | 0.04 | 149.65 | 149.69 | 0.02 | 75.18 | 75.20 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | |
| Bocaccio rf. | 0.00 | 0.70 | 0.70 | — | — | — | 0.00 | — | 0.00 | — | — | — |
| Chilipepper rf. | 0.18 | 1.81 | 1.99 | — | — | — | — | — | — | — | — | — |
| Greenstriped rf. | 0.00 | 0.70 | 0.70 | — | — | — | — | — | — | — | — | — |
| Redstripe rf. | 0.00 | 3.52 | 3.52 | — | — | — | — | — | — | — | — | — |
| Shelf rf., unid. | 0.00 | 0.00 | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Stripetail rf. | 0.00 | 0.25 | 0.25 | — | — | — | — | — | — | — | — | — |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | |
| Flag rf. | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 |
| Greenblotched rf. | — | — | — | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — |
| Greenspotted rf. | — | — | — | 0.00 | 0.11 | 0.11 | — | — | — | — | — | — |
| Greenstriped rf. | — | — | — | 0.00 | 0.25 | 0.25 | — | — | — | — | — | — |
| Halfbanded rf. | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Mexican rf. | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Pink rf. | — | — | — | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — |
| Rosethorn rf. | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 2d (continued). Electronically monitored (EM) estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of IFQ species in the EM catch share bottom trawl and pot fisheries.

| IFQ species in EM catch shares | Bottom Trawl (N of 40°10'N) | | | Bottom Trawl (S of 40°10'N) | | | Pot (N of 40°10'N) | | | Pot (S of 40°10'N) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] |
| | 8 | 456 | 1,503 | 3 | 414 | 550 | 5 | 578 | 279 | 6 | 648 | 225 |
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Rosy rf. | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Shelf rf., unid. | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Silvergray rf. | — | — | — | 0.00 | 0.04 | 0.04 | — | — | — | — | — | — |
| Stripetail rf. | — | — | — | 0.00 | 0.12 | 0.12 | — | — | — | — | — | — |
| Vermilion rf. | — | — | — | 0.00 | 0.06 | 0.06 | — | — | — | — | — | — |
| Yellowtail rf. | — | — | — | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | |
| Aurora rf. | 0.00 | 1.38 | 1.38 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Bank rf. | 0.00 | 0.11 | 0.11 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Blackgill rf. | 0.00 | 0.37 | 0.37 | — | — | — | 0.00 | 0.00 | 0.01 | — | — | — |
| Redbanded rf. | 0.00 | 0.96 | 0.96 | — | — | — | 0.02 | 0.15 | 0.17 | — | — | — |
| Rougheye/blackspotted rf. | 0.00 | 0.12 | 0.12 | — | — | — | 0.00 | 0.15 | 0.15 | — | — | — |
| Sharpchin rf. | 0.00 | 0.00 | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Shortraker rf. | 0.00 | 0.03 | 0.03 | — | — | — | — | — | — | — | — | — |
| Shortraker/rougheye/blackspotted rf. | — | — | — | — | — | — | 0.02 | — | 0.02 | — | — | — |
| Slope rf., unid. | 0.01 | 0.09 | 0.10 | — | — | — | 0.00 | — | 0.00 | — | — | — |
| Splitnose rf. | 0.00 | 0.41 | 0.41 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Yellowmouth rf. | 0.00 | 2.16 | 2.16 | — | — | — | — | — | — | — | — | — |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | |
| Aurora rf. | — | — | — | 0.00 | 2.05 | 2.05 | — | — | — | 0.00 | 0.01 | 0.01 |
| Bank rf. | — | — | — | 0.02 | 5.04 | 5.06 | — | — | — | — | — | — |
| Blackgill rf. | — | — | — | 0.00 | 7.55 | 7.55 | — | — | — | 0.00 | 0.61 | 0.61 |
| Pacific ocean perch | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Redbanded rf. | — | — | — | 0.00 | 0.03 | 0.03 | — | — | — | — | — | — |
| Rougheye/blackspotted rf. | — | — | — | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — |
| Shortraker rf. | — | — | — | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — |
| Slope rf., unid. | — | — | — | 0.00 | 0.11 | 0.11 | — | — | — | — | — | — |
| Mixed thornyheads | | | | | | | | | | | | |
| SST/LST | 0.07 | — | 0.07 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | 0.00 | — | 0.00 |

[a] Fleet landings of groundfish, in metric tons.

Table 2d (continued). Electronically monitored (EM) estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of IFQ species in the EM catch share bottom trawl and pot fisheries.

| IFQ species in EM catch shares | Bottom Trawl (N of 40°10'N) | | | Bottom Trawl (S of 40°10'N) | | | Pot (N of 40°10'N) | | | Pot (S of 40°10'N) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] |
| | 8 | 456 | 1,503 | 3 | 414 | 550 | 5 | 578 | 279 | 6 | 648 | 225 |
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Other flatfish | | | | | | | | | | | | |
| Curlfin sole | — | — | — | 0.00 | 0.09 | 0.09 | — | — | — | — | — | — |
| Flatfish, unid. | 0.09 | — | 0.09 | 0.10 | 0.00 | 0.10 | 0.00 | 0.00 | 0.01 | — | — | — |
| Flathead sole | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Pacific sanddab | 0.00 | 0.34 | 0.34 | 7.04 | 21.89 | 28.93 | — | — | — | — | — | — |
| Rex sole | 0.05 | 24.25 | 24.31 | 0.05 | 4.79 | 4.84 | 0.00 | 0.00 | 0.00 | — | — | — |
| Rock sole | 0.00 | — | 0.00 | 0.00 | 0.12 | 0.12 | — | — | — | — | — | — |
| Sand sole | — | — | — | 0.00 | 0.49 | 0.49 | — | — | — | — | — | — |
| Sanddab, unid. | — | — | — | 0.00 | 0.97 | 0.97 | — | — | — | — | — | — |
| Other rockfish | | | | | | | | | | | | |
| Rockfish, unid. | 0.03 | — | 0.03 | 0.09 | — | 0.09 | 0.00 | — | 0.00 | 0.00 | — | 0.00 |
| Pacific hake | 5.96 | 0.28 | 6.25 | 7.68 | 2.44 | 10.12 | — | — | — | 0.01 | — | 0.01 |
| Pacific ocean perch (N of 40°10'N) | 0.00 | 0.24 | 0.24 | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Petrale sole | 0.13 | 114.04 | 114.17 | 0.09 | 137.70 | 137.80 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 |
| Sablefish (N of 36°N) | 0.16 | 168.57 | 168.65 | 0.02 | 49.20 | 49.21 | 5.73 | 278.18 | 279.32 | 0.94 | 135.03 | 135.22 |
| 50% discard mortality (trawl) | 0.08 | | | 0.01 | | | | | | | | |
| 20% discard mortality (FG) | | | | | | | 1.15 | | | 0.19 | | |
| Sablefish (S of 36°N) | — | — | — | 0.00 | 0.25 | 0.25 | — | — | — | 0.93 | 88.88 | 89.07 |
| 50% discard mortality (trawl) | | | | 0.00 | | | | | | | | |
| 20% discard mortality (FG) | | | | | | | | | | 0.19 | | |
| SST (N of 34°27'N) | 0.05 | 66.97 | 67.03 | 0.00 | 18.47 | 18.48 | 0.07 | 0.27 | 0.34 | 0.08 | 0.47 | 0.55 |
| SST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Splitnose rf. (S of 40°10'N) | — | — | — | 0.01 | 2.38 | 2.39 | — | — | — | — | — | — |
| Starry flounder | 0.00 | 2.69 | 2.69 | — | — | — | — | — | — | — | — | — |
| Widow rf. | 0.00 | 1.12 | 1.12 | 0.00 | 0.31 | 0.31 | — | — | — | — | — | — |
| Yelloweye rf. | — | — | — | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — |
| Yellowtail rf. (N of 40°10'N) | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 2e. Electronically monitored (EM) discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the EM catch share midwater fisheries. Discard amounts are derived from the EM program and include FOS-estimated expansions of the small amount of unsampled at-sea discard.

| EM midwater | Midwater Rockfish Trawl | | | Midwater Hake Trawl | | |
|---|---|---|---|---|---|---|
| | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] |
| | 10 | 88 | 1,570 | 22 | 2,072 | 133,155 |
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Arrowtooth flounder | 0.05 | 6.24 | 6.29 | 0.00 | 0.01 | 0.01 |
| Big skate | 0.01 | 1.13 | 1.13 | 0.00 | 0.04 | 0.04 |
| Canary rf. | 0.54 | 64.01 | 64.55 | 0.00 | 17.51 | 17.51 |
| Darkblotched rf. | 0.46 | 30.95 | 31.40 | 0.00 | 0.00 | 0.00 |
| Dover sole | 0.00 | 0.01 | 0.01 | — | — | — |
| ECS | | | | | | |
| Soupfin shark | 0.00 | 0.45 | 0.45 | 0.00 | 0.02 | 0.02 |
| English sole | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Groundfish, unid. | 0.00 | 0.19 | 0.19 | — | — | — |
| Lingcod (N of 40°10'N) | 0.12 | 7.17 | 7.30 | 0.00 | 0.71 | 0.72 |
| Longnose skate | 0.00 | 0.35 | 0.35 | 0.00 | 0.03 | 0.03 |
| LST (N of 40°10'N) | 0.00 | 0.00 | 0.00 | — | — | — |
| Minor ns. rf. (N of 34°27'N) | | | | | | |
| Blue/deacon rf. | 0.00 | 0.00 | 0.00 | — | — | — |
| Nearshore rf., unid. | 0.00 | 0.00 | 0.00 | — | — | — |
| Minor sh. rf. (N of 40°10'N) | | | | | | |
| Bocaccio rf. | 0.04 | 4.42 | 4.46 | 0.00 | 0.32 | 0.33 |
| Chilipepper rf. | 0.20 | 48.45 | 48.65 | 0.00 | 3.42 | 3.42 |
| Greenstriped rf. | 0.00 | 0.09 | 0.09 | 0.00 | 0.05 | 0.05 |
| Harlequin rf. | 0.00 | 0.08 | 0.08 | 0.00 | 0.01 | 0.01 |
| Redstripe rf. | 0.08 | 15.03 | 15.11 | 0.00 | 4.06 | 4.06 |
| Shelf rf., unid. | 0.00 | 0.02 | 0.02 | — | — | — |
| Silvergray rf. | 0.00 | 0.12 | 0.12 | 0.02 | 3.99 | 4.01 |
| Stripetail rf. | — | 0.01 | 0.01 | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | |
| Aurora rf. | 0.01 | 0.37 | 0.38 | — | — | — |
| Rougheye/blackspotted rf. | 0.01 | 2.33 | 2.34 | — | — | — |
| Sharpchin rf. | 0.01 | 2.24 | 2.26 | 0.00 | 0.03 | 0.03 |
| Shortraker rf. | 0.00 | 0.07 | 0.07 | — | — | — |
| Slope rf., unid. | 0.00 | 5.46 | 5.46 | — | — | — |
| Splitnose rf. | 0.04 | 34.78 | 34.81 | 0.00 | 0.01 | 0.01 |
| Yellowmouth rf. | 0.00 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 |
| Other flatfish | | | | | | |
| Flatfish, unid. | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Flathead sole | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pacific sanddab | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rex sole | 0.00 | 0.04 | 0.04 | — | — | — |
| Rock sole | 0.00 | 0.00 | 0.00 | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 2e (continued). Electronically monitored (EM) discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the EM catch share midwater fisheries.

| EM midwater | Midwater Rockfish Trawl | | | Midwater Hake Trawl | | |
|---|---|---|---|---|---|---|
| | EM vessels | EM tows | Landings[a] | EM vessels | EM tows | Landings[a] |
| | 10 | 88 | 1,570 | 22 | 2,072 | 133,155 |
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Other rockfish | | | | | | |
| Rockfish, unid. | 0.01 | 0.00 | 0.01 | 0.68 | 0.00 | 0.68 |
| Pacific cod | 0.01 | 0.59 | 0.60 | 0.00 | 0.18 | 0.18 |
| Pacific hake | 1,679.08 | 133,134.74 | 134,813.82 | 5.16 | 158.68 | 163.84 |
| Pacific ocean perch | 0.37 | 46.02 | 46.39 | 0.00 | 0.07 | 0.07 |
| Petrale sole | 0.00 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 |
| Roundfish, unid. | 0.02 | 0.00 | 0.02 | — | — | — |
| Sablefish | 1.47 | 91.27 | 92.74 | 0.00 | 0.07 | 0.07 |
| Shortbelly rf. | 0.20 | 119.91 | 120.11 | 0.00 | 0.23 | 0.23 |
| SST | 0.01 | 0.98 | 0.99 | 0.00 | 0.00 | 0.00 |
| Spiny dogfish shark | 1.44 | 89.21 | 90.65 | 0.00 | 0.01 | 0.01 |
| Widow rf. | 3.65 | 906.64 | 910.29 | 9.73 | 1,257.71 | 1,267.45 |
| Yelloweye rf. | 0.00 | 0.00 | 0.00 | — | — | — |
| Yellowtail rf. | 8.55 | 1,191.08 | 1,199.63 | 0.83 | 285.13 | 285.96 |
| **Nongroundfish species** | | | | | | |
| Dungeness crab | 0.00 | 0.00 | 0.00 | — | — | — |
| Other nongroundfish | | | | | | |
| Skate, unid. | 0.00 | 0.11 | 0.11 | — | — | — |
| Squid, unid. | 0.16 | 16.82 | 16.98 | 0.00 | 0.03 | 0.03 |

[a] Fleet landings of groundfish, in metric tons.

## Mortality Summary for Shorebased IFQ Sectors

We estimated coastwide landings, discard weight from 100% observer coverage and EM data, and fishing mortality, including discard mortality rates, in the 2017 shorebased nonhake IFQ sectors (Table 3a). We applied a 50% mortality rate to discarded sablefish and lingcod weight caught by IFQ bottom trawl and LE California halibut trawl sectors, reflecting guidance from the GMT to use rates from management under the pre-IFQ LE groundfish bottom trawl sector (before 2011). We also applied a 20% mortality rate to discarded sablefish caught by IFQ longline and pot gear, the rate suggest by GMT based on non-nearshore groundfish fixed gear sectors. We applied a 7% mortality rate to discarded lingcod caught by IFQ hook-and-line gear, previously used in nearshore groundfish fixed gear sectors. We also applied discard mortality rate assumptions (previously made for stock assessment purposes) recommended by PFMC's Scientific and Statistical Committee (SSC) for longnose skate (50% for both bottom trawl and fixed gear) and spiny dogfish (50% for hook-and-line; PFMC 2012), as well as for big skate (50% for bottom trawl; PFMC 2015a, 2015b).

The total estimated weight, comprising the sampled and expanded discard weight and the landed weight, is reported by species for the shoreside midwater hake sector (Table 3a) and for the shoreside midwater rockfish sector (Table 3b). No discard mortality rates are applied in midwater trawl sectors.

Table 3a. Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries. Discard ratios (Tables 2a, 2b) were multiplied by expansion factors to generate estimated discard and summarized with sampled discard at the sector level. Estimated total discards of non-IFQ species on observed EM trips were combined with total at-sea discard weights of IFQ species as recorded by EM systems. Discard mortality rates have been applied where appropriate. Finally, landings were summarized from PacFIN.

| | IFQ Bottom Trawl | | | IFQ Hook and Line | | | IFQ Pot | | | IFQ Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Arrowtooth flounder | 348.46 | 1,006.89 | 1,355.34 | 3.48 | 0.10 | 3.57 | 0.41 | 0.10 | 0.51 | 0.00 | 0.78 | 0.78 |
| Big skate | 17.84 | 202.64 | 220.48 | 0.00 | 0.13 | 0.13 | — | — | — | 0.00 | 1.26 | 1.26 |
| Black rf. (OR) | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Black rf. (WA) | 0.00 | 0.23 | 0.23 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Bocaccio rf. (S of 40°10'N) | 0.12 | 87.43 | 87.55 | — | 0.06 | 0.06 | — | — | — | — | — | — |
| Canary rf. | 0.10 | 133.09 | 133.19 | — | 0.01 | 0.01 | — | — | — | 0.00 | 34.39 | 34.40 |
| Chilipepper rf. (S of 40°10'N) | 3.17 | 102.32 | 105.49 | — | — | — | — | — | — | — | — | — |
| Cowcod rf. (S of 40°10'N) | 0.00 | 0.42 | 0.42 | — | — | — | — | — | — | — | — | — |
| Darkblotched rf. | 2.85 | 147.64 | 150.49 | — | 0.05 | 0.05 | 0.00 | 0.03 | 0.03 | 0.00 | 0.19 | 0.19 |
| Dover sole | 55.94 | 7,282.64 | 7,338.57 | 0.00 | 0.45 | 0.46 | 0.69 | 0.47 | 1.16 | — | 0.05 | 0.05 |
| ECS | | | | | | | | | | | | |
| Aleutian skate | 0.63 | — | 0.63 | — | — | — | — | — | — | — | — | — |
| Black skate | 10.72 | — | 10.72 | 0.17 | — | 0.17 | — | — | — | — | — | — |
| CA grenadier | 0.08 | — | 0.08 | — | — | — | — | — | — | — | — | — |
| CA skate | 0.57 | 0.64 | 1.22 | — | — | — | — | — | — | — | — | — |
| Deepsea skate | 0.07 | — | 0.07 | — | — | — | — | — | — | — | — | — |
| Giant grenadier | 44.57 | — | 44.57 | 0.13 | — | 0.13 | 0.90 | — | 0.90 | — | — | — |
| Grenadier, unid. | 2.97 | 10.42 | 13.39 | — | — | — | 0.03 | — | 0.03 | — | — | — |
| Pacific flatnose | 0.27 | — | 0.27 | — | — | — | 0.04 | — | 0.04 | — | — | — |
| Pacific grenadier | 17.17 | 0.35 | 17.52 | 0.01 | — | 0.01 | 1.15 | — | 1.15 | — | — | — |
| Popeye grenadier | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Sandpaper skate | 49.12 | — | 49.12 | 0.24 | — | 0.24 | 0.00 | — | 0.00 | 0.13 | — | 0.13 |
| Shoulderspot grenadier | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Smooth grenadier | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Soupfin shark | 0.18 | 0.72 | 0.91 | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Spotted ratfish | 78.51 | 1.16 | 79.66 | 0.08 | — | 0.08 | — | — | — | 0.58 | 0.31 | 0.89 |
| English sole | 42.03 | 204.26 | 246.29 | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.23 | 0.23 |

Table 3a (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Bottom Trawl | | | IFQ Hook and Line | | | IFQ Pot | | | IFQ Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Lingcod (N of 40°10'N) | 12.66 | 580.47 | 593.14 | — | 0.18 | 0.18 | 0.49 | 2.38 | 2.87 | 0.03 | 2.39 | 2.43 |
| Lingcod (S of 40°10'N) | 1.72 | 20.52 | 22.24 | 0.00 | 0.16 | 0.16 | 0.13 | 0.06 | 0.18 | — | — | — |
| Longnose skate | 47.92 | 708.72 | 756.64 | 0.25 | 5.35 | 5.61 | 0.02 | — | 0.02 | 0.02 | 1.49 | 1.51 |
| LST (N of 34°27'N) | 4.87 | 798.56 | 803.43 | — | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | — | 0.05 | 0.05 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | |
| Blue/deacon rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Copper rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Nearshore rf., unid. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Quillback rf. | 0.00 | 0.06 | 0.06 | — | — | — | — | — | — | — | — | — |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | |
| Brown rf. | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Copper rf. | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | |
| Bocaccio rf. | 0.16 | 20.53 | 20.69 | — | — | — | 0.00 | — | 0.00 | 0.00 | 2.82 | 2.82 |
| Chilipepper rf. | 4.76 | 20.15 | 24.91 | — | — | — | — | — | — | 0.00 | 4.24 | 4.24 |
| Cowcod rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Greenblotched rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Greenspotted rf. | 0.03 | 0.09 | 0.12 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Greenstriped rf. | 24.92 | 20.55 | 45.48 | — | 0.01 | 0.01 | 0.00 | — | 0.00 | 0.00 | 0.11 | 0.12 |
| Halfbanded rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Harlequin rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | 0.00 | 0.02 | 0.02 |
| Pygmy rf. | 0.02 | — | 0.02 | — | — | — | — | — | — | — | — | — |
| Redstripe rf. | 0.02 | 3.92 | 3.94 | — | — | — | — | — | — | 0.00 | 10.02 | 10.02 |
| Rosethorn rf. | 0.35 | 2.95 | 3.30 | 0.00 | 0.03 | 0.03 | 0.01 | 0.01 | 0.02 | — | 0.00 | 0.00 |
| Rosy rf. | 0.02 | — | 0.02 | — | — | — | — | — | — | — | — | — |
| Shelf rf., unid. | 0.08 | 24.46 | 24.54 | — | — | — | — | 0.00 | 0.00 | — | 0.04 | 0.04 |
| Silvergray rf. | 0.00 | 1.19 | 1.19 | — | 0.01 | 0.01 | — | — | — | 0.00 | 0.59 | 0.59 |
| Starry rf. | 0.03 | — | 0.03 | — | — | — | — | — | — | — | — | — |
| Stripetail rf. | 18.91 | 3.52 | 22.43 | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Tiger rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |

Table 3a (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Bottom Trawl | | | IFQ Hook and Line | | | IFQ Pot | | | IFQ Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | **Discard** | **Landed** | **Estimate** | **Discard** | **Landed** | **Estimate** | **Discard** | **Landed** | **Estimate** | **Discard** | **Landed** | **Estimate** |
| **Groundfish species** | | | | | | | | | | | | |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | |
| Flag rf. | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Greenblotched rf. | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — |
| Greenspotted rf. | 0.00 | 0.31 | 0.31 | — | — | — | — | — | — | — | — | — |
| Greenstriped rf. | 0.07 | 0.62 | 0.69 | — | — | — | — | — | — | — | — | — |
| Halfbanded rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Mexican rf. | 0.00 | 0.03 | 0.03 | — | — | — | — | — | — | — | — | — |
| Pink rf. | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — |
| Rosethorn rf. | 0.01 | 0.00 | 0.01 | — | — | — | — | — | — | — | — | — |
| Rosy rf. | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Shelf rf., unid. | 0.00 | 0.06 | 0.06 | — | — | — | — | — | — | — | — | — |
| Silvergray rf. | 0.00 | 0.04 | 0.04 | — | — | — | — | — | — | — | — | — |
| Stripetail rf. | 0.55 | 0.12 | 0.67 | — | — | — | — | — | — | — | — | — |
| Vermilion rf. | 0.00 | 0.06 | 0.06 | — | 0.22 | 0.22 | — | — | — | — | — | — |
| Yellowtail rf. | 0.00 | 0.04 | 0.04 | — | — | — | — | — | — | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | |
| Aurora rf. | 3.71 | 21.61 | 25.32 | — | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | — | 0.02 | 0.02 |
| Bank rf. | 0.00 | 2.45 | 2.45 | — | — | — | — | 0.00 | 0.00 | — | 0.02 | 0.02 |
| Blackgill rf. | 0.00 | 4.92 | 4.93 | — | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | — | 0.02 | 0.02 |
| Redbanded rf. | 0.27 | 6.15 | 6.42 | 0.01 | 0.90 | 0.91 | 0.04 | 0.23 | 0.26 | — | 0.00 | 0.00 |
| Rougheye/blackspotted rf. | 0.00 | 24.63 | 24.63 | 0.09 | 7.04 | 7.12 | 0.04 | 0.78 | 0.82 | — | 0.43 | 0.43 |
| Sharpchin rf. | 0.06 | 4.09 | 4.15 | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 |
| Shortraker rf. | 0.00 | 8.14 | 8.14 | 0.01 | 0.82 | 0.84 | — | 0.03 | 0.03 | — | 0.02 | 0.02 |
| Shortraker/rougheye/blackspotted rf. | — | — | — | 0.03 | — | 0.03 | 0.02 | — | 0.02 | — | — | — |
| Slope rf., unid. | 0.48 | 1.12 | 1.60 | — | — | — | — | 0.10 | 0.10 | — | 0.19 | 0.19 |
| Splitnose rf. | 6.33 | 15.81 | 22.14 | — | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 1.12 | 1.12 |
| Yellowmouth rf. | 0.00 | 4.53 | 4.53 | — | 0.00 | 0.00 | — | — | — | 0.00 | 0.02 | 0.02 |

Table 3a (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Bottom Trawl | | | IFQ Hook and Line | | | IFQ Pot | | | IFQ Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | |
| Aurora rf. | 2.09 | 4.03 | 6.12 | — | — | — | 0.00 | 0.01 | 0.01 | — | — | — |
| Bank rf. | 0.05 | 33.44 | 33.49 | — | — | — | — | — | — | — | — | — |
| Blackgill rf. | 0.15 | 19.43 | 19.59 | — | — | — | 0.02 | 0.62 | 0.64 | — | — | — |
| Pacific ocean perch | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Redbanded rf. | 0.04 | 0.32 | 0.37 | — | — | — | — | — | — | — | — | — |
| Rougheye/blackspotted rf. | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — |
| Sharpchin rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — |
| Shortraker rf. | 0.00 | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — |
| Slope rf., unid. | 0.00 | 0.12 | 0.12 | — | — | — | — | — | — | — | — | — |
| Mixed thornyheads | | | | | | | | | | | | |
| SST/LST | 0.23 | — | 0.23 | — | — | — | 0.02 | — | 0.02 | — | — | — |
| Other flatfish | | | | | | | | | | | | |
| Butter sole | 0.03 | 0.00 | 0.03 | — | — | — | — | — | — | — | — | — |
| Curlfin sole | 0.08 | 0.56 | 0.64 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Flatfish, unid. | 0.22 | 2.91 | 3.13 | — | — | — | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Flathead sole | 21.76 | 18.99 | 40.75 | — | — | — | — | — | — | — | 0.27 | 0.27 |
| Pacific sanddab | 57.56 | 64.41 | 121.97 | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Rex sole | 85.06 | 464.69 | 549.76 | — | — | — | — | 0.00 | 0.00 | — | 0.80 | 0.80 |
| Rock sole | 0.23 | 1.25 | 1.47 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Sand sole | 0.49 | 5.31 | 5.80 | — | — | — | — | — | — | — | — | — |
| Sanddab, unid. | 0.12 | 4.19 | 4.31 | — | — | — | — | — | — | — | — | — |
| Other groundfish | | | | | | | | | | | | |
| Kelp greenling (OR) | 0.02 | 0.01 | 0.02 | — | — | — | — | — | — | — | — | — |
| Kelp greenling (WA) | 0.09 | 0.02 | 0.10 | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Other rockfish | | | | | | | | | | | | |
| Rockfish, unid. | 0.11 | 0.08 | 0.19 | — | — | — | 0.00 | — | 0.00 | 0.68 | — | 0.68 |
| Pacific cod | 0.15 | 41.53 | 41.68 | 0.00 | — | 0.00 | — | — | — | 0.00 | 0.65 | 0.65 |
| Pacific hake | 315.95 | 32.78 | 348.73 | — | — | — | 0.01 | — | 0.01 | 22.07 | 282.02 | 304.09 |

Table 3a (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Bottom Trawl | | | IFQ Hook and Line | | | IFQ Pot | | | IFQ Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | |
| Pacific ocean perch | 0.58 | 46.10 | 46.68 | — | 0.01 | 0.01 | — | 0.01 | 0.01 | 0.00 | 0.21 | 0.21 |
| Petrale sole | 13.51 | 2,718.20 | 2,731.71 | 0.00 | 0.01 | 0.02 | 0.05 | 0.04 | 0.10 | — | 0.19 | 0.19 |
| Sablefish | 21.44 | 1,517.28 | 1,538.72 | 0.37 | 95.18 | 95.55 | 2.10 | 752.54 | 754.64 | 0.02 | 0.40 | 0.42 |
| Sablefish | 0.05 | 0.96 | 1.00 | — | — | — | 0.37 | 110.00 | 110.37 | — | — | — |
| Shortbelly rf. | 0.11 | 0.46 | 0.58 | — | — | — | — | — | — | 0.00 | 3.64 | 3.64 |
| SST | 4.34 | 731.98 | 736.32 | 0.02 | 5.44 | 5.46 | 0.27 | 0.91 | 1.18 | 0.00 | 0.03 | 0.03 |
| Spiny dogfish shark | 144.21 | 2.72 | 146.92 | 6.74 | — | 6.74 | 0.18 | 0.00 | 0.18 | 0.04 | 0.13 | 0.17 |
| Splitnose rf. | 2.49 | 10.05 | 12.54 | — | — | — | — | — | — | — | — | — |
| Starry flounder | 0.34 | 9.22 | 9.56 | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Widow rf. | 0.28 | 33.61 | 33.89 | — | — | — | — | — | — | 9.75 | 4,847.52 | 4,857.27 |
| YELLOWEYE RF. | 0.01 | 0.14 | 0.14 | — | 0.01 | 0.01 | — | 0.00 | 0.00 | — | 0.00 | 0.00 |
| Yellowtail rf. | 0.52 | 199.22 | 199.74 | 0.00 | 0.16 | 0.16 | — | — | — | 0.83 | 952.88 | 953.70 |
| **Nongroundfish species** | | | | | | | | | | | | |
| Dungeness crab | 171.94 | 0.02 | 171.96 | 0.00 | — | 0.00 | 1.36 | — | 1.36 | 0.10 | 0.00 | 0.10 |
| Non-FMP flatfish | | | | | | | | | | | | |
| Deepsea sole | 5.82 | 0.01 | 5.82 | — | — | — | 0.00 | — | 0.00 | — | — | — |
| Slender sole | 61.33 | 0.11 | 61.44 | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | | | | | | | |
| Sculpin, unid. | 0.76 | 0.00 | 0.76 | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Skate, unid. | 0.83 | 17.84 | 18.68 | — | 0.01 | 0.01 | — | 0.00 | 0.00 | — | 0.01 | 0.01 |
| Squid, unid. | 0.30 | 1.27 | 1.57 | — | — | — | — | — | — | 0.00 | 0.05 | 0.05 |
| Shared ECS | | | | | | | | | | | | |
| Starry skate | 0.09 | 0.00 | 0.09 | — | — | — | — | — | — | — | — | — |
| Bristlemouth, unid. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Deepsea smelt, unid. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Lanternfish, unid. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Lightfish, unid. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Noneulachon smelt, unid. | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — |
| Non-Humboldt squid, unid. | 11.75 | — | 11.75 | — | — | — | 0.00 | — | 0.00 | 0.09 | — | 0.09 |
| Pacific saury | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — |
| Smelt, unid. | — | — | — | — | — | — | — | 2.16 | 2.16 | — | — | — |

Table 3b. Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries. Discard ratios (Tables 2a, 2b) were multiplied by expansion factors to generate estimated discard and summarized with sampled discard at the sector level. Estimated total discards of non-IFQ species on observed EM trips were combined with total at-sea discard weights of IFQ species as recorded by EM systems. Discard mortality rates have been applied where appropriate. Finally, landings were summarized from PacFIN.

| | IFQ Midwater Hake Trawl | | | At-sea Catcher–Processors | | | At-sea Mothership Catcher Vessels | | |
|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Arrowtooth flounder | 0.05 | 6.80 | 6.85 | 3.79 | 10.06 | 13.86 | 0.12 | 3.53 | 3.65 |
| Big skate | 0.01 | 1.33 | 1.34 | 1.58 | 0.56 | 2.14 | 0.57 | 0.07 | 0.64 |
| Black rf. (WA) | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Canary rf. | 0.55 | 73.72 | 74.27 | 0.96 | 1.10 | 2.06 | 0.21 | 4.29 | 4.50 |
| Darkblotched rf. | 0.46 | 32.56 | 33.02 | 6.75 | 25.26 | 32.00 | 3.17 | 4.47 | 7.64 |
| Dover sole | 0.00 | 0.01 | 0.01 | 0.04 | 0.33 | 0.36 | 0.00 | 0.10 | 0.11 |
| ECS | | | | | | | | | |
| Aleutian skate | — | — | — | — | 0.00 | 0.00 | 0.00 | — | 0.00 |
| CA skate | — | — | — | 0.00 | — | 0.00 | 0.02 | — | 0.02 |
| Grenadier, unid. | — | — | — | 0.23 | 0.78 | 1.01 | 0.09 | — | 0.09 |
| Pacific flatnose | — | — | — | 0.00 | — | 0.00 | — | — | — |
| Sandpaper skate | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| Soupfin shark | 0.00 | 0.54 | 0.54 | 0.89 | 0.09 | 0.97 | 0.74 | 0.17 | 0.91 |
| Spotted ratfish | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| English sole | 0.00 | 0.01 | 0.01 | 0.01 | 0.03 | 0.04 | 0.00 | 0.01 | 0.01 |
| Groundfish, unid. | 0.00 | 0.19 | 0.19 | — | — | — | — | — | — |
| Lingcod (N of 40°10'N) | 0.13 | 7.78 | 7.91 | 0.05 | 0.08 | 0.13 | 0.05 | 0.80 | 0.85 |
| Longnose skate | 0.00 | 0.42 | 0.42 | 0.33 | 0.12 | 0.45 | 0.50 | 0.02 | 0.52 |
| LST (N of 34°27'N) | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | — | — | — |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | |
| Blue/deacon rf. | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Nearshore rf., unid. | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | |
| Bocaccio rf. | 0.04 | 4.73 | 4.77 | 0.20 | 0.17 | 0.38 | 0.03 | 0.32 | 0.35 |
| Chilipepper rf. | 0.20 | 51.02 | 51.22 | 0.64 | 0.65 | 1.29 | 0.13 | 11.19 | 11.32 |
| Greenstriped rf. | 0.00 | 0.10 | 0.10 | — | — | — | — | — | — |
| Harlequin rf. | 0.00 | 0.08 | 0.08 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 |

Table 3b (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Midwater Hake Trawl | | | At-sea Catcher–Processors | | | At-sea Mothership Catcher Vessels | | |
|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Redstripe rf. | 0.08 | 15.91 | 15.99 | 0.53 | 0.24 | 0.77 | 0.03 | 0.17 | 0.20 |
| Rosethorn rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Shelf rf., unid. | 0.00 | 0.02 | 0.02 | — | — | — | — | — | — |
| Silvergray rf. | 0.02 | 4.15 | 4.17 | 0.42 | 0.35 | 0.77 | 0.16 | 0.25 | 0.41 |
| Stripetail rf. | — | — | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | |
| Aurora rf. | 0.01 | 0.38 | 0.38 | 0.01 | 0.00 | 0.01 | — | — | — |
| Bank rf. | — | — | — | 0.02 | 0.04 | 0.05 | 0.00 | 0.00 | 0.01 |
| Blackgill rf. | — | — | — | 0.00 | — | 0.00 | 0.00 | 0.01 | 0.01 |
| Redbanded rf. | — | — | — | 0.00 | 0.02 | 0.03 | 0.02 | 0.00 | 0.03 |
| Rougheye/blackspotted rf. | 0.01 | 2.48 | 2.49 | 11.77 | 22.11 | 33.87 | 0.63 | 3.64 | 4.27 |
| Sharpchin rf. | 0.01 | 3.14 | 3.15 | 0.01 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 |
| Shortraker rf. | 0.00 | 0.07 | 0.07 | 0.01 | 0.02 | 0.03 | — | 0.00 | 0.00 |
| Slope rf., unid. | 0.00 | 5.46 | 5.47 | — | — | — | — | — | — |
| Splitnose rf. | 0.04 | 36.98 | 37.02 | 12.93 | 49.62 | 62.55 | 4.27 | 18.40 | 22.67 |
| Yellowmouth rf. | 0.00 | 0.04 | 0.04 | 0.01 | 0.37 | 0.38 | — | 0.00 | 0.00 |
| Other flatfish | | | | | | | | | |
| Flatfish, unid. | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 |
| Flathead sole | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| Pacific sanddab | — | 0.00 | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 |
| Rex sole | 0.00 | 0.05 | 0.05 | 1.80 | 5.54 | 7.34 | 0.07 | 1.05 | 1.12 |
| Rock sole | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Other rockfish | | | | | | | | | |
| Rockfish, unid. | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Pacific cod | 0.01 | 0.70 | 0.71 | 0.00 | 0.01 | 0.01 | 0.00 | 0.18 | 0.18 |
| Pacific hake | 1,789.52 | 144,126.01 | 145,915.53 | 25.26 | 137,104.45 | 137,129.71 | 898.57 | 65,358.46 | 66,257.03 |
| Pacific ocean perch (N of 40°10'N) | 0.37 | 47.07 | 47.44 | 5.16 | 15.17 | 20.33 | 0.51 | 5.42 | 5.93 |
| Petrale sole | 0.00 | 0.04 | 0.04 | — | 0.00 | 0.00 | — | — | — |
| Roundfish, unid. | 0.02 | — | 0.02 | 0.31 | 0.28 | 0.59 | — | — | — |

Table 3b (continued). Nonhake IFQ sector totals, including the EM portion of the fleet. Landings (mt), estimated discard (mt), and fishing mortality estimates (mt) of groundfish species from nonhake IFQ fisheries.

| | IFQ Midwater Hake Trawl | | | At-sea Catcher–Processors | | | At-sea Mothership Catcher Vessels | | |
|---|---|---|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Sablefish (N of 36°N) | 1.47 | 97.04 | 98.51 | 33.61 | 33.87 | 67.48 | 16.43 | 69.35 | 85.79 |
| Shortbelly rf. | 0.66 | 124.65 | 125.31 | 8.06 | 132.75 | 140.81 | 10.50 | 17.23 | 27.73 |
| SST (N of 34°27'N) | 0.01 | 1.05 | 1.06 | 4.99 | 19.80 | 24.79 | 1.54 | 1.63 | 3.18 |
| Spiny dogfish shark | 1.44 | 100.22 | 101.66 | 10.59 | 97.60 | 108.19 | 24.96 | 6.75 | 31.70 |
| Widow rf. | 3.65 | 969.50 | 973.15 | 113.86 | 296.02 | 409.88 | 14.66 | 51.44 | 66.11 |
| Yelloweye rf. | 0.00 | 0.00 | 0.00 | — | — | — | 0.00 | — | 0.00 |
| Yellowtail rf. (N of 40°10'N) | 8.63 | 1,296.46 | 1,305.09 | 33.98 | 96.24 | 130.22 | 37.89 | 110.03 | 147.93 |
| **Nongroundfish species** | | | | | | | | | |
| Dungeness crab | 0.00 | 0.00 | 0.00 | — | — | — | — | — | — |
| Non-FMP flatfish | | | | | | | | | |
| Slender sole | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other nongroundfish | | | | | | | | | |
| Skate, unid. | 0.00 | 0.12 | 0.12 | — | — | — | — | — | — |
| Squid, unid. | 0.16 | 17.87 | 18.03 | 107.76 | 63.11 | 170.87 | 20.40 | 7.84 | 28.24 |
| Shared ECS | | | | | | | | | |
| Blacksmelt, unid. | — | — | — | 0.00 | — | 0.00 | — | — | — |
| Deepsea smelt, unid. | — | — | — | 0.01 | 0.03 | 0.04 | 0.00 | — | 0.00 |
| Duckbill barracudina | — | — | — | 0.37 | 0.32 | 0.69 | 0.02 | 0.00 | 0.02 |
| Lanternfish, unid. | — | — | — | 0.20 | 0.27 | 0.47 | 0.00 | 0.00 | 0.00 |
| Non-Humboldt squid, unid. | 0.07 | — | 0.07 | — | — | — | — | — | — |
| Pacific saury | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Slender barracudina | — | — | — | 0.00 | 0.00 | 0.00 | — | — | — |
| White barracudina | — | — | — | 0.01 | 0.00 | 0.02 | 0.00 | — | 0.00 |

## At-Sea Hake Co-op Sectors

The midwater trawl fishery for hake comprises three at-sea processing fleets: CPs, MSCVs, and a tribal catcher vessel fleet delivering to motherships. A-SHOP produces estimates of total catch (discarded and retained) in the at-sea hake fishery. Observers sample unsorted catch and provide a visual estimate of the proportion retained, at the species level. Discarded catch weight is calculated on a haul basis for the total weight of all species. The discard weight estimate, along with the proportion retained, forms the basis for the two at-sea hake sectors summarized in Table 3b. In 2017, the tribal fleet did not make any at-sea landings; shorebased tribal landings are presented in Table 15. We estimated coastwide landings, sampled discard weight, estimated discard weight, and estimated fishing mortality in all 2017 hake IFQ/co-op program sectors (Table 3b).

# California Halibut Bottom Trawl Fishery

Fleetwide discard estimates in the California halibut bottom trawl fishery were derived from WCGOP and fish ticket data. All California halibut vessels are permitted by the state of California, but are considered OA unless they also have a federal LE groundfish permit. In 2017, no fishing effort occurred in the LE California halibut fishery. The WCGOP randomly samples the OA California halibut fishery following non-catch share sampling priorities, protocols, and selection design.

Discard ratios for the OA California halibut fishery were calculated by dividing the observed discard weight of each species or complex by the observed retained weight of California halibut. The fleetwide landed weight of California halibut was then used as a multiplier to expand observed discard ratios to the fleetwide level (Table 4). Fleetwide landings were compiled from OA trawl fish tickets (see Figure 1) for those vessels that had a state-issued California halibut bottom trawl permit but no federal bottom trawl permit.

The discard estimate for each species was computed based on the following equation:

$$D = \frac{\sum_t d_t}{\sum_t r_t} \times F$$

where:

- $D$ = discard estimate for a given species,
- $t$ = observed tows,
- $d$ = observed discard weight for a given species,
- $r$ = observed retained weight of California halibut, and
- $F$ = weight of retained California halibut recorded on fish tickets for the fleet (expansion factor).

We estimated fishing mortalities of groundfish species caught in the OA California halibut trawl fishery (Table 4a). A 50% mortality rate was applied for discarded lingcod and sablefish, which are assumptions made by GMT and carried over from management under the pre-IFQ groundfish bottom trawl sector. We also applied an SSC-recommended discard mortality rate assumption (previously made for stock assessment purposes) of 50% for longnose skate (PFMC 2012) and a 50% mortality rate to big skate discard (PFMC 2015a, 2015b).

## California Sea Cucumber Trawl Fishery

For the first time in 2017, the sea cucumber trawl fishery was observed by WCGOP as a pilot study, and fleetwide discard estimates were derived from WCGOP and fish ticket data (Figure 1). Prior to 2017, landings in this fishery were included in the incidental fisheries, and no estimates of discards were calculated. Effort in this fishery was defined as occurring only in California, using shrimp trawl and bottom trawl, and landing more sea cucumber than other species. Discard estimates for each species were computed based on the same equation as described above for the OA California halibut fishery, but utilizing sea cucumber as the retained weight for both discard rates and expansion factors. No mortality rates were applied. We estimated landings, discard, and total mortality in the 2017 sea cucumber trawl fishery (Table 4b).

Table 4a. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the OA California halibut fishery (which only occurs south of lat 40°10'N). Ratios are computed as the observed discard weight divided by the observed weight of retained California halibut (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of California halibut to generate estimated discard. Discard mortality rates were provided by the GMT.

| Open Access CA Halibut Fishery (S of 40°10'N) | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 13 | | 129 | 555 | 96 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Big skate | 0.3745 | 0.0434 | 0.1159 | 36.11 | 1.92 | 19.98 |
| 50% discard mortality (trawl) | | | | 18.06 | | |
| Cabezon (CA) | 0.0001 | 0.0000 | 0.2519 | 0.01 | — | 0.01 |
| CA scorpionfish (S of 34°27'N) | 0.0041 | 0.0008 | 0.1820 | 0.40 | — | 0.40 |
| Canary rf. | 0.0001 | 0.0000 | 0.1224 | 0.01 | — | 0.01 |
| Chilipepper rf. (S of 40°10'N) | 0.0001 | 0.0000 | 0.6274 | 0.01 | — | 0.01 |
| Dover sole | 0.0000 | 0.0000 | 0.3705 | 0.00 | 0.00 | 0.00 |
| ECS | | | | | | |
| CA skate | 0.2069 | 0.0247 | 0.1193 | 19.95 | 0.14 | 20.08 |
| Sandpaper skate | 0.0000 | 0.0000 | 0.0908 | 0.00 | — | 0.00 |
| Soupfin shark | 0.0093 | 0.0020 | 0.2161 | 0.90 | 0.03 | 0.93 |
| Spotted ratfish | 0.0001 | 0.0000 | 0.2589 | 0.01 | — | 0.01 |
| English sole | 0.0251 | 0.0030 | 0.1180 | 2.42 | 0.07 | 2.49 |
| Lingcod (S of 40°10'N) | 0.0100 | 0.0021 | 0.2055 | 0.97 | 0.60 | 1.09 |
| 50% discard mortality (trawl) | | | | 0.48 | | |
| Longnose skate | 0.0045 | 0.0007 | 0.1605 | 0.43 | — | 0.22 |
| 50% discard mortality (trawl) | | | | 0.22 | | |
| Minor ns. rf. (S of 40°10'N) | | | | | | |
| Brown rf. | 0.0019 | 0.0006 | 0.3043 | 0.18 | 0.00 | 0.18 |
| Calico rf. | 0.0001 | 0.0000 | 0.3552 | 0.01 | — | 0.01 |
| Copper rf. | 0.0001 | 0.0001 | 0.6998 | 0.01 | 0.00 | 0.01 |
| Quillback rf. | 0.0000 | 0.0000 | 0.0908 | 0.00 | — | 0.00 |
| Minor sh. rf. (S of 40°10'N) | | | | | | |
| Bronzespotted rf. | 0.0000 | 0.0000 | 0.5793 | 0.00 | — | 0.00 |
| Greenspotted rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Halfbanded rf. | 0.0000 | 0.0000 | 0.1001 | 0.00 | — | 0.00 |
| Mexican rf. | 0.0000 | 0.0000 | 0.4641 | 0.00 | — | 0.00 |
| Rosy rf. | 0.0000 | 0.0000 | 0.0908 | 0.00 | — | 0.00 |
| Stripetail rf. | 0.0000 | 0.0000 | 0.1001 | 0.00 | — | 0.00 |
| Vermilion rf. | 0.0001 | 0.0000 | 0.2879 | 0.01 | 0.00 | 0.02 |
| Yellowtail rf. | 0.0001 | 0.0001 | 0.6701 | 0.01 | — | 0.01 |
| Other flatfish | | | | | | |
| Curlfin sole | 0.0162 | 0.0020 | 0.1256 | 1.56 | 0.51 | 2.07 |
| Flatfish, unid. | 0.0002 | 0.0001 | 0.6186 | 0.02 | 0.13 | 0.15 |
| Pacific sanddab | 0.0121 | 0.0018 | 0.1529 | 1.16 | 0.04 | 1.20 |
| Rex sole | 0.0003 | 0.0001 | 0.2129 | 0.03 | — | 0.03 |
| Rock sole | 0.0003 | 0.0000 | 0.1528 | 0.03 | 0.19 | 0.22 |
| Sand sole | 0.0070 | 0.0013 | 0.1824 | 0.68 | 4.75 | 5.43 |
| Sanddab, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |

[a] Fleet landings of CA halibut, in metric tons.

Table 4a (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the OA California halibut fishery.

| Open Access CA Halibut Fishery (S of 40°10'N) | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 13 | | 129 | 555 | 96 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Other groundfish | | | | | | |
| Kelp greenling (CA) | 0.0000 | 0.0000 | 0.4451 | 0.00 | — | 0.00 |
| Leopard shark | 0.0575 | 0.0090 | 0.1558 | 5.54 | — | 5.54 |
| Pacific hake | 0.0000 | 0.0000 | 0.2084 | 0.00 | — | 0.00 |
| Petrale sole | 0.0053 | 0.0011 | 0.2060 | 0.51 | 2.64 | 3.15 |
| Spiny dogfish shark | 0.0577 | 0.0090 | 0.1558 | 5.56 | — | 5.56 |
| Starry flounder | 0.0107 | 0.0023 | 0.2161 | 1.03 | 3.53 | 4.56 |
| **Nongroundfish species** | | | | | | |
| CA halibut | 0.2075 | 0.0267 | 0.1287 | 20.01 | 96.43 | 116.44 |
| Dungeness crab | 1.1878 | 0.1372 | 0.1155 | 114.54 | — | 114.54 |
| Non-FMP flatfish | | | | | | |
| Diamond turbot | 0.0004 | 0.0001 | 0.2230 | 0.04 | — | 0.04 |
| Hornyhead turbot | 0.0142 | 0.0016 | 0.1129 | 1.37 | 0.00 | 1.37 |
| Longfin sanddab | 0.0026 | 0.0003 | 0.1318 | 0.25 | — | 0.25 |
| Slender sole | 0.0000 | 0.0000 | 0.0908 | 0.00 | 0.07 | 0.07 |
| Speckled sanddab | 0.0000 | 0.0000 | 0.3339 | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | |
| Sculpin, unid. | 0.0005 | 0.0001 | 0.1545 | 0.05 | — | 0.05 |
| Skate, unid. | 0.0000 | 0.0000 | 0.0908 | 0.00 | 0.40 | 0.41 |
| Starry skate | 0.0030 | 0.0005 | 0.1801 | 0.29 | 0.00 | 0.29 |
| Shared ECS | | | | | | |
| Non-humboldt squid, unid. | 0.0003 | 0.0001 | 0.3048 | 0.03 | — | 0.03 |
| Pacific sandlance | 0.0000 | 0.0000 | 0.0908 | 0.00 | — | 0.00 |

[a] Fleet landings of CA halibut, in metric tons.

Table 4b. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the sea cucumber fishery. Ratios are computed as the observed discard weight divided by the observed weight of retained sea cucumber (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of sea cucumber to generate estimated discard.

| Sea Cucumber Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 3 | | 19 | 51 | 14 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Big skate | 0.0046 | 0.0004 | 0.0803 | 0.06 | — | 0.06 |
| Bocaccio rf. (S of 40°10'N) | 0.0004 | 0.0001 | 0.1968 | 0.00 | — | 0.00 |
| CA scorpionfish (S of 34°27'N) | 0.0115 | 0.0022 | 0.1924 | 0.16 | — | 0.16 |
| Chilipepper rf. (S of 40°10'N) | 0.0005 | 0.0002 | 0.4323 | 0.01 | — | 0.01 |
| Darkblotched rf. | 0.0001 | 0.0000 | 0.3517 | 0.00 | — | 0.00 |
| Dover sole | 0.0038 | 0.0008 | 0.2055 | 0.05 | 0.00 | 0.05 |
| ECS | | | | | | |
| CA skate | 0.1141 | 0.0177 | 0.1553 | 1.58 | — | 1.58 |
| English sole | 0.0980 | 0.0170 | 0.1730 | 1.35 | 0.02 | 1.38 |
| Lingcod (S of 40°10'N) | 0.0031 | 0.0007 | 0.2169 | 0.04 | — | 0.04 |
| Longnose skate | 0.0015 | 0.0001 | 0.0803 | 0.02 | — | 0.02 |
| Minor ns. rf. (S of 40°10'N) | | | | | | |
| Brown rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Calico rf. | 0.0037 | 0.0006 | 0.1740 | 0.05 | — | 0.05 |
| Copper rf. | 0.0079 | 0.0019 | 0.2344 | 0.11 | 0.01 | 0.12 |
| Minor sh. rf. (S of 40°10'N) | | | | | | |
| Freckled rf. | 0.0000 | 0.0000 | 0.0803 | 0.00 | — | 0.00 |
| Greenspotted rf. | 0.0005 | 0.0002 | 0.3483 | 0.01 | 0.00 | 0.01 |
| Halfbanded rf. | 0.0463 | 0.0157 | 0.3401 | 0.64 | — | 0.64 |
| Rosethorn rf. | 0.0002 | 0.0001 | 0.2634 | 0.00 | — | 0.00 |
| Squarespot rf. | 0.0017 | 0.0007 | 0.4213 | 0.02 | — | 0.02 |
| Starry rf. | 0.0001 | 0.0000 | 0.0803 | 0.00 | — | 0.00 |
| Stripetail rf. | 0.0045 | 0.0009 | 0.2019 | 0.06 | — | 0.06 |
| Vermilion rf. | 0.0025 | 0.0008 | 0.3071 | 0.03 | 0.00 | 0.04 |
| Other flatfish | | | | | | |
| Curlfin sole | 0.0010 | 0.0003 | 0.3288 | 0.01 | — | 0.01 |
| Flatfish, unid. | 0.0002 | 0.0000 | 0.0803 | 0.00 | 0.01 | 0.01 |
| Pacific sanddab | 0.0145 | 0.0029 | 0.1981 | 0.20 | 0.00 | 0.20 |
| Sanddab, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Petrale sole | 0.0005 | 0.0001 | 0.1609 | 0.01 | 0.00 | 0.01 |
| Shortbelly rf. | 0.0000 | 0.0000 | 0.0803 | 0.00 | — | 0.00 |
| Spiny dogfish shark | 0.0124 | 0.0023 | 0.1838 | 0.17 | — | 0.17 |

[a] Fleet landings of sea cucumber, in metric tons.

Table 4b (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the sea cucumber fishery.

| Sea Cucumber Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 3 | | 19 | 51 | 14 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Nongroundfish species** | | | | | | |
| Non-FMP flatfish | | | | | | |
| Hornyhead turbot | 0.0118 | 0.0024 | 0.1985 | 0.16 | 0.00 | 0.16 |
| Longfin sanddab | 0.0106 | 0.0020 | 0.1903 | 0.15 | — | 0.15 |
| Other nongroundfish | | | | | | |
| Sculpin, unid. | 0.0061 | 0.0011 | 0.1850 | 0.08 | — | 0.08 |
| Shared ECS | | | | | | |
| Non-Humboldt squid, unid. | 0.0000 | 0.0000 | 0.0803 | 0.00 | — | 0.00 |

[a] Fleet landings of sea cucumber, in metric tons.

## Pink Shrimp Trawl Fishery

Fleetwide discard estimates for the pink shrimp trawl fishery were derived from WCGOP and fish ticket data (Figure 1). The discard estimate for each species in each state was computed based on the same equation as described above for the OA California halibut fishery, but utilizing pink shrimp as the retained weight for both discard rates and expansion factors. We estimated landings, discard, and total mortality in the 2017 individual state pink shrimp trawl fisheries (Table 5a).

Prior to 2011, pink shrimp fish tickets in the area north of lat 40°10'N were compiled for a single discard expansion factor, but pink shrimp fish tickets south of lat 40°10'N were summarized as part of the remaining incidental fisheries. Observer data from all state pink shrimp fleets in the north were combined to calculate discard rates. In 2010, WCGOP coverage of the Washington pink shrimp fleet began, and coverage of all state fisheries from 2011 to the present was sufficient to further stratify the analysis by state.

## California Ridgeback Prawn Trawl Fishery

WCGOP observed the California ridgeback prawn fishery from 2002–05, covering vessels targeting coonstripe, ridgeback, and spotted prawn, but these data have not been used in discard estimations. In 2017, WCGOP observed the California ridgeback prawn portion of the fishery as a pilot study, and fleetwide discard estimates were derived from WCGOP and fish ticket data (Figure 1). Prior to 2017, landings in this fishery were included in the incidental fisheries, and no estimates of discards were calculated. Effort in this fishery was defined as occurring only in California, using shrimp trawl and bottom trawl gears, and landing more ridgeback prawn than other species. Discard estimates for each species were computed based on the same equation as described above for the OA California halibut fishery, but utilizing ridgeback prawn as the retained weight for both discard rates and expansion factors. No mortality rates were applied. We estimated landings, discard, and total mortality in the 2017 ridgeback prawn trawl fishery (Table 5b).

Table 5a. Observed discard ratios, SEs, CVs, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from state pink shrimp fisheries. Ratios are computed as the observed discard weight divided by the observed weight of retained pink shrimp (adjusted to fish tickets). Discard ratios were multiplied by state fleet landings of pink shrimp to generate estimated discard.

| Pink Shrimp Trawl Fishery | California | | | | | | Oregon | | | | | | Washington | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | |
| | 11 | 18 | 230 | 1,484 | | | 45 | 112 | 1,466 | 10,459 | | | 16 | 48 | 847 | 3,041 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Arrowtooth flounder | 0.0001 | 0.0000 | 0.2119 | 0.13 | — | | 0.0001 | 0.0000 | 0.0974 | 0.73 | — | | 0.0001 | 0.0000 | 0.1899 | 0.27 | — | |
| Big skate | 0.0000 | 0.0000 | 0.0708 | 0.00 | — | | — | — | — | — | — | | — | — | — | — | — | |
| Bocaccio rf. (S of 40°10'N) | 0.0001 | 0.0000 | 0.2455 | 0.12 | — | | — | — | — | — | — | | — | — | — | — | — | |
| Canary rf. | 0.0000 | 0.0000 | 0.0708 | 0.00 | — | | 0.0000 | 0.0000 | 0.8426 | 0.07 | — | | — | — | — | — | — | |
| Chilipepper rf. (S of 40°10'N) | 0.0007 | 0.0001 | 0.1722 | 1.07 | — | | — | — | — | — | — | | — | — | — | — | — | |
| Cowcod rf. (S of 40°10'N) | 0.0001 | 0.0000 | 0.6704 | 0.09 | — | | — | — | — | — | — | | — | — | — | — | — | |
| Darkblotched rf. | 0.0000 | 0.0000 | 0.1744 | 0.05 | — | | 0.0002 | 0.0000 | 0.0777 | 2.37 | — | | 0.0012 | 0.0001 | 0.0558 | 3.63 | — | |
| Dover sole | 0.0011 | 0.0003 | 0.2620 | 1.70 | — | | 0.0002 | 0.0000 | 0.1126 | 2.47 | — | | 0.0001 | 0.0000 | 0.2182 | 0.39 | — | |
| ECS | | | | | | | | | | | | | | | | | | |
| Aleutian skate | 0.0000 | 0.0000 | 0.2546 | 0.00 | — | | — | — | — | — | — | | — | — | — | — | — | |
| California skate | 0.0000 | 0.0000 | 0.3042 | 0.00 | — | | 0.0000 | 0.0000 | 0.2203 | 0.03 | — | | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | |
| Pacific flatnose | — | — | — | — | — | | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | | — | — | — | — | — | |
| Sandpaper skate | 0.0000 | 0.0000 | 0.0965 | 0.00 | — | | 0.0000 | 0.0000 | 0.1293 | 0.05 | — | | 0.0000 | 0.0000 | 0.6728 | 0.00 | — | |
| Soupfin shark | — | — | — | — | — | | — | — | — | — | — | | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | |
| Spotted ratfish | 0.0000 | 0.0000 | 0.2056 | 0.07 | — | | 0.0000 | 0.0000 | 0.1312 | 0.06 | — | | 0.0000 | 0.0000 | 0.5640 | 0.03 | — | |
| English sole | 0.0000 | 0.0000 | 0.5347 | 0.02 | — | | 0.0000 | 0.0000 | 0.2423 | 0.02 | — | | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | |
| Lingcod (N of 40°10'N) | 0.0000 | 0.0000 | 0.1523 | 0.00 | — | | 0.0000 | 0.0000 | 0.3565 | 0.01 | — | | — | — | — | — | — | |
| Longnose skate | 0.0001 | 0.0000 | 0.2860 | 0.07 | — | | 0.0000 | 0.0000 | 0.3595 | 0.39 | — | | 0.0000 | 0.0000 | 0.4356 | 0.02 | — | |
| LST (N of 34°27'N) | — | — | — | — | — | | 0.0000 | 0.0000 | 0.1254 | 0.00 | — | | — | — | — | — | — | |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Blue/deacon rf. | — | — | — | — | — | | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | | — | — | — | — | — | |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Nearshore rf., unid. | 0.0002 | 0.0000 | 0.0708 | 0.28 | — | | — | — | — | — | — | | — | — | — | — | — | |

[a] Fleet landings of pink shrimp, in metric tons.

Table 5a (continued). Observed discard ratios, SEs, CVs, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from state pink shrimp fisheries. Ratios are computed as the observed discard weight divided by the observed weight of retained pink shrimp (adjusted to fish tickets). Discard ratios were multiplied by state fleet landings of pink shrimp to generate estimated discard.

| Pink Shrimp Trawl Fishery | California | | | | | | Oregon | | | | | | Washington | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | |
| | 11 | 18 | 230 | 1,484 | | | 45 | 112 | 1,466 | 10,459 | | | 16 | 48 | 847 | 3,041 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Bocaccio rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.2765 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Chilipepper rf. | 0.0001 | 0.0000 | 0.3081 | 0.19 | — | 0.19 | 0.0001 | 0.0000 | 0.2144 | 1.12 | — | 1.12 | 0.0001 | 0.0000 | 0.3534 | 0.18 | — | 0.18 |
| Cowcod rf. | 0.0000 | 0.0000 | 0.4659 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.2122 | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Greenstriped rf. | 0.0000 | 0.0000 | 0.1536 | 0.05 | — | 0.05 | 0.0001 | 0.0000 | 0.0996 | 0.58 | — | 0.58 | 0.0000 | 0.0000 | 0.1751 | 0.05 | — | 0.05 |
| Halfbanded rf. | 0.0000 | 0.0000 | 0.3741 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.2072 | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Puget sound rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Pygmy rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.6072 | 0.17 | — | 0.17 | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Redstripe rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.1730 | 0.16 | — | 0.16 | 0.0000 | 0.0000 | 0.3747 | 0.00 | — | 0.00 |
| Rosethorn rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Shelf rf., unid. | 0.0000 | 0.0000 | 0.7992 | 0.05 | — | 0.05 | 0.0001 | 0.0001 | 0.3847 | 1.46 | — | 1.46 | 0.0002 | 0.0002 | 0.7286 | 0.64 | — | 0.64 |
| Squarespot rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Stripetail rf. | 0.0002 | 0.0001 | 0.2974 | 0.30 | — | 0.30 | 0.0003 | 0.0000 | 0.0974 | 3.05 | — | 3.05 | 0.0000 | 0.0000 | 0.2041 | 0.09 | — | 0.09 |
| Tiger rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.4729 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Vermilion rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Halfbanded rf. | 0.0000 | 0.0000 | 0.2797 | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Redstripe rf. | 0.0000 | 0.0000 | 0.0708 | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Shelf rf., unid. | 0.0004 | 0.0003 | 0.6532 | 0.58 | — | 0.58 | — | — | — | — | — | — | — | — | — | — | — | — |
| Spotted rf., unid. | 0.0000 | 0.0000 | 0.0708 | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Squarespot rf. | 0.0000 | 0.0000 | 0.4289 | 0.02 | — | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — |
| Stripetail rf. | 0.0029 | 0.0006 | 0.1943 | 4.36 | — | 4.36 | — | — | — | — | — | — | — | — | — | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.1399 | 0.00 | — | 0.00 |

[a] Fleet landings of pink shrimp, in metric tons.

Table 5a (continued). Observed discard ratios, SEs, CVs, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from state pink shrimp fisheries. Ratios are computed as the observed discard weight divided by the observed weight of retained pink shrimp (adjusted to fish tickets). Discard ratios were multiplied by state fleet landings of pink shrimp to generate estimated discard.

| Pink Shrimp Trawl Fishery | California | | | | | | Oregon | | | | | | Washington | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd tows | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd tows | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd tows | Expansion factor[a] | |
| | 11 | | 18 | 230 | 1,484 | | 45 | | 112 | 1,466 | 10,459 | | 16 | | 48 | 847 | 3,041 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Redbanded rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.7285 | 0.13 | — | 0.13 | 0.0000 | 0.0000 | 0.6078 | 0.01 | — | 0.01 |
| Rougheye/blackspotted rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Sharpchin rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.1167 | 0.26 | — | 0.26 | — | — | — | — | — | — |
| Splitnose rf. | 0.0000 | 0.0000 | 0.5863 | 0.00 | — | 0.00 | 0.0001 | 0.0000 | 0.1336 | 0.83 | — | 0.83 | 0.0000 | 0.0000 | 0.2466 | 0.04 | — | 0.04 |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Aurora rf. | 0.0003 | 0.0001 | 0.2331 | 0.38 | — | 0.38 | — | — | — | — | — | — | — | — | — | — | — | — |
| Other flatfish | | | | | | | | | | | | | | | | | | |
| Flatfish, unid. | 0.0010 | 0.0005 | 0.4923 | 1.54 | — | 1.54 | 0.0001 | 0.0000 | 0.3770 | 0.55 | — | 0.55 | 0.0000 | 0.0000 | 0.0277 | 0.02 | — | 0.02 |
| Flathead sole | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.1569 | 0.31 | — | 0.31 | 0.0001 | 0.0000 | 0.2083 | 0.33 | — | 0.33 |
| Pacific sanddab | 0.0007 | 0.0002 | 0.2652 | 1.01 | — | 1.01 | 0.0001 | 0.0000 | 0.0935 | 1.47 | — | 1.47 | 0.0001 | 0.0000 | 0.2450 | 0.19 | — | 0.19 |
| Rex sole | 0.0033 | 0.0009 | 0.2676 | 4.84 | — | 4.84 | 0.0018 | 0.0001 | 0.0715 | 18.74 | — | 18.74 | 0.0025 | 0.0002 | 0.0767 | 7.50 | — | 7.50 |
| Rock sole | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Pacific cod | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.3869 | 0.01 | — | 0.01 |
| Pacific hake | 0.0539 | 0.0096 | 0.1785 | 79.97 | — | 79.97 | 0.0132 | 0.0019 | 0.1406 | 137.89 | — | 137.89 | 0.0518 | 0.0069 | 0.1327 | 157.38 | — | 157.38 |
| Pacific ocean perch (N of 40°10'N) | 0.0000 | 0.0000 | 0.3286 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.1466 | 0.04 | — | 0.04 | 0.0001 | 0.0000 | 0.1509 | 0.19 | — | 0.19 |
| Petrale sole | 0.0000 | 0.0000 | 0.3912 | 0.03 | — | 0.03 | 0.0000 | 0.0000 | 0.1560 | 0.07 | — | 0.07 | 0.0001 | 0.0000 | 0.1781 | 0.20 | — | 0.20 |
| Roundfish, unid. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Sablefish (N of 36°N) | 0.0001 | 0.0000 | 0.1912 | 0.11 | — | 0.11 | 0.0000 | 0.0000 | 0.3295 | 0.08 | — | 0.08 | 0.0000 | 0.0000 | 0.5426 | 0.00 | — | 0.00 |
| Sablefish (S of 36°N) | 0.0000 | 0.0000 | 0.3664 | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Shortbelly rf. | 0.0015 | 0.0003 | 0.1796 | 2.23 | — | 2.23 | 0.0014 | 0.0001 | 0.0980 | 14.22 | — | 14.22 | 0.0017 | 0.0002 | 0.1249 | 5.05 | — | 5.05 |
| SST (N of 34°27'N) | 0.0000 | 0.0000 | 0.3464 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.3826 | 0.03 | — | 0.03 | — | — | — | — | — | — |
| Spiny dogfish shark | 0.0000 | 0.0000 | 0.3626 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.3691 | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Splitnose rf. (S of 40°10'N) | 0.0019 | 0.0010 | 0.5055 | 2.88 | — | 2.88 | — | — | — | — | — | — | — | — | — | — | — | — |
| Widow rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Yelloweye rf. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0375 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Yellowtail rf. (N of 40°10'N) | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.1704 | 0.00 | — | 0.00 |

[a] Fleet landings of pink shrimp, in metric tons.

Table 5a (continued). Observed discard ratios, SEs, CVs, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species from state pink shrimp fisheries. Ratios are computed as the observed discard weight divided by the observed weight of retained pink shrimp (adjusted to fish tickets). Discard ratios were multiplied by state fleet landings of pink shrimp to generate estimated discard.

| Pink Shrimp Trawl Fishery | California | | | | | | Oregon | | | | | | Washington | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | | Observed vessels | Obs'd trips | Obs'd tows | Expansion factor[a] | | |
| | 11 | 18 | 230 | 1,484 | | | 45 | 112 | 1,466 | 10,459 | | | 16 | 48 | 847 | 3,041 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | |
| Dungeness crab | 0.0000 | 0.0000 | 0.0708 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | |
| Deepsea sole | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.11 | — | 0.11 | — | — | — | — | — | — |
| Longfin sanddab | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0441 | 0.00 | — | 0.00 |
| Slender sole | 0.0068 | 0.0014 | 0.2118 | 10.08 | — | 10.08 | 0.0053 | 0.0004 | 0.0730 | 55.06 | — | 55.06 | 0.0021 | 0.0002 | 0.0991 | 6.31 | — | 6.31 |
| Other nongroundfish | | | | | | | | | | | | | | | | | | |
| Sculpin, unid. | 0.0000 | 0.0000 | 0.5226 | 0.04 | — | 0.04 | 0.0000 | 0.0000 | 0.1108 | 0.15 | — | 0.15 | — | — | — | — | — | — |
| Skate, unid. | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0277 | 0.00 | — | 0.00 |
| Shared ECS | | | | | | | | | | | | | | | | | | |
| Barracudina, unid. | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |
| Lanternfish, unid. | 0.0000 | 0.0000 | 0.2750 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0815 | 0.02 | — | 0.02 | 0.0000 | 0.0000 | 0.4266 | 0.00 | — | 0.00 |
| Noneulachon smelt, unid. | 0.0000 | 0.0000 | 0.3465 | 0.05 | — | 0.05 | 0.0000 | 0.0000 | 0.2777 | 0.15 | — | 0.15 | 0.0003 | 0.0000 | 0.1501 | 0.85 | — | 0.85 |
| Non-Humboldt squid, unid. | 0.0011 | 0.0002 | 0.1450 | 1.67 | — | 1.67 | 0.0004 | 0.0001 | 0.1448 | 3.98 | — | 3.98 | 0.0001 | 0.0000 | 0.0920 | 0.42 | — | 0.42 |
| Pacific saury | — | — | — | — | — | — | 0.0000 | 0.0000 | 0.0269 | 0.00 | — | 0.00 | — | — | — | — | — | — |

[a] Fleet landings of pink shrimp, in metric tons.

Table 5b. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the ridgeback prawn fishery. Ratios are computed as the observed discard weight divided by the observed weight of retained ridgeback prawn (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of ridgeback prawn to generate estimated discard.

| Ridgeback Prawn Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 9 | | 63 | 292 | 161 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Arrowtooth flounder | 0.0001 | 0.0000 | 0.0378 | 0.01 | — | 0.01 |
| Big skate | 0.0000 | 0.0000 | 0.0378 | 0.00 | — | 0.00 |
| Black rf. (CA) | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Bocaccio rf. (S of 40°10'N) | 0.0009 | 0.0002 | 0.2138 | 0.15 | 0.00 | 0.15 |
| Cabezon (CA) | 0.0001 | 0.0000 | 0.0378 | 0.01 | 0.00 | 0.02 |
| CA scorpionfish (S of 37°24'N) | 0.0048 | 0.0031 | 0.6426 | 0.77 | 0.14 | 0.92 |
| Canary rf. | 0.0001 | 0.0000 | 0.0378 | 0.01 | — | 0.01 |
| Chilipepper rf. (S of 40°10'N) | 0.0040 | 0.0008 | 0.1945 | 0.65 | — | 0.65 |
| Cowcod rf. (S of 40°10'N) | 0.0004 | 0.0001 | 0.3391 | 0.07 | — | 0.07 |
| Darkblotched rf. | 0.0001 | 0.0000 | 0.3096 | 0.01 | — | 0.01 |
| Dover sole | 0.0654 | 0.0075 | 0.1141 | 10.52 | 0.01 | 10.52 |
| ECS | | | | | | |
| CA skate | 0.0068 | 0.0013 | 0.1962 | 1.09 | — | 1.09 |
| Soupfin shark | 0.0003 | 0.0000 | 0.0378 | 0.04 | — | 0.04 |
| Spotted ratfish | 0.0046 | 0.0008 | 0.1708 | 0.73 | — | 0.73 |
| English sole | 0.1369 | 0.0139 | 0.1018 | 22.00 | 0.80 | 22.80 |
| Lingcod (S of 40°10'N) | 0.0022 | 0.0004 | 0.1670 | 0.35 | 0.05 | 0.40 |
| Longnose skate | 0.0024 | 0.0005 | 0.2299 | 0.38 | 0.01 | 0.39 |
| Minor ns. rf. (S of 40°10'N) | | | | | | |
| Brown rf. | 0.0001 | 0.0000 | 0.3232 | 0.01 | 0.00 | 0.02 |
| Calico rf. | 0.0006 | 0.0001 | 0.1577 | 0.10 | — | 0.10 |
| Copper rf. | 0.0001 | 0.0001 | 0.5631 | 0.02 | — | 0.02 |
| Kelp rf. | 0.0000 | 0.0000 | 0.0378 | 0.00 | — | 0.00 |
| Minor sh. rf. (S of 40°10'N) | | | | | | |
| Flag rf. | 0.0000 | 0.0000 | 0.0378 | 0.01 | — | 0.01 |
| Freckled rf. | 0.0001 | 0.0000 | 0.1852 | 0.02 | — | 0.02 |
| Greenblotched rf. | 0.0005 | 0.0003 | 0.6710 | 0.08 | — | 0.08 |
| Greenspotted rf. | 0.0001 | 0.0001 | 0.5156 | 0.02 | — | 0.02 |
| Greenstriped rf. | 0.0003 | 0.0001 | 0.1721 | 0.05 | — | 0.05 |
| Halfbanded rf. | 0.0258 | 0.0046 | 0.1804 | 4.14 | — | 4.14 |
| Mexican rf. | 0.0001 | 0.0001 | 0.4140 | 0.02 | — | 0.02 |
| Redstripe rf. | 0.0000 | 0.0000 | 0.1614 | 0.01 | — | 0.01 |
| Rosy rf. | 0.0000 | 0.0000 | 0.0378 | 0.00 | — | 0.00 |
| Shelf rf., unid. | 0.0039 | 0.0015 | 0.3870 | 0.63 | 0.04 | 0.67 |
| Speckled rf. | 0.0000 | 0.0000 | 0.4084 | 0.00 | — | 0.00 |
| Squarespot rf. | 0.0003 | 0.0001 | 0.3097 | 0.05 | — | 0.05 |
| Stripetail rf. | 0.0308 | 0.0036 | 0.1156 | 4.96 | — | 4.96 |
| Swordspine rf. | 0.0000 | 0.0000 | 0.0378 | 0.00 | — | 0.00 |
| Vermilion rf. | 0.0035 | 0.0023 | 0.6665 | 0.56 | 0.01 | 0.57 |

[a] Fleet landings of ridgeback prawn, in metric tons.

Table 5b (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the ridgeback prawn fishery.

| Ridgeback Prawn Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor[a] | |
|---|---|---|---|---|---|---|
| | 9 | | 63 | 292 | 161 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | | | |
| Aurora rf. | 0.0003 | 0.0000 | 0.0378 | 0.06 | — | 0.06 |
| Bank rf. | 0.0000 | 0.0000 | 0.0378 | 0.00 | — | 0.00 |
| Slope rf., unid. | 0.0001 | 0.0000 | 0.0378 | 0.01 | 0.04 | 0.05 |
| Mixed thornyheads | | | | | | |
| SST/LST | 0.0000 | 0.0000 | 0.0000 | — | 0.01 | 0.01 |
| Other flatfish | | | | | | |
| Curlfin sole | 0.0004 | 0.0001 | 0.2530 | 0.06 | 0.00 | 0.07 |
| Flatfish, unid. | 0.0117 | 0.0029 | 0.2486 | 1.88 | 1.04 | 2.92 |
| Pacific sanddab | 0.2095 | 0.0144 | 0.0689 | 33.66 | 0.09 | 33.75 |
| Rex sole | 0.0035 | 0.0004 | 0.1093 | 0.57 | — | 0.57 |
| Rock sole | 0.0000 | 0.0000 | 0.0000 | — | 0.11 | 0.11 |
| Sanddab, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.63 | 0.63 |
| Pacific hake | 0.1061 | 0.0113 | 0.1063 | 17.05 | 0.04 | 17.09 |
| Petrale sole | 0.0052 | 0.0009 | 0.1728 | 0.83 | 0.43 | 1.26 |
| Sablefish (S of 36°N) | 0.0003 | 0.0001 | 0.1840 | 0.05 | 0.00 | 0.05 |
| Shortbelly rf. | 0.0002 | 0.0001 | 0.5426 | 0.03 | — | 0.03 |
| Spiny dogfish shark | 0.0024 | 0.0009 | 0.3724 | 0.38 | — | 0.38 |
| Splitnose rf. (S of 40°10'N) | 0.0001 | 0.0000 | 0.4974 | 0.02 | — | 0.02 |
| **Nongroundfish species** | | | | | | |
| CA halibut | 0.0003 | 0.0001 | 0.3156 | 0.05 | 2.04 | 2.09 |
| Non-FMP flatfish | | | | | | |
| Hornyhead turbot | 0.0107 | 0.0013 | 0.1176 | 1.73 | — | 1.73 |
| Longfin sanddab | 0.0111 | 0.0017 | 0.1541 | 1.78 | — | 1.78 |
| Slender sole | 0.0155 | 0.0035 | 0.2245 | 2.49 | — | 2.49 |
| Other nongroundfish | | | | | | |
| Sculpin, unid. | 0.0005 | 0.0001 | 0.2845 | 0.08 | 0.02 | 0.10 |
| Skate, unid. | 0.0001 | 0.0000 | 0.0378 | 0.02 | 1.01 | 1.03 |
| Shared ECS | | | | | | |
| Noneulachon smelt, unid. | 0.0002 | 0.0001 | 0.3813 | 0.03 | — | 0.03 |
| Non-Humboldt squid, unid. | 0.0022 | 0.0004 | 0.1665 | 0.36 | — | 0.36 |

[a] Fleet landings of ridgeback prawn, in metric tons.

# Non-Nearshore Fixed Gear Fishery

Fleetwide discard estimates for the LE and OA non-nearshore fixed gear sector of the groundfish fishery were derived from WCGOP and fish ticket data. Fish tickets for fixed gear that did not have recorded sablefish or nearshore species were included in the non-nearshore fixed gear sector only if groundfish landings were greater than nongroundfish landings based on a unique vessel and landing date (Figure 1). Fixed gear fish tickets where nongroundfish landings were greater than groundfish landings and sablefish or nearshore species were not recorded were summarized as incidental landings (Table 14). Fixed gear fish tickets with nongroundfish landings greater than groundfish landings but also containing sablefish were classified as non-nearshore fixed gear; those with nearshore species landings on a nearshore permit were classified as nearshore fixed gear sector. Fish tickets associated with the Pacific halibut directed commercial fishery were isolated and removed from our analyses based on landed catch of Pacific halibut recorded on the fish ticket on the day of the opening or within two subsequent days.

Fish tickets were partitioned into three commercial fixed gear subsectors: LE sablefish endorsed primary season, LE nonsablefish endorsed, and OA fixed gear groundfish. Vessels landing catch without a federal groundfish permit were classified as the OA fixed gear groundfish subsector. Those vessels landing catch with a federal groundfish permit were further separated based on whether the vessel's federal groundfish permit(s) had a sablefish endorsement with tier quota for the primary season or whether it was not endorsed (also referred to as zero-tier permits). Fish tickets for all LE vessels with tier sablefish endorsements operating during the sablefish primary season (April–October) and within their allotted tier quota were placed in the LE sablefish endorsed primary subsector. If LE sablefish-endorsed vessels fished outside of the primary season (November–March) or made trips within the season after they had reached their cumulative tier quota, the fish tickets were placed in the LE nonsablefish endorsed subsector. Fish tickets from nonsablefish endorsed LE vessels were also placed in this subsector.

Data used in these analyses were collected by WCGOP from the following fixed gear subsectors in order of priority: LE sablefish endorsed primary season fixed gear, LE zero-tier (nonendorsed), and OA fixed gear (non-nearshore). LE sablefish endorsed vessels that were fishing outside of the primary season or that had reached their cumulative tier quota in the primary season were not observed. However, observed LE zero-tier discard rates were assumed to be the most comparable discard rates and were used to expand these landings.

Observer data were stratified by subsector, gear type, and area (where applicable; Tables 6–8). Area strata (north and south of lat 36°N) are based on PFMC area management for sablefish trip limits. Gear type was defined as longline gear or pot/trap gear. Explicit depth stratification of fixed gear fishing effort is not possible, because there are no fleetwide estimates of fishing depths. If landings were made by a fixed gear subsector for which there were no or very few WCGOP observations, the most appropriate observed discard ratios were selected and applied to these landings based on similarities in the fishery management structure, fishing and discard behavior, and the gear fished. For example, observed discard rates from the OA fixed gear pot sector were used to estimate the total discard associated with the small amount of groundfish landed by the pot gear portion of the LE nonsablefish endorsed subsector, which is unobserved.

We summarized the number of observed vessels, trips, and sets, along with fleetwide sablefish and FMP groundfish landings (Tables 6–8). Retained groundfish was used as the denominator, rather than sablefish weight alone, because some subsectors, primarily fixed gear fisheries south of lat 36°N, have a wider range of target species. A broader denominator was therefore necessary to effectively capture fishing effort in these calculations.

We calculated total coastwide landings, discard, and fishing mortality for the LE and OA non-nearshore fixed gear sectors (Table 9a). A 20% mortality rate is applied for discarded sablefish and a 7% rate for line-caught discarded lingcod, based on guidance from GMT. We also applied SSC-recommended discard mortality rates (previously made for stock assessment purposes) for longnose skate (50%) and spiny dogfish (50%; PFMC 2012).

Table 6. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE sablefish endorsed primary season (tier endorsed) fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of sablefish to generate discard estimates for each gear type; see Table 9 for total mortality across all non-IFQ, non-nearshore fixed gear sectors. Effort by pot gear in this fishery only occured north of lat 36°N. Discard mortality rates were provided by the GMT.

| LE Sablefish Endorsed Primary Season | Longline (Coast) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | | | Expansion factor (fleet landings of sablefish, mt) | | | Observed vessels | | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | |
| | 25 | 109 | 694 | 1,048 | | | 13 | | | 3 | | 14 | 186 | 375 | |
| | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | |
| Arrowtooth flounder | 0.0249 | 0.0021 | 0.0848 | 26.07 | 1.56 | 27.63 | 0.32 | — | 0.32 | 0.0005 | 0.0001 | 0.2615 | 0.20 | 0.02 | 0.22 |
| Big skate | 0.0005 | 0.0001 | 0.2780 | 0.48 | 2.41 | 2.88 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Black rf. (CA) | 0.0000 | 0.0000 | 0.0000 | — | 0.67 | 0.67 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Bocaccio rf. (S of 40°10'N) | 0.0000 | 0.0000 | 0.0000 | 0.00 | 0.19 | 0.19 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Cabezon (CA) | 0.0000 | 0.0000 | 0.0000 | — | 0.18 | 0.18 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Canary rf. | 0.0006 | 0.0003 | 0.6151 | 0.59 | 1.18 | 1.77 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Chilipepper rf. (S of 40°10'N) | 0.0001 | 0.0000 | 0.4697 | 0.11 | 0.06 | 0.17 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Darkblotched rf. | 0.0003 | 0.0001 | 0.2304 | 0.30 | 2.04 | 2.35 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | 0.01 | 0.01 | 0.03 |
| Dover sole | 0.0007 | 0.0001 | 0.0840 | 0.68 | 1.28 | 1.97 | 0.01 | 0.02 | 0.03 | 0.0000 | 0.0000 | 0.1719 | 0.02 | 0.27 | 0.28 |
| ECS | | | | | | | | | | | | | | | |
| Aleutian skate | 0.0001 | 0.0000 | 0.2998 | 0.07 | — | 0.07 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Black skate | 0.0003 | 0.0001 | 0.2010 | 0.30 | — | 0.30 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| CA skate | 0.0001 | 0.0000 | 0.3360 | 0.12 | — | 0.12 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Giant grenadier | 0.0008 | 0.0002 | 0.2425 | 0.88 | — | 0.88 | 0.01 | — | 0.01 | 0.0012 | 0.0002 | 0.1895 | 0.43 | — | 0.43 |
| Grenadier, unid. | 0.0030 | 0.0010 | 0.3225 | 3.18 | 3.50 | 6.68 | 0.04 | — | 0.04 | 0.0002 | 0.0001 | 0.3282 | 0.09 | — | 0.09 |
| Pacific flatnose | 0.0002 | 0.0001 | 0.3566 | 0.22 | — | 0.22 | 0.00 | — | 0.00 | 0.0001 | 0.0000 | 0.2371 | 0.03 | — | 0.03 |
| Pacific grenadier | 0.0039 | 0.0020 | 0.5002 | 4.13 | — | 4.13 | 0.05 | — | 0.05 | 0.0002 | 0.0001 | 0.2625 | 0.09 | — | 0.09 |
| Sandpaper skate | 0.0026 | 0.0003 | 0.1018 | 2.69 | — | 2.69 | 0.03 | — | 0.03 | 0.0000 | 0.0000 | 0.0000 | 0.00 | — | 0.00 |
| Soupfin shark | 0.0004 | 0.0000 | 0.0599 | 0.45 | — | 0.45 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Spotted ratfish | 0.0026 | 0.0004 | 0.1389 | 2.69 | — | 2.69 | 0.03 | — | 0.03 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Lingcod (N of 40°10'N) | 0.0017 | 0.0004 | 0.2515 | 1.82 | 7.63 | 7.76 | — | — | — | 0.0000 | 0.0000 | 0.0000 | 0.01 | 1.91 | 1.92 |
| 7% discard mortality (line) | | | | 0.13 | | | | | | | | | | | |
| Lingcod (S of 40°10'N) | 0.0001 | 0.0000 | 0.6098 | 0.07 | 3.42 | 3.43 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | 0.35 | 0.35 |
| 7% discard mortality (line) | | | | 0.00 | | | 0.00 | | | | | | | | |
| Longnose skate | 0.0794 | 0.0062 | 0.0778 | 83.23 | 36.82 | 78.44 | 1.01 | — | 0.51 | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 |
| 50% discard mortality (FG) | | | | 41.61 | | | 0.51 | | | | | | | | |

Table 6 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE sablefish endorsed primary season (tier endorsed) fixed gear fleet.

| LE Sablefish Endorsed Primary Season | Longline (Coast) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | | | Expansion factor (fleet landings of sablefish, mt) | | | Observed vessels | | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | |
| | 25 | 109 | 694 | 1,048 | | | 13 | | | 3 | | 14 | 186 | 375 | |
| | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | |
| LST (N of 34°27'N) | 0.0007 | 0.0002 | 0.3178 | 0.72 | 0.97 | 1.70 | 0.01 | 0.04 | 0.05 | 0.0000 | 0.0000 | 0.2249 | 0.01 | 0.01 | 0.03 |
| LST (S of 34°27'N) | 0.0000 | 0.0000 | 0.0000 | — | — | — | — | 0.16 | 0.16 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | |
| Blue/deacon rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.06 | 0.06 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| China rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Copper rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.09 | 0.09 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Olive rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Quillback rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.05 | 0.05 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | |
| Black and yellow rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.05 | 0.05 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Blue/deacon rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.01 | 0.01 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Brown rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.04 | 0.04 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| China rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.19 | 0.19 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Copper rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.94 | 0.94 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Gopher rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.01 | 0.01 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Quillback rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.42 | 0.42 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | |
| Bocaccio rf. | 0.0001 | 0.0000 | 0.2329 | 0.07 | 0.50 | 0.57 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Chilipepper rf. | 0.0001 | 0.0000 | 0.3491 | 0.12 | 0.36 | 0.48 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Cowcod rf. | 0.0000 | 0.0000 | 0.0000 | 0.02 | — | 0.02 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Greenspotted rf. | 0.0000 | 0.0000 | 0.3673 | 0.01 | — | 0.01 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Greenstriped rf. | 0.0008 | 0.0001 | 0.1532 | 0.82 | 0.16 | 0.98 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Redstripe rf. | 0.0000 | 0.0000 | 0.1020 | 0.05 | — | 0.05 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Rosethorn rf. | 0.0003 | 0.0001 | 0.2429 | 0.34 | 0.07 | 0.41 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.01 | 0.01 |
| Shelf rf., unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 |
| Silvergray rf. | 0.0006 | 0.0005 | 0.7326 | 0.65 | 0.60 | 1.25 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Vermilion rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.04 | 0.04 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | |
| Greenblotched rf. | 0.0000 | 0.0000 | 0.0000 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |

Table 6 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE sablefish endorsed primary season (tier endorsed) fixed gear fleet.

| LE Sablefish Endorsed Primary Season | Longline (Coast) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | | | Expansion factor (fleet landings of sablefish, mt) | | | Observed vessels | | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | |
| | 25 | 109 | 694 | 1,048 | | | 13 | | | 3 | | 14 | 186 | 375 | |
| | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | |
| Rosethorn rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.07 | 0.07 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Rosy rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Shelf rf., unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.02 | 0.02 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Vermilion rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.52 | 0.52 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Yellowtail rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.08 | 0.08 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | | | |
| Aurora rf. | 0.0000 | 0.0000 | 0.2200 | 0.03 | 0.06 | 0.09 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Bank rf. | 0.0000 | 0.0000 | 0.1691 | 0.01 | — | 0.01 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Blackgill rf. | 0.0006 | 0.0002 | 0.2780 | 0.59 | 1.30 | 1.89 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Redbanded rf. | 0.0071 | 0.0010 | 0.1406 | 7.41 | 12.20 | 19.61 | — | — | — | 0.0000 | 0.0000 | 0.0000 | 0.00 | 0.49 | 0.50 |
| Rougheye/blackspotted rf. | 0.0108 | 0.0028 | 0.2578 | 11.33 | 25.13 | 36.47 | — | — | — | 0.0001 | 0.0000 | 0.0000 | 0.02 | 0.36 | 0.38 |
| Sharpchin rf. | 0.0000 | 0.0000 | 0.4320 | 0.01 | — | 0.01 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Shortraker rf. | 0.0017 | 0.0003 | 0.1813 | 1.74 | 1.82 | 3.56 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.08 | 0.08 |
| Shortraker/rougheye/blackspotted rf. | 0.0008 | 0.0002 | 0.2793 | 0.79 | — | 0.79 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Slope rf., unid. | 0.0000 | 0.0000 | 0.1570 | 0.02 | 0.95 | 0.97 | — | — | — | 0.0000 | 0.0000 | 0.0000 | 0.00 | 0.17 | 0.17 |
| Splitnose rf. | 0.0000 | 0.0000 | 0.0000 | — | 0.04 | 0.04 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Yellowmouth rf. | 0.0000 | 0.0000 | 0.0000 | — | 1.81 | 1.81 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | |
| Aurora rf. | 0.0000 | 0.0000 | 0.0000 | 0.00 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Blackgill rf. | 0.0001 | 0.0000 | 0.2171 | 0.05 | 5.45 | 5.50 | 0.00 | 0.44 | 0.44 | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 |
| Redbanded rf. | 0.0001 | 0.0000 | 0.2956 | 0.05 | 0.02 | 0.08 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | 0.02 | 0.02 |
| Rougheye/blackspotted rf. | 0.0001 | 0.0000 | 0.3743 | 0.06 | 0.01 | 0.07 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Slope rf., unid. | 0.0000 | 0.0000 | 0.0000 | — | 2.52 | 2.52 | — | — | — | 0.0000 | 0.0000 | 0.0000 | 0.01 | 0.14 | 0.15 |
| Mixed thornyheads | | | | | | | | | | | | | | | |
| SST/LST | 0.0005 | 0.0001 | 0.1991 | 0.48 | 0.12 | 0.60 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | 0.00 | 0.07 | 0.07 |
| Other flatfish | | | | | | | | | | | | | | | |
| Flatfish, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.02 | 0.02 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Rock sole | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |

Table 6 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE sablefish endorsed primary season (tier endorsed) fixed gear fleet.

| LE Sablefish Endorsed Primary Season | Longline (Coast) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | | | Expansion factor (fleet landings of sablefish, mt) | | | Observed vessels | | Observed trips | Observed sets | Expansion factor (fleet landings of sablefish, mt) | |
| | 25 | 109 | 694 | 1,048 | | | 13 | | | 3 | | 14 | 186 | 375 | |
| | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | |
| Other groundfish | | | | | | | | | | | | | | | |
| Kelp greenling (CA) | 0.0000 | 0.0000 | 0.0000 | — | 0.06 | 0.06 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Pacific cod | 0.0002 | 0.0000 | 0.1263 | 0.20 | 1.67 | 1.87 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Pacific hake | 0.0002 | 0.0000 | 0.1672 | 0.23 | 0.01 | 0.24 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Pacific ocean perch (N of 40°10'N) | 0.0001 | 0.0000 | 0.3532 | 0.08 | 0.16 | 0.24 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Petrale sole | 0.0002 | 0.0000 | 0.2264 | 0.23 | 0.77 | 0.99 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | 0.01 | 0.01 |
| Sablefish (N of 36°N) | 0.1676 | 0.0111 | 0.0663 | 175.62 | 1,047.60 | 1,082.73 | — | — | — | 0.1438 | 0.0233 | 0.1618 | 53.99 | 375.48 | 386.28 |
| 20% discard mortality (FG) | | | | 35.12 | | | | | | | | | 10.80 | | |
| Sablefish (S of 36°N) | 0.0000 | 0.0000 | 0.0000 | — | — | — | 0.00 | 12.77 | 12.77 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| 20% discard mortality (FG) | | | | | | | 0.00 | | | | | | | | |
| SST (N of 34°27'N) | 0.0030 | 0.0004 | 0.1482 | 3.11 | 23.34 | 26.44 | 0.04 | 0.99 | 1.02 | 0.0000 | 0.0000 | 0.0000 | 0.01 | 0.54 | 0.55 |
| SST (S of 34°27'N) | 0.0000 | 0.0000 | 0.0000 | — | — | — | — | 5.54 | 5.54 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Spiny dogfish shark | 0.1012 | 0.0125 | 0.1234 | 106.06 | 0.21 | 106.27 | 1.29 | — | 1.29 | 0.0001 | 0.0000 | 0.0000 | 0.03 | — | 0.03 |
| 50% discard mortality (line) | | | | 53.03 | | | 0.65 | | | | | | | | |
| Widow rf. | 0.0001 | 0.0000 | 0.2263 | 0.09 | 0.26 | 0.36 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| Yelloweye rf. | 0.0008 | 0.0001 | 0.1552 | 0.82 | — | 0.82 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | 0.01 | — | 0.01 |
| Yellowtail rf. (N of 40°10'N) | 0.0003 | 0.0001 | 0.2954 | 0.34 | 0.46 | 0.80 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | 0.00 | 0.00 |
| **Nongroundfish species** | | | | | | | | | | | | | | | |
| Dungeness crab | 0.0000 | 0.0000 | 0.2415 | 0.02 | — | 0.02 | 0.00 | — | 0.00 | 0.0010 | 0.0002 | 0.2373 | 0.36 | — | 0.36 |
| Non-FMP flatfish | | | | | | | | | | | | | | | |
| Deepsea sole | 0.0000 | 0.0000 | 0.0000 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | 0.0001 | 0.0000 | 0.2125 | 0.02 | — | 0.02 |
| Other nongroundfish | | | | | | | | | | | | | | | |
| Sculpin, unid. | 0.0000 | 0.0000 | 0.0000 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Skate, unid. | 0.0006 | 0.0001 | 0.1789 | 0.60 | 0.44 | 1.04 | 0.01 | — | 0.01 | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Squid, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.02 | 0.02 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |
| Shared ECS | | | | | | | | | | | | | | | |
| Smelt, unid. | 0.0000 | 0.0000 | 0.0000 | — | 0.03 | 0.03 | — | — | — | 0.0000 | 0.0000 | 0.0000 | — | — | — |

Table 7. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE nonendorsed fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of FMP groundfish, adjusted to fish tickets. Pot landings in this sector only occurred north of lat 36°N and were not observed, so observed OA pot discard ratios were applied to estimate discard. Discard ratios were multiplied by fleet landings of FMP groundfish to generate discard estimates for each gear type; see Table 9 for total mortality across all non-IFQ non-nearshore fixed gear sectors. Discard mortality rates were provided by the GMT.

| Limited Entry Nonendorsed Fixed Gear | Longline (N of 36°N) | | | | | | Longline (S of 36°N) | | | | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | OA observed (see Table 8b) | | | Expansion factor[a] | | |
| | 6 | | 12 | 15 | 283 | | 6 | | 22 | 56 | 502 | | | | | 14 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Arrowtooth flounder | — | — | — | — | 0.29 | | — | — | — | — | — | | 0.0040 | 0.0009 | 0.2291 | 0.06 | — | |
| Big skate | — | — | — | — | 0.39 | | 0.0025 | 0.0006 | 0.2475 | 1.23 | — | | — | — | — | — | — | |
| Black rf. (CA) | — | — | — | — | 10.17 | | — | — | — | — | — | | — | — | — | — | — | |
| Bocaccio rf. (S of 40°10'N) | — | — | — | — | 0.21 | | — | — | — | — | 1.58 | | — | — | — | — | — | |
| Cabezon (CA) | — | — | — | — | 0.13 | | — | — | — | — | 0.00 | | 0.0022 | 0.0004 | 0.1735 | 0.03 | 0.59 | |
| CA scorpionfish (S of 37°24'N) | — | — | — | — | — | | — | — | — | — | 1.12 | | 0.0001 | 0.0000 | 0.3508 | 0.00 | — | |
| Canary rf. | — | — | — | — | 0.32 | | — | — | — | — | 0.24 | | — | — | — | — | 0.00 | |
| Chilipepper rf. (S of 40°10'N) | — | — | — | — | 0.05 | | — | — | — | — | 0.03 | | — | — | — | — | — | |
| Darkblotched rf. | — | — | — | — | 0.81 | | — | — | — | — | — | | — | — | — | — | — | |
| Dover sole | — | — | — | — | 0.59 | | 0.0018 | 0.0006 | 0.3113 | 0.92 | 0.88 | | 0.0028 | 0.0005 | 0.1826 | 0.04 | — | |
| ECS | | | | | | | | | | | | | | | | | | |
| Black skate | — | — | — | — | — | | 0.0095 | 0.0033 | 0.3476 | 4.76 | 0.01 | | — | — | — | — | — | |
| CA grenadier | — | — | — | — | — | | 0.0004 | 0.0001 | 0.2970 | 0.18 | — | | — | — | — | — | — | |
| CA skate | — | — | — | — | — | | — | — | — | — | 0.01 | | — | — | — | — | — | |
| Giant grenadier | 0.0023 | 0.0009 | 0.4146 | 0.64 | — | | 0.0123 | 0.0037 | 0.2992 | 6.16 | 0.32 | | — | — | — | — | — | |
| Grenadier, unid. | 0.0004 | — | — | 0.11 | 7.64 | | 0.0002 | — | — | 0.11 | 3.62 | | — | — | — | — | — | |
| Pacific flatnose | — | — | — | — | — | | 0.0003 | — | — | 0.14 | — | | — | — | — | — | — | |
| Pacific grenadier | 0.0007 | 0.0003 | 0.4037 | 0.19 | — | | 0.0092 | 0.0050 | 0.5405 | 4.61 | 0.66 | | — | — | — | — | — | |
| Sandpaper skate | — | — | — | — | — | | — | — | — | — | — | | 0.0001 | — | — | 0.00 | — | |
| Smooth grenadier | — | — | — | — | — | | 0.0000 | — | — | 0.01 | — | | — | — | — | — | — | |
| Soupfin shark | — | — | — | — | — | | 0.0000 | — | — | 0.02 | 0.04 | | — | — | — | — | — | |
| Spotted ratfish | 0.0004 | 0.0001 | 0.2709 | 0.11 | — | | — | — | — | — | — | | 0.0001 | 0.0000 | 0.1909 | 0.00 | — | |
| Lingcod (N of 40°10'N) | — | — | — | — | 2.13 | | — | — | — | — | — | | 0.0016 | 0.0002 | 0.1351 | 0.02 | 0.70 | |
| Lingcod (S of 40°10'N) | — | — | — | — | 0.89 | | — | — | — | — | 1.44 | | 0.0010 | 0.0003 | 0.3355 | 0.01 | 0.26 | |
| Longnose skate | 0.0136 | 0.0043 | 0.3182 | 3.85 | 3.46 | | 0.0214 | 0.0070 | 0.3257 | 10.74 | 1.69 | | — | — | — | — | — | |
| 50% discard mortality (FG) | | | | 1.92 | | | | | | 5.37 | | | | | | | | |

[a] Fleet landings of groundfish, in metric tons.

Table 7 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE nonendorsed fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of FMP groundfish, adjusted to fish tickets.

| Limited Entry Nonendorsed Fixed Gear | Longline (N of 36°N) | | | | | | Longline (S of 36°N) | | | | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | OA observed (see Table 8b) | | | Expansion factor[a] | | |
| | 6 | | 12 | 15 | 283 | | 6 | | 22 | 56 | 502 | | | | | 14 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| LST (N of 34°27'N) | 0.0001 | 0.0000 | 0.2736 | 0.02 | 1.35 | 1.37 | 0.0052 | 0.0014 | 0.2620 | 2.60 | 1.66 | 4.26 | 0.0000 | — | — | 0.00 | — | 0.00 |
| LST (S of 34°27'N) | — | — | — | — | — | — | 0.0016 | 0.0004 | 0.2579 | 0.79 | 10.93 | 11.72 | — | — | — | — | — | — |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Blue/deacon rf. | — | — | — | — | 0.64 | 0.64 | — | — | — | — | — | — | — | — | — | — | — | — |
| China rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Copper rf. | — | — | — | — | 0.09 | 0.09 | — | — | — | — | — | — | — | — | — | — | — | — |
| Nearshore rf., unid. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — |
| Olive rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Quillback rf. | — | — | — | — | 0.19 | 0.19 | — | — | — | — | — | — | — | — | — | — | — | — |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.0002 | 0.0000 | 0.1179 | 0.00 | 0.54 | 0.55 |
| Blue/deacon rf. | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — |
| Brown rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — |
| China rf. | — | — | — | — | 0.04 | 0.04 | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Copper rf. | — | — | — | — | 0.16 | 0.16 | — | — | — | — | 0.06 | 0.06 | — | — | — | — | — | — |
| Gopher rf. | — | — | — | — | 0.05 | 0.05 | — | — | — | — | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.3865 | 0.00 | 0.55 | 0.55 |
| Grass rf. | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 | 0.0000 | — | — | 0.00 | 0.09 | 0.09 |
| Kelp rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Nearshore rf., unid. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Olive rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Quillback rf. | — | — | — | — | 0.07 | 0.07 | — | — | — | — | — | — | — | — | — | — | — | — |
| Treefish rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.0002 | 0.0000 | 0.1373 | 0.00 | 0.00 | 0.00 |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Bocaccio rf. | — | — | — | — | 0.09 | 0.09 | — | — | — | — | — | — | — | — | — | — | — | — |
| Chilipepper rf. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — |
| Flag rf. | — | — | — | — | 0.08 | 0.08 | — | — | — | — | — | — | — | — | — | — | — | — |
| Greenstriped rf. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Rosethorn rf. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — | 0.0000 | — | — | 0.00 | — | 0.00 |

[a] Fleet landings of groundfish, in metric tons.

Table 7 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE nonendorsed fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of FMP groundfish, adjusted to fish tickets.

| Limited Entry Nonendorsed Fixed Gear | Longline (N of 36°N) | | | | | | Longline (S of 36°N) | | | | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | OA observed (see Table 8b) | | | Expansion factor[a] | | |
| | 6 | | 12 | 15 | 283 | | 6 | | 22 | 56 | 502 | | | | | 14 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Rosy rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Shelf rf., unid. | — | — | — | — | 0.09 | 0.09 | — | — | — | — | — | — | — | — | — | — | — | — |
| Silvergray rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Vermilion rf. | — | — | — | — | 0.09 | 0.09 | — | — | — | — | — | — | — | — | — | — | — | — |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Flag rf. | — | — | — | — | — | — | — | — | — | — | 0.05 | 0.05 | — | — | — | — | — | — |
| Greenblotched rf. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — |
| Greenspotted rf. | — | — | — | — | 0.04 | 0.04 | — | — | — | — | 0.50 | 0.50 | — | — | — | — | — | — |
| Greenstriped rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 0.03 | 0.03 | — | — | — | — | — | — |
| Mexican rf. | — | — | — | — | — | — | — | — | — | — | 0.03 | 0.03 | — | — | — | — | — | — |
| Rosethorn rf. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Rosy rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Shelf rf., unid. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 0.04 | 0.04 | — | — | — | — | — | — |
| Speckled rf. | — | — | — | — | — | — | — | — | — | — | 0.22 | 0.22 | — | — | — | — | — | — |
| Squarespot rf. | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 | — | — | — | — | — | — |
| Starry rf. | — | — | — | — | 0.06 | 0.06 | — | — | — | — | 0.34 | 0.34 | — | — | — | — | — | — |
| Vermilion rf. | — | — | — | — | 0.60 | 0.60 | — | — | — | — | 14.80 | 14.80 | — | — | — | — | — | — |
| Yellowtail rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 0.18 | 0.18 | — | — | — | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Blackgill rf. | — | — | — | — | 1.76 | 1.76 | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Redbanded rf. | — | — | — | — | 3.42 | 3.42 | — | — | — | — | — | — | 0.0001 | 0.0000 | 0.2572 | 0.00 | 0.01 | 0.01 |
| Rougheye/blackspotted rf. | — | — | — | — | 3.14 | 3.14 | — | — | — | — | — | — | — | — | — | — | — | — |
| Shortraker rf. | — | — | — | — | 0.22 | 0.22 | — | — | — | — | — | — | — | — | — | — | — | — |
| Slope rf., unid. | — | — | — | — | 0.42 | 0.42 | — | — | — | — | — | — | — | — | — | — | — | — |
| Splitnose rf. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Yellowmouth rf. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 7 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE nonendorsed fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of FMP groundfish, adjusted to fish tickets.

| Limited Entry Nonendorsed Fixed Gear | Longline (N of 36°N) | | | | | | Longline (S of 36°N) | | | | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | OA observed (see Table 8b) | | | Expansion factor[a] | | |
| | 6 | | 12 | 15 | 283 | | 6 | | 22 | 56 | 502 | | | | | 14 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | 0.06 | 0.06 | 0.0000 | — | — | 0.02 | 0.59 | 0.61 | 0.0000 | — | — | 0.00 | — | 0.00 |
| Bank rf. | — | — | — | — | — | — | — | — | — | — | 0.25 | 0.25 | — | — | — | — | — | — |
| Blackgill rf. | — | — | — | — | 4.02 | 4.02 | 0.0001 | — | — | 0.05 | 14.39 | 14.45 | 0.0005 | 0.0001 | 0.2754 | 0.01 | — | 0.01 |
| Redbanded rf. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | 0.0004 | 0.0001 | 0.2348 | 0.01 | — | 0.01 |
| Shortraker rf. | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Shortraker/rougheye/blackspotted rf. | — | — | — | — | — | — | 0.0006 | — | — | 0.28 | — | 0.28 | — | — | — | — | — | — |
| Slope rf., unid. | — | — | — | — | 0.08 | 0.08 | — | — | — | — | 0.20 | 0.20 | — | — | — | — | — | — |
| Mixed thornyheads | | | | | | | | | | | | | | | | | | |
| SST/LST | — | — | — | — | 0.07 | 0.07 | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — |
| Other flatfish | | | | | | | | | | | | | | | | | | |
| Pacific sanddab | — | — | — | — | — | — | 0.0000 | — | — | 0.01 | 2.20 | 2.21 | — | — | — | — | — | — |
| Sand sole | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | — | — | — |
| Sanddab, unid. | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 1.65 | 1.65 | — | — | — | — | — | — |
| Other groundfish | | | | | | | | | | | | | | | | | | |
| Kelp greenling (CA) | — | — | — | — | 0.01 | 0.01 | — | — | — | — | 0.35 | 0.35 | — | — | — | — | 0.16 | 0.16 |
| Pacific cod | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |
| Pacific hake | 0.0004 | 0.0001 | 0.2947 | 0.11 | 0.12 | 0.23 | 0.0016 | 0.0006 | 0.3547 | 0.82 | 0.08 | 0.91 | — | — | — | — | — | — |
| Pacific ocean perch (N of 40°10'N) | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — |
| Petrale sole | — | — | — | — | 0.16 | 0.16 | — | — | — | — | 0.01 | 0.01 | 0.0001 | 0.0000 | 0.2306 | 0.00 | — | 0.00 |
| Sablefish (N of 36°N) | 0.1481 | 0.0734 | 0.4958 | 41.85 | 221.80 | 230.17 | — | — | — | — | — | — | 0.1890 | 0.0429 | 0.2270 | 2.74 | 11.51 | 12.06 |
| 20% discard mortality (FG) | | | | 8.37 | | | | | | | | | | | | 0.55 | | |
| Sablefish (S of 36°N) | — | — | — | — | — | — | 0.0389 | 0.0279 | 0.7187 | 19.49 | 295.01 | 298.91 | — | — | — | — | — | — |
| 20% discard mortality (FG) | | | | | | | | | | 3.90 | | | | | | | | |
| SST (N of 34°27'N) | 0.0023 | 0.0010 | 0.4245 | 0.64 | 15.54 | 16.18 | 0.0001 | — | — | 0.06 | 15.33 | 15.39 | 0.0003 | 0.0001 | 0.3179 | 0.00 | 0.02 | 0.02 |
| SST (S of 34°27'N) | — | — | — | — | — | — | 0.0066 | 0.0033 | 0.5013 | 3.33 | 130.43 | 133.76 | — | — | — | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 7 (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the LE nonendorsed fixed gear fleet. Ratios are computed as the observed discard weight divided by the observed weight of FMP groundfish, adjusted to fish tickets.

| Limited Entry Nonendorsed Fixed Gear | Longline (N of 36°N) | | | | | | Longline (S of 36°N) | | | | | | Pot (N of 36°N) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | Observed vessels | | Obs'd trips | Obs'd sets | Expansion factor[a] | | OA observed (see Table 8b) | | | Expansion factor[a] | | |
| | 6 | | 12 | 15 | 283 | | 6 | | 22 | 56 | 502 | | | | | 14 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard ratio | SE | CV | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | | | | | | | | | | |
| Spiny dogfish shark | 0.0010 | 0.0004 | 0.3931 | 0.29 | 1.03 | 1.17 | 0.0001 | — | — | 0.05 | 0.02 | 0.04 | — | — | — | — | 0.01 | 0.01 |
| 50% discard mortality (line) | | | | 0.14 | | | | | | 0.02 | | | | | | | | |
| Splitnose rf. | — | — | — | — | — | — | — | — | — | — | 0.03 | 0.03 | — | — | — | — | — | — |
| Widow rf. | — | — | — | — | 0.02 | 0.02 | — | — | — | — | 0.70 | 0.70 | — | — | — | — | — | — |
| Yellowtail rf. | — | — | — | — | 0.05 | 0.05 | — | — | — | — | — | — | — | — | — | — | — | — |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | |
| CA halibut | — | — | — | — | — | — | — | — | — | — | 0.16 | 0.16 | — | — | — | — | — | — |
| Dungeness crab | — | — | — | — | — | — | — | — | — | — | — | — | 0.0012 | 0.0004 | 0.2993 | 0.02 | 0.25 | 0.27 |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | |
| Deepsea sole | — | — | — | — | — | — | — | — | — | — | — | — | 0.0000 | — | — | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | | | | | | | | | | | | | |
| CA sheephead | — | — | — | — | — | — | — | — | — | — | 0.10 | 0.10 | 0.0152 | 0.0018 | 0.1193 | 0.22 | — | 0.22 |
| Skate, unid. | — | — | — | — | 0.05 | 0.05 | 0.0066 | 0.0031 | 0.4688 | 3.32 | 0.05 | 3.37 | — | — | — | — | — | — |

[a] Fleet landings of groundfish, in metric tons.

Table 8a. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish or FMP groundfish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of FMP groundfish to generate discard estimates; see Table 9 for total mortality across all non-IFQ non-nearshore fixed gear sectors. Discard mortality rates were provided by the GMT.

| Open Access Fixed Gear | Longline (Coastwide) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 60 | 78 | 202 | | | 17 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Arrowtooth flounder | 0.0145 | 0.0049 | 0.3362 | 4.34 | 0.69 | 5.03 | 0.72 | — | 0.72 |
| Big skate | 0.0013 | — | — | 0.38 | 1.19 | 1.58 | 0.06 | — | 0.06 |
| Black rf. (CA) | 0.0001 | — | — | 0.02 | 0.20 | 0.22 | 0.00 | — | 0.00 |
| Black rf. (OR) | — | — | — | — | 3.15 | 3.15 | — | — | — |
| Bocaccio rf. | 0.0004 | — | — | 0.13 | 1.13 | 1.26 | 0.02 | 2.23 | 2.25 |
| Cabezon (CA) | 0.0004 | 0.0001 | 0.3470 | 0.13 | — | 0.13 | 0.02 | — | 0.02 |
| Cabezon (OR) | — | — | — | — | 0.15 | 0.15 | — | — | — |
| Canary rf. | 0.0007 | 0.0002 | 0.2171 | 0.21 | 2.01 | 2.22 | 0.03 | 0.43 | 0.46 |
| Chilipepper rf. (S of 40°10'N) | — | — | — | — | 0.61 | 0.61 | — | 0.16 | 0.16 |
| Darkblotched rf. | 0.0021 | 0.0006 | 0.2863 | 0.61 | 1.63 | 2.25 | 0.10 | — | 0.10 |
| Dover sole | 0.0019 | 0.0007 | 0.3986 | 0.56 | 0.09 | 0.65 | 0.09 | — | 0.09 |
| ECS | | | | | | | | | |
| Black skate | 0.0009 | 0.0005 | 0.4980 | 0.27 | — | 0.27 | 0.04 | — | 0.04 |
| Grenadier, unid. | — | — | — | — | 3.73 | 3.73 | — | — | — |
| Sandpaper skate | 0.0006 | 0.0001 | 0.2108 | 0.17 | — | 0.17 | 0.03 | — | 0.03 |
| Soupfin shark | — | — | — | — | — | — | — | 0.26 | 0.26 |
| Spotted ratfish | 0.0031 | 0.0006 | 0.2090 | 0.91 | — | 0.91 | 0.15 | — | 0.15 |
| Lingcod (N of 40°10'N) | 0.0050 | 0.0013 | 0.2652 | 1.49 | 40.81 | 40.91 | — | — | — |
| 7% discard mortality rate (line) | | | | 0.10 | | | | | |
| Lingcod (S of 40°10'N) | 0.0042 | 0.0007 | 0.1618 | 1.24 | 21.47 | 21.56 | 0.20 | 6.82 | 6.83 |
| 7% discard mortality rate (line) | | | | 0.09 | | | 0.01 | | |
| Longnose skate | 0.0603 | 0.0125 | 0.2074 | 18.02 | 4.54 | 13.55 | 2.98 | — | 1.49 |
| 50% discard mortality rate (FG) | | | | 9.01 | | | 1.49 | | |

Table 8a (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet.

| Open Access Fixed Gear | Longline (Coastwide) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 60 | 78 | 202 | | | 17 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| LST (N of 34°27'N) | 0.0000 | — | — | 0.01 | — | 0.01 | 0.00 | — | 0.00 |
| LST (N of 34°27'N) | 0.0000 | — | — | 0.01 | — | 0.01 | 0.00 | 0.15 | 0.15 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | |
| Blue/deacon rf. | 0.0001 | — | — | 0.02 | 0.10 | 0.12 | — | — | — |
| China rf. | — | — | — | — | 0.02 | 0.02 | — | — | — |
| Copper rf. | 0.0001 | — | — | 0.04 | 0.02 | 0.06 | — | — | — |
| Grass rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Quillback rf. | 0.0000 | — | — | 0.01 | 0.04 | 0.05 | — | — | — |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | |
| Blue/deacon rf. | 0.0001 | 0.0000 | 0.3087 | 0.02 | — | 0.02 | 0.00 | — | 0.00 |
| Brown rf. | 0.0001 | — | — | 0.03 | — | 0.03 | 0.01 | — | 0.01 |
| Copper rf. | 0.0002 | — | — | 0.05 | — | 0.05 | 0.01 | 0.01 | 0.02 |
| Olive rf. | 0.0001 | — | — | 0.02 | — | 0.02 | 0.00 | — | 0.00 |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | |
| Bocaccio rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Chilipepper rf. | — | — | — | — | 0.05 | 0.05 | — | — | — |
| Greenspotted rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Greenstriped rf. | 0.0006 | 0.0003 | 0.4749 | 0.19 | 0.02 | 0.20 | — | — | — |
| Rosethorn rf. | 0.0001 | 0.0001 | 0.4351 | 0.04 | 0.01 | 0.05 | — | — | — |
| Rosy rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Shelf rf., unid. | 0.0004 | — | — | 0.13 | 0.28 | 0.41 | — | — | — |
| Silvergray rf. | — | — | — | — | 0.09 | 0.09 | — | — | — |
| Tiger rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Vermilion rf. | — | — | — | — | 0.14 | 0.14 | — | — | — |

Table 8a (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet.

| Open Access Fixed Gear | Longline (Coastwide) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 60 | 78 | 202 | | | 17 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | |
| Flag rf. | — | — | — | — | — | — | — | 0.09 | 0.09 |
| Greenblotched rf. | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Greenspotted rf. | — | — | — | — | 0.10 | 0.10 | — | 0.94 | 0.94 |
| Greenstriped rf. | 0.0000 | — | — | 0.01 | 0.00 | 0.01 | 0.00 | 0.10 | 0.10 |
| Honeycomb rf. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Mexican rf. | — | — | — | — | — | — | — | 0.71 | 0.71 |
| Pink rf. | — | — | — | — | — | — | — | 0.21 | 0.21 |
| Rosethorn rf. | — | — | — | — | 0.00 | 0.00 | — | 0.00 | 0.00 |
| Rosy rf. | 0.0000 | — | — | 0.01 | 0.01 | 0.02 | 0.00 | 0.02 | 0.03 |
| Shelf rf., unid. | — | — | — | — | 0.15 | 0.15 | — | 0.54 | 0.54 |
| Speckled rf. | — | — | — | — | — | — | — | 0.08 | 0.08 |
| Squarespot rf. | — | — | — | — | — | — | — | 0.03 | 0.03 |
| Starry rf. | — | — | — | — | 0.00 | 0.00 | — | 0.31 | 0.31 |
| Vermilion rf. | — | — | — | — | 1.85 | 1.85 | — | 15.15 | 15.15 |
| Yellowtail rf. | 0.0000 | — | — | 0.01 | 2.01 | 2.02 | 0.00 | 0.39 | 0.39 |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | |
| Aurora rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Blackgill rf. | — | — | — | — | 0.14 | 0.14 | — | — | — |
| Redbanded rf. | 0.0037 | 0.0010 | 0.2588 | 1.10 | 1.91 | 3.01 | — | — | — |
| Rougheye/blackspotted rf. | 0.0639 | 0.0548 | 0.8584 | 19.08 | 1.86 | 20.94 | — | — | — |
| Shortraker rf. | — | — | — | — | 0.10 | 0.10 | — | — | — |
| Shortraker/rougheye/blackspotted rf. | 0.0004 | — | — | 0.11 | — | 0.11 | — | — | — |
| Slope rf., unid. | — | — | — | — | 0.11 | 0.11 | — | — | — |
| Splitnose rf. | 0.0001 | — | — | 0.04 | 0.01 | 0.04 | — | — | — |
| Yellowmouth rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |

Table 8a (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet.

| Open Access Fixed Gear | Longline (Coastwide) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 60 | 78 | 202 | | | 17 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | |
| Aurora rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Bank rf. | — | — | — | — | — | — | — | 0.07 | 0.07 |
| Blackgill rf. | 0.0007 | 0.0003 | 0.4507 | 0.20 | 0.64 | 0.85 | 0.03 | 0.80 | 0.84 |
| Redbanded rf. | — | — | — | — | 0.07 | 0.07 | — | — | — |
| Slope rf., unid. | — | — | — | — | 0.21 | 0.21 | — | 0.03 | 0.03 |
| Mixed thornyheads | | | | | | | | | |
| SST/LST | 0.0001 | 0.0001 | 0.4787 | 0.03 | — | 0.03 | 0.01 | 0.77 | 0.77 |
| Other flatfish | | | | | | | | | |
| Curlfin sole | — | — | — | — | — | — | — | 0.03 | 0.03 |
| Flatfish, unid. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Pacific sanddab | — | — | — | — | 0.02 | 0.02 | — | 0.23 | 0.23 |
| Rock sole | — | — | — | — | 0.04 | 0.04 | — | 0.00 | 0.00 |
| Sand sole | — | — | — | — | 0.02 | 0.02 | — | — | — |
| Sanddab, unid. | — | — | — | — | 1.10 | 1.10 | — | 0.76 | 0.76 |
| Other groundfish | | | | | | | | | |
| Kelp greenling (CA) | 0.0000 | — | — | 0.01 | — | 0.01 | 0.00 | — | 0.00 |
| Kelp greenling (OR) | — | — | — | — | 0.02 | 0.02 | — | — | — |
| Leopard shark | — | — | — | — | 0.49 | 0.49 | — | 0.07 | 0.07 |
| Other rockfish | | | | | | | | | |
| Rockfish, unid. | — | — | — | — | 0.11 | 0.11 | — | 0.05 | 0.05 |
| Pacific cod | — | — | — | — | 0.02 | 0.02 | — | — | — |
| Pacific hake | 0.0009 | 0.0003 | 0.3628 | 0.26 | 0.04 | 0.30 | 0.04 | — | 0.04 |
| Pacific ocean perch (N of 40°10'N) | — | — | — | — | 0.02 | 0.02 | — | — | — |
| Petrale sole | 0.0003 | 0.0000 | 0.1704 | 0.09 | 0.69 | 0.77 | 0.01 | 0.02 | 0.03 |
| Sablefish (N of 36°N) | 0.1955 | 0.0529 | 0.2704 | 58.41 | 202.29 | 213.98 | — | — | — |
| 20% discard mortality (FG) | | | | 11.68 | | | | | |

Table 8a (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear longline fleet.

| Open Access Fixed Gear | Longline (Coastwide) | | | Longline (N of 36°N) | | | Longline (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 60 | 78 | 202 | | | 17 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Sablefish (N of 36°N) | — | — | — | — | — | — | — | 17.31 | 17.31 |
| SST (N of 34°27'N) | 0.0034 | 0.0010 | 0.2924 | 1.03 | 0.06 | 1.08 | 0.17 | — | 0.17 |
| SST (N of 34°27'N) | 0.0012 | 0.0003 | 0.2437 | 0.37 | — | 0.37 | 0.06 | 0.47 | 0.53 |
| Spiny dogfish shark | 0.0643 | 0.0288 | 0.4484 | 19.19 | 1.67 | 11.26 | 3.17 | 0.01 | 1.60 |
| 50% discard mortality (line) | | | | 9.60 | | | 1.59 | | |
| Splitnose rf. (S of 40°10'N) | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Starry flounder | — | — | — | — | 0.02 | 0.02 | — | 0.02 | 0.02 |
| Widow rf. | — | — | — | — | 0.45 | 0.45 | — | 0.01 | 0.01 |
| Yelloweye rf. | 0.0040 | 0.0015 | 0.3683 | 1.19 | 0.07 | 1.26 | 0.20 | — | 0.20 |
| Yellowtail rf. (N of 40°10'N) | 0.0003 | — | — | 0.10 | 0.18 | 0.28 | — | — | — |
| **Nongroundfish species** | | | | | | | | | |
| CA halibut | — | — | — | — | 0.70 | 0.70 | — | 0.77 | 0.77 |
| Dungeness crab | 0.0000 | — | — | 0.01 | 0.01 | 0.02 | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | | | | |
| Skate, unid. | 0.0011 | 0.0007 | 0.6063 | 0.34 | 0.22 | 0.55 | 0.06 | — | 0.06 |
| Shared ECS | | | | | | | | | |
| Smelt, unid. | — | — | — | — | 0.02 | 0.02 | — | — | — |

Table 8b. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear pot fleet. Ratios are computed as the observed discard weight divided by the observed weight of retained sablefish or FMP groundfish (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of FMP groundfish to generate discard estimates; see Table 9 for total mortality across all non-IFQ non-nearshore fixed gear sectors. Discard mortality rates were provided by the GMT.

| Open Access Fixed Gear | Pot (Coastwide) | | | Pot (N of 36°N) | | | Pot (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 84 | 122 | 194 | | | 8 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Arrowtooth flounder | 0.0040 | 0.0009 | 0.2291 | 0.79 | 0.00 | 0.79 | 0.04 | — | 0.04 |
| Black rf. (CA) | — | — | — | — | 0.47 | 0.47 | — | — | — |
| Bocaccio rf. (S of 40°10'N) | — | — | — | — | — | — | — | 0.03 | 0.03 |
| Cabezon (CA) | 0.0022 | 0.0004 | 0.1735 | 0.44 | 0.84 | 1.28 | 0.02 | 0.43 | 0.45 |
| CA scorpionfish (S of 34°27'N) | 0.0001 | 0.0000 | 0.3508 | 0.01 | — | 0.01 | 0.00 | — | 0.00 |
| Canary rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Chilipepper rf. | — | — | — | — | — | — | — | — | — |
| Darkblotched rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Dover sole | 0.0028 | 0.0005 | 0.1826 | 0.55 | 0.04 | 0.60 | 0.03 | 0.00 | 0.03 |
| ECS | | | | | | | | | |
| Sandpaper skate | 0.0001 | — | — | 0.01 | — | 0.01 | 0.00 | — | 0.00 |
| Spotted ratfish | 0.0001 | 0.0000 | 0.1909 | 0.01 | — | 0.01 | 0.00 | — | 0.00 |
| English sole | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Lingcod (N of 40°10'N) | 0.0016 | 0.0002 | 0.1351 | 0.32 | 1.30 | 1.62 | — | — | — |
| Lingcod (S of 40°10'N) | 0.0010 | 0.0003 | 0.3355 | 0.19 | 1.25 | 1.44 | 0.01 | 0.10 | 0.11 |
| LST (N of 34°27'N) | 0.0000 | — | — | 0.00 | 0.02 | 0.02 | 0.00 | — | 0.00 |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | |
| Black and yellow rf. | 0.0002 | 0.0000 | 0.1179 | 0.05 | 0.61 | 0.65 | 0.00 | 0.57 | 0.57 |
| China rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Gopher rf. | 0.0000 | 0.0000 | 0.3865 | 0.01 | 0.45 | 0.45 | 0.00 | 0.33 | 0.33 |
| Grass rf. | 0.0000 | — | — | 0.01 | 0.04 | 0.05 | 0.00 | 0.05 | 0.05 |
| Kelp rf. | — | — | — | — | 0.02 | 0.02 | — | 0.02 | 0.02 |
| Treefish rf. | 0.0002 | 0.0000 | 0.1373 | 0.04 | — | 0.04 | 0.00 | — | 0.00 |

Table 8b (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear pot fleet.

| Open Access Fixed Gear | Pot (Coastwide) | | | Pot (N of 36°N) | | | Pot (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 84 | 122 | 194 | | | 8 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | |
| Rosethorn rf. | 0.0000 | — | — | 0.00 | — | 0.00 | — | — | — |
| Shelf rf., unid. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | |
| Greenspotted rf. | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Rosethorn rf. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Shelf rf., unid. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Vermilion rf. | — | — | — | — | 0.00 | 0.00 | — | 0.63 | 0.63 |
| Yellowtail rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | |
| Aurora rf. | — | — | — | — | 0.00 | 0.00 | — | — | — |
| Blackgill rf. | — | — | — | — | 0.01 | 0.01 | — | — | — |
| Redbanded rf. | 0.0001 | 0.0000 | 0.2572 | 0.01 | 0.01 | 0.02 | — | — | — |
| Rougheye/blackspotted rf. | — | — | — | — | 0.04 | 0.04 | — | — | — |
| Slope rf., unid. | — | — | — | — | 0.07 | 0.07 | — | — | — |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | |
| Aurora rf. | 0.0000 | — | — | 0.00 | — | 0.00 | 0.00 | 0.01 | 0.01 |
| Blackgill rf. | 0.0005 | 0.0001 | 0.2754 | 0.10 | 0.09 | 0.19 | 0.01 | 0.21 | 0.22 |
| Redbanded rf. | 0.0004 | 0.0001 | 0.2348 | 0.08 | — | 0.08 | 0.00 | — | 0.00 |
| Slope rf., unid. | — | — | — | — | 0.01 | 0.01 | — | 0.00 | 0.00 |
| Mixed thornyheads | | | | | | | | | |
| SST/LST | — | — | — | — | 0.12 | 0.12 | — | 0.00 | 0.00 |
| Other flatfish | | | | | | | | | |
| Flatfish, unid. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Pacific sanddab | — | — | — | — | — | — | — | 0.33 | 0.33 |
| Sanddab, unid. | — | — | — | — | 0.00 | 0.00 | — | 0.11 | 0.11 |

Table 8b (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) from the OA fixed gear pot fleet.

| Open Access Fixed Gear | Pot (Coastwide) | | | Pot (N of 36°N) | | | Pot (S of 36°N) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed vessels | Observed trips | Observed sets | Expansion factor (fleet landings of groundfish, mt) | | | Expansion factor (fleet landings of groundfish, mt) | | |
| | 43 | 84 | 122 | 194 | | | 8 | | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | | | | |
| Other groundfish | | | | | | | | | |
| Kelp greenling (CA) | — | — | — | — | 0.22 | 0.22 | — | 0.07 | 0.07 |
| Petrale sole | 0.0001 | 0.0000 | 0.2306 | 0.02 | 0.02 | 0.05 | 0.00 | — | 0.00 |
| Sablefish (N of 36°N) | 0.1890 | 0.0429 | 0.2270 | 37.81 | 194.34 | 201.90 | — | — | — |
| 20% discard mortality (FG) | | | | 7.56 | | | — | | |
| Sablefish (S of 36°N) | — | — | — | — | — | — | 0.00 | 7.71 | 7.71 |
| 20% discard mortality (FG) | | | | — | | | 0.00 | | |
| SST (N of 34°27'N) | 0.0003 | 0.0001 | 0.3179 | 0.06 | 0.00 | 0.07 | 0.00 | — | 0.00 |
| Splitnose rf. (S of 40°10'N) | — | — | — | — | — | — | — | 0.02 | 0.02 |
| **Nongroundfish species** | | | | | | | | | |
| Dungeness crab | 0.0012 | 0.0004 | 0.2993 | 0.24 | 3.65 | 3.90 | 0.01 | — | 0.01 |
| Non-FMP flatfish | | | | | | | | | |
| Deepsea sole | 0.0000 | — | — | 0.00 | — | 0.00 | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | | | | |
| CA sheephead | 0.0152 | 0.0018 | 0.1193 | 3.03 | — | 3.03 | 0.16 | — | 0.16 |

Table 9a. Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors. Discard ratios were multiplied by fleet landings of sablefish or groundfish to generate estimated discard. Discard mortality rates were provided by the GMT.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Groundfish species** | | | | | | | | | |
| Arrowtooth flounder | 26.39 | 0.26 | 1.87 | 28.52 | 5.05 | 0.83 | 0.70 | 6.58 | 35.10 |
| Big skate | 1.71 | — | 2.80 | 4.51 | 0.44 | — | 1.19 | 1.64 | 6.14 |
| Black rf. (CA) | — | — | 10.84 | 10.84 | 0.02 | — | 0.66 | 0.69 | 11.52 |
| Black rf. (OR) | — | — | — | — | — | — | 3.15 | 3.15 | 3.15 |
| Bocaccio rf. (S of 40°10'N) | 0.00 | — | 1.97 | 1.98 | 0.15 | — | 3.39 | 3.54 | 5.52 |
| Cabezon (CA) | — | 0.03 | 0.91 | 0.94 | 0.15 | 0.46 | 1.26 | 1.88 | 2.82 |
| Cabezon (OR) | — | — | — | — | — | — | 0.15 | 0.15 | 0.15 |
| CA scorpionfish (S of 34°27'N) | — | 0.00 | 1.12 | 1.12 | — | 0.01 | — | 0.01 | 1.13 |
| Canary rf. | 0.59 | — | 1.75 | 2.34 | 0.24 | — | 2.45 | 2.69 | 5.03 |
| Chilipepper rf. (S of 40°10'N) | 0.11 | — | 0.14 | 0.25 | — | — | 0.77 | 0.77 | 1.02 |
| Darkblotched rf. | 0.31 | 0.01 | 2.87 | 3.19 | 0.71 | — | 1.64 | 2.35 | 5.54 |
| Dover sole | 1.61 | 0.06 | 3.04 | 4.71 | 0.65 | 0.58 | 0.14 | 1.37 | 6.09 |
| ECS | | | | | | | | | |
| Aleutian skate | 0.08 | — | — | 0.08 | — | — | — | — | 0.08 |
| Black skate | 5.07 | — | 0.01 | 5.08 | 0.32 | — | — | 0.32 | 5.40 |
| CA grenadier | 0.18 | — | — | 0.18 | — | — | — | — | 0.18 |
| CA skate | 0.12 | — | 0.01 | 0.12 | — | — | — | — | 0.12 |
| Giant grenadier | 7.68 | 0.43 | 0.32 | 8.43 | — | — | — | — | 8.43 |
| Grenadier, unid. | 3.43 | 0.09 | 14.76 | 18.28 | — | — | 3.73 | 3.73 | 22.00 |
| Pacific flatnose | 0.36 | 0.03 | — | 0.40 | — | — | — | — | 0.40 |
| Pacific grenadier | 8.98 | 0.09 | 0.66 | 9.73 | — | — | — | — | 9.73 |
| Sandpaper skate | 2.72 | 0.01 | — | 2.72 | 0.20 | 0.01 | — | 0.22 | 2.94 |
| Smooth grenadier | 0.01 | — | — | 0.01 | — | — | — | — | 0.01 |
| Soupfin shark | 0.47 | — | 0.04 | 0.51 | — | — | 0.26 | 0.26 | 0.77 |
| Spotted ratfish | 2.84 | 0.00 | — | 2.84 | 1.06 | 0.01 | — | 1.08 | 3.91 |
| English sole | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 |
| Lingcod (N of 40°10'N) | 1.82 | 0.03 | 12.37 | 12.53 | 1.49 | 0.32 | 42.11 | 42.53 | 55.06 |
| 7% discard mortality (line) | 0.13 | | | | 0.10 | | | | |

Table 9a (continued). Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Groundfish species** | | | | | | | | | |
| Lingcod (S of 40°10'N) | 0.07 | 0.01 | 6.37 | 6.39 | 1.44 | 0.20 | 29.64 | 29.94 | 36.33 |
| 7% discard mortality (line) | 0.00 | | | | 0.10 | | | | |
| Longnose skate | 98.83 | — | 42.00 | 91.41 | 21.00 | — | 4.54 | 15.04 | 106.45 |
| 50% discard mortality (FG) | 49.42 | | | | 10.50 | | | | |
| LST (N of 34°27'N) | 3.35 | 0.01 | 4.04 | 7.40 | 0.01 | 0.00 | 0.02 | 0.03 | 7.43 |
| LST (S of 34°27'N) | 0.79 | — | 11.10 | 11.88 | 0.01 | — | 0.15 | 0.16 | 12.04 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | |
| Blue/deacon rf. | — | — | 0.69 | 0.69 | 0.02 | — | 0.10 | 0.12 | 0.81 |
| China rf. | — | — | 0.00 | 0.00 | — | — | 0.02 | 0.02 | 0.03 |
| Copper rf. | — | — | 0.18 | 0.18 | 0.04 | — | 0.02 | 0.06 | 0.24 |
| Grass rf. | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 |
| Nearshore rf., unid. | — | — | 0.02 | 0.02 | — | — | — | — | 0.02 |
| Olive rf. | — | — | 0.00 | 0.00 | — | — | — | — | 0.00 |
| Quillback rf. | — | — | 0.24 | 0.24 | 0.01 | — | 0.04 | 0.05 | 0.29 |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | |
| Black and yellow rf. | — | 0.00 | 0.59 | 0.59 | — | 0.05 | 1.18 | 1.23 | 1.82 |
| Blue/deacon rf. | — | — | 0.03 | 0.03 | 0.02 | — | — | 0.02 | 0.05 |
| Brown rf. | — | — | 0.04 | 0.04 | 0.04 | — | — | 0.04 | 0.08 |
| China rf. | — | — | 0.24 | 0.24 | — | — | 0.00 | 0.00 | 0.24 |
| Copper rf. | — | — | 1.16 | 1.16 | 0.06 | — | 0.01 | 0.07 | 1.23 |
| Gopher rf. | — | 0.00 | 0.62 | 0.62 | — | 0.01 | 0.77 | 0.78 | 1.40 |
| Grass rf. | — | 0.00 | 0.10 | 0.10 | — | 0.01 | 0.09 | 0.10 | 0.20 |
| Kelp rf. | — | — | 0.02 | 0.02 | — | — | 0.04 | 0.04 | 0.06 |
| Nearshore rf., unid. | — | — | 0.01 | 0.01 | — | — | — | — | 0.01 |
| Olive rf. | — | — | 0.00 | 0.00 | 0.02 | — | — | 0.02 | 0.02 |
| Quillback rf. | — | — | 0.49 | 0.49 | — | — | — | — | 0.49 |
| Treefish rf. | — | 0.00 | 0.00 | 0.00 | — | 0.04 | — | 0.04 | 0.05 |

Table 9a (continued). Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Groundfish species** | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | |
| Bocaccio rf. | 0.07 | — | 0.59 | 0.66 | — | — | 0.01 | 0.01 | 0.68 |
| Chilipepper rf. | 0.12 | — | 0.38 | 0.50 | — | — | 0.05 | 0.05 | 0.55 |
| Cowcod rf. | 0.02 | — | — | 0.02 | — | — | — | — | 0.02 |
| Flag rf. | — | — | 0.08 | 0.08 | — | — | — | — | 0.08 |
| Greenspotted rf. | 0.01 | — | — | 0.01 | — | — | 0.00 | 0.00 | 0.01 |
| Greenstriped rf. | 0.82 | — | 0.17 | 0.99 | 0.19 | — | 0.02 | 0.20 | 1.20 |
| Redstripe rf. | 0.05 | — | — | 0.05 | — | — | — | — | 0.05 |
| Rosethorn rf. | 0.34 | 0.00 | 0.10 | 0.43 | 0.04 | 0.00 | 0.01 | 0.06 | 0.49 |
| Rosy rf. | — | — | 0.00 | 0.00 | — | — | 0.00 | 0.00 | 0.00 |
| Shelf rf., unid. | — | — | 0.16 | 0.16 | 0.13 | — | 0.29 | 0.41 | 0.57 |
| Silvergray rf. | 0.65 | — | 0.61 | 1.25 | — | — | 0.09 | 0.09 | 1.34 |
| Tiger rf. | — | — | — | — | — | — | 0.01 | 0.01 | 0.01 |
| Vermilion rf. | — | — | 0.13 | 0.13 | — | — | 0.14 | 0.14 | 0.27 |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | |
| Flag rf. | — | — | 0.05 | 0.05 | — | — | 0.09 | 0.09 | 0.14 |
| Greenblotched rf. | 0.00 | — | 0.03 | 0.03 | — | — | 0.02 | 0.02 | 0.05 |
| Greenspotted rf. | — | — | 0.53 | 0.53 | — | — | 1.05 | 1.05 | 1.58 |
| Greenstriped rf. | — | — | 0.03 | 0.03 | 0.01 | — | 0.10 | 0.11 | 0.14 |
| Honeycomb rf. | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 |
| Mexican rf. | — | — | 0.03 | 0.03 | — | — | 0.71 | 0.71 | 0.74 |
| Pink rf. | — | — | — | — | — | — | 0.21 | 0.21 | 0.21 |
| Rosethorn rf. | — | — | 0.08 | 0.08 | — | — | 0.01 | 0.01 | 0.09 |
| Rosy rf. | — | — | 0.03 | 0.03 | 0.01 | — | 0.03 | 0.04 | 0.08 |
| Shelf rf., unid. | — | — | 0.07 | 0.07 | — | — | 0.70 | 0.70 | 0.77 |
| Speckled rf. | — | — | 0.22 | 0.22 | — | — | 0.08 | 0.08 | 0.30 |
| Squarespot rf. | — | — | 0.04 | 0.04 | — | — | 0.03 | 0.03 | 0.08 |
| Starry rf. | — | — | 0.39 | 0.39 | — | — | 0.32 | 0.32 | 0.71 |
| Vermilion rf. | — | — | 15.91 | 15.91 | — | — | 17.64 | 17.64 | 33.55 |
| Yellowtail rf. | — | — | 0.27 | 0.27 | 0.01 | — | 2.41 | 2.42 | 2.69 |

Table 9a (continued). Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Groundfish species** | | | | | | | | | |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | |
| Aurora rf. | 0.03 | — | 0.07 | 0.10 | — | — | 0.01 | 0.01 | 0.12 |
| Bank rf. | 0.01 | — | 0.00 | 0.01 | — | — | — | — | 0.01 |
| Blackgill rf. | 0.59 | — | 3.07 | 3.66 | — | — | 0.14 | 0.14 | 3.80 |
| Redbanded rf. | 7.41 | 0.00 | 16.13 | 23.54 | 1.10 | 0.01 | 1.91 | 3.02 | 26.57 |
| Rougheye/blackspotted rf. | 11.33 | 0.02 | 28.63 | 39.98 | 19.08 | — | 1.90 | 20.98 | 60.96 |
| Sharpchin rf. | 0.01 | — | 0.00 | 0.01 | — | — | — | — | 0.01 |
| Shortraker rf. | 1.74 | — | 2.13 | 3.87 | — | — | 0.10 | 0.10 | 3.97 |
| Shortraker/rougheye/blackspotted rf. | 0.79 | — | — | 0.79 | 0.11 | — | — | 0.11 | 0.90 |
| Slope rf., unid. | 0.02 | 0.00 | 1.54 | 1.56 | — | — | 0.17 | 0.17 | 1.74 |
| Splitnose rf. | — | — | 0.05 | 0.05 | 0.04 | — | 0.01 | 0.04 | 0.09 |
| Yellowmouth rf. | — | — | 1.81 | 1.81 | — | — | 0.01 | 0.01 | 1.83 |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | |
| Aurora rf. | 0.03 | 0.00 | 0.69 | 0.72 | — | 0.00 | 0.01 | 0.02 | 0.74 |
| Bank rf. | — | — | 0.25 | 0.25 | — | — | 0.07 | 0.07 | 0.32 |
| Blackgill rf. | 0.11 | 0.01 | 24.32 | 24.43 | 0.24 | 0.11 | 1.75 | 2.09 | 26.53 |
| Redbanded rf. | 0.05 | 0.01 | 0.05 | 0.11 | — | 0.09 | 0.07 | 0.16 | 0.27 |
| Rougheye/blackspotted rf. | 0.06 | — | 0.01 | 0.07 | — | — | — | — | 0.07 |
| Shortraker rf. | — | — | 0.01 | 0.01 | — | — | — | — | 0.01 |
| Shortraker/rougheye/blackspotted rf. | 0.28 | — | — | 0.28 | — | — | — | — | 0.28 |
| Slope rf., unid. | — | 0.01 | 2.94 | 2.95 | — | — | 0.26 | 0.26 | 3.21 |
| Mixed thornyheads | | | | | | | | | |
| SST/LST | 0.49 | 0.00 | 0.28 | 0.77 | 0.04 | — | 0.89 | 0.93 | 1.70 |
| Other flatfish | | | | | | | | | |
| Curlfin sole | — | — | — | — | — | — | 0.03 | 0.03 | 0.03 |
| Flatfish, unid. | — | — | 0.02 | 0.02 | — | — | 0.01 | 0.01 | 0.04 |
| Pacific sanddab | 0.01 | — | 2.20 | 2.21 | — | — | 0.59 | 0.59 | 2.79 |
| Rock sole | — | — | 0.00 | 0.00 | — | — | 0.04 | 0.04 | 0.04 |
| Sand sole | — | — | 0.00 | 0.00 | — | — | 0.02 | 0.02 | 0.02 |
| Sanddab, unid. | — | — | 1.65 | 1.65 | — | — | 1.98 | 1.98 | 3.63 |

Table 9a (continued). Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Groundfish species** | | | | | | | | | |
| Other groundfish | | | | | | | | | |
| Kelp greenling (CA) | — | — | 0.59 | 0.59 | 0.01 | — | 0.29 | 0.30 | 0.88 |
| Kelp greenling (OR) | — | — | — | — | — | — | 0.02 | 0.02 | 0.02 |
| Leopard shark | — | — | — | — | — | — | 0.56 | 0.56 | 0.56 |
| Other rockfish | | | | | | | | | |
| Rockfish, unid. | — | — | — | — | — | — | 0.16 | 0.16 | 0.16 |
| Pacific cod | 0.21 | — | 1.68 | 1.89 | — | — | 0.02 | 0.02 | 1.92 |
| Pacific hake | 1.16 | — | 0.22 | 1.38 | 0.31 | — | 0.04 | 0.34 | 1.72 |
| Pacific ocean perch (N of 40°10'N) | 0.08 | — | 0.18 | 0.27 | — | — | 0.02 | 0.02 | 0.28 |
| Petrale sole | 0.23 | 0.00 | 0.94 | 1.17 | 0.10 | 0.02 | 0.73 | 0.85 | 2.03 |
| Sablefish (N of 36°N) | 217.47 | 56.72 | 1,656.39 | 1,711.23 | 58.41 | 37.81 | 396.63 | 415.88 | 2,127.11 |
| 20% discard mortality (FG) | 43.49 | 11.34 | | | 11.68 | 7.56 | | | |
| Sablefish (S of 36°N) | 19.49 | — | 307.78 | 311.68 | — | 0.00 | 25.02 | 25.02 | 336.70 |
| 20% discard mortality (FG) | 3.90 | | | | | 0.00 | | | |
| SST (N of 34°27'N) | 3.85 | 0.02 | 55.75 | 59.61 | 1.20 | 0.07 | 0.06 | 1.32 | 60.93 |
| SST (S of 34°27'N) | 3.33 | — | 135.98 | 139.30 | 0.43 | — | 0.47 | 0.90 | 140.20 |
| Spiny dogfish shark | 107.69 | 0.03 | 1.27 | 55.15 | 22.36 | — | 1.68 | 12.86 | 68.01 |
| 50% discard mortality (line) | 53.84 | | | | 11.18 | | | | |
| Splitnose rf. (S of 40°10'N) | — | — | 0.03 | 0.03 | — | — | 0.04 | 0.04 | 0.08 |
| Starry flounder | — | — | — | — | — | — | 0.04 | 0.04 | 0.04 |
| Widow rf. | 0.10 | — | 0.99 | 1.08 | — | — | 0.46 | 0.46 | 1.55 |
| Yelloweye rf. | 0.83 | 0.01 | — | 0.83 | 1.38 | — | 0.07 | 1.45 | 2.29 |
| Yellowtail rf. (N of 40°10'N) | 0.34 | — | 0.51 | 0.85 | 0.10 | — | 0.18 | 0.28 | 1.13 |
| **Nongroundfish species** | | | | | | | | | |
| CA halibut | — | — | 0.16 | 0.16 | — | — | 1.46 | 1.46 | 1.63 |
| Dungeness crab | 0.02 | 0.38 | 0.25 | 0.65 | 0.01 | 0.25 | 3.66 | 3.93 | 4.57 |
| Non-FMP flatfish | | | | | | | | | |
| Deepsea sole | 0.00 | 0.02 | — | 0.02 | — | 0.00 | — | 0.00 | 0.03 |

Table 9a (continued). Estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the LE and OA non-nearshore fixed gear sectors.

| | Limited Entry (Coastwide) | | | | Open Access (Coastwide) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Longline discard | Pot discard | Landed | LE total | Longline discard | Pot discard | Landed | OA total | LE & OA coastwide |
| **Nongroundfish species** | | | | | | | | | |
| Other nongroundfish | | | | | | | | | |
| CA sheephead | — | 0.22 | 0.10 | 0.32 | — | 3.19 | — | 3.19 | 3.51 |
| Sculpin, unid. | 0.00 | — | — | 0.00 | — | — | — | — | 0.00 |
| Skate, unid. | 3.93 | — | 0.53 | 4.46 | 0.39 | — | 0.22 | 0.61 | 5.07 |
| Squid, unid. | — | — | 0.02 | 0.02 | — | — | — | — | 0.02 |
| Shared ECS | | | | | | | | | |
| Smelt, unid. | — | — | 0.03 | 0.03 | — | — | 0.02 | 0.02 | 0.05 |

## Directed Pacific Halibut Fishery

For the first time in 2017, WCGOP observed the directed Pacific halibut fishery as a pilot study, and fleetwide discard estimates were derived from WCGOP and fish ticket data (Figure 1). As described above in the non-nearshore fixed gear sector, this fishery was defined based on using fixed gear and landing Pacific halibut within two days of the halibut fishery openings. Prior to 2017, landings in this fishery were included in the incidental fisheries, and no estimates of discards were calculated. Effort in this fishery occurs primarily in Washington and Oregon, and uses only hook-and-line gear. Discard estimates for each species were computed based on the same equation as described above for the OA California halibut fishery, but utilizing Pacific halibut as the retained weight for both discard rates and expansion factors. We estimated landings, discard, and total mortality in the 2017 directed Pacific halibut fishery (Table 9b). Because the gear and effort in this fishery are similar to the non-nearshore and catch shares hook-and-line fisheries, the same mortality rates were applied to discarded lingcod (7%), longnose skate (50%), sablefish (20%), and spiny dogfish (50%).

## Nearshore Fixed Gear Fishery

Fleetwide discard estimates for the commercial nearshore fixed gear sector of the groundfish fishery were derived from WCGOP observer data, fish ticket landings (Figure 1), and mortality rates provided by GMT (Table A-4).

WCGOP selects commercial nearshore vessels in California and Oregon for observer coverage based on state-issued nearshore permits or licenses; no nearshore fishery exists in Washington. Although California and Oregon nearshore fisheries are sampled separately for observer coverage, fleetwide discard estimates are provided for the areas north and south of the groundfish management line at lat 40°10'N, in accordance with federal groundfish management specifications.

For species without swim bladders, we applied a discard mortality rate of 7% for all FMP species (Albin and Karpov 1996). In June 2017, GMT provided revised depth-specific discard survival assumptions for some nearshore species (Table A-4). This update separated the >20 fth depth bin into 20–30 fth and >30 fth, allowing for more accurate accounting of discard mortality by depth, and provided distinct rates north and south of lat 40°10'N that reflect the differing depth distributions of observed fishing effort and align with recreational mortality rates using similar gear (PFMC 2017). We first generated estimates of the depth distribution of landings (0–10 fth, 11–20 fth, 21–30 fth, and >30 fth) based on the observed percentage of catch for each species or complex from 2003–17 (Table 10).[3] Using data from all previously observed years ensures that data are comparable across years and that proportions are available for all species landed in a given year. Fleet landings of each nearshore species or complex in 2017 were then distributed among depth intervals using the percentages computed in the previous step. Finally, the total distributed landed weights of all nearshore groundfish species within each depth stratum were used to expand observed discard to the fleetwide level.

[3] 10 fth ≅ 18 m, so the depth distributions are approximately 0–18 m, 19–36 m, 37–54 m, and >55 m.

Prior to the calculation of discard ratios in this sector, WCGOP observer data were stratified by area and depth (Table 11). Discard ratios were calculated by dividing the stratum discard weight of each species or complex by the retained weight of nearshore species. Observed discard ratios were multiplied by the allocated landed weight of all nearshore groundfish species within each depth stratum, and then by the depth-specific discard mortality rates. Nearshore fishermen focus much of their effort in shallow waters, so the estimated amount of catch in deeper depth bins is most often confidential. Because we are unable to display the observed discard ratios used to estimate mortality, we provide the CVs at the finest aggregated, nonconfidential strata possible north and south of lat 40°10'N (Table 11). We also report the total estimated gross discard and discard mortality, calculated at the confidential-level depth strata (Tables 12a, 12b).

We summarize the estimated total fishing mortality in observed non-IFQ groundfish fisheries by sector (Table 13).

Table 9b. Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the directed Pacific halibut fishery. Ratios are computed as the observed discard weight divided by the observed weight of retained Pacific halibut (adjusted to fish tickets). Discard ratios were multiplied by fleet landings of Pacific halibut to generate estimated discard. Discard mortality rates were provided by GMT.

| Directed Pacific Halibut Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor (fleet landings of PHLB, mt) | |
|---|---|---|---|---|---|---|
| | 13 | | 22 | 62 | 137 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Groundfish species** | | | | | | |
| Arrowtooth flounder | 0.1120 | 0.0276 | 0.2466 | 15.35 | 0.89 | 16.24 |
| Big skate | 0.0013 | 0.0002 | 0.1558 | 0.18 | 0.72 | 0.91 |
| Canary rf. | 0.0001 | 0.0000 | 0.1558 | 0.02 | 0.22 | 0.24 |
| Darkblotched rf. | 0.0046 | 0.0015 | 0.3367 | 0.63 | 0.06 | 0.69 |
| Dover sole | 0.0013 | 0.0003 | 0.2517 | 0.17 | 0.04 | 0.22 |
| ECS | | | | | | |
| Sandpaper skate | 0.0009 | 0.0004 | 0.4009 | 0.13 | — | 0.13 |
| Spotted ratfish | 0.0014 | 0.0004 | 0.2522 | 0.20 | — | 0.20 |
| Lingcod (N of 40°10'N) | 0.0015 | 0.0004 | 0.2638 | 0.20 | 1.45 | 1.46 |
| 7% discard mortality (line) | | | | 0.01 | | |
| Longnose skate | 0.0587 | 0.0140 | 0.2394 | 8.04 | 3.04 | 7.06 |
| 50% discard mortality (FG) | | | | 4.02 | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | |
| Bocaccio rf. | — | — | — | — | 0.05 | 0.05 |
| Chilipepper rf. | — | — | — | — | 0.00 | 0.00 |
| Greenstriped rf. | 0.0004 | 0.0001 | 0.2679 | 0.05 | 0.00 | 0.06 |
| Rosethorn rf. | 0.0001 | 0.0000 | 0.2004 | 0.01 | 0.02 | 0.03 |
| Silvergray rf. | — | — | — | — | 0.18 | 0.18 |
| Vermilion rf. | — | — | — | — | 0.01 | 0.01 |
| Minor sl. rf. (N of 40°10'N) | | | | | | |
| Aurora rf. | — | — | — | — | 0.00 | 0.00 |
| Blackgill rf. | — | — | — | — | 0.00 | 0.00 |
| Redbanded rf. | 0.0004 | 0.0001 | 0.3303 | 0.06 | 0.30 | 0.36 |
| Rougheye/blackspotted rf. | 0.0253 | 0.0105 | 0.4137 | 3.47 | 1.20 | 4.67 |
| Shortraker rf. | 0.0009 | 0.0003 | 0.3824 | 0.12 | 0.05 | 0.18 |
| Shortraker/rougheye/blackspotted rf. | 0.0126 | 0.0049 | 0.3883 | 1.73 | — | 1.73 |
| Slope rf., unid. | 0.0002 | 0.0000 | 0.1558 | 0.03 | 0.07 | 0.10 |
| Splitnose rf. | — | — | — | — | 0.00 | 0.00 |
| Yellowmouth rf. | 0.0001 | 0.0000 | 0.1558 | 0.02 | 0.02 | 0.04 |
| Pacific cod | — | — | — | — | 0.05 | 0.05 |
| Pacific hake | 0.0021 | 0.0011 | 0.5048 | 0.29 | 0.03 | 0.32 |
| Pacific ocean perch (N of 40°10'N) | 0.0002 | 0.0000 | 0.2018 | 0.02 | 0.02 | 0.04 |
| Petrale sole | 0.0012 | 0.0005 | 0.3658 | 0.17 | 0.07 | 0.25 |
| Sablefish (N of 36°N) | 0.3600 | 0.1562 | 0.4340 | 49.34 | 32.65 | 42.52 |
| 20% discard mortality (FG) | | | | 9.87 | | |

Table 9b (continued). Observed discard ratios, SE, CV, estimated discard (mt), landings (mt), and fishing mortality estimates (mt) of groundfish species in the directed Pacific halibut fishery.

| Directed Pacific Halibut Fishery | Observed vessels | | Observed trips | Observed tows | Expansion factor (fleet landings of PHLB, mt) | |
|---|---|---|---|---|---|---|
| | 13 | | 22 | 62 | 137 | |
| Weight (mt) | Discard ratio | SE | CV | Discard | Landed | Total estimate |
| **Groundfish species** | | | | | | |
| SST (N of 34°27'N) | 0.0054 | 0.0013 | 0.2334 | 0.75 | 0.13 | 0.87 |
| Spiny dogfish shark | 0.0027 | 0.0010 | 0.3612 | 0.37 | 0.03 | 0.22 |
| 50% discard mortlaity (line) | | | | 0.19 | | |
| Widow rf. | 0.0002 | 0.0000 | 0.1558 | 0.02 | 0.01 | 0.03 |
| YELLOWEYE RF. | 0.0049 | 0.0008 | 0.1558 | 0.68 | — | 0.68 |
| Yellowtail rf. (N of 40°10'N) | 0.0003 | 0.0001 | 0.2177 | 0.04 | 0.04 | 0.08 |
| **Nongroundfish species** | | | | | | |
| Dungeness crab | 0.0002 | 0.0000 | 0.2163 | 0.02 | — | 0.02 |
| Other nongroundfish | | | | | | |
| Skate, unid. | 0.0197 | 0.0055 | 0.2770 | 2.70 | 0.66 | 3.36 |

Table 10. Commercial landings of nearshore species (mt) in Oregon and California during 2017, partitioned by depth interval and groundfish management area based on observed catch, 2003–17. Data from both states were combined. The California state-permit framework, which groups nearshore rockfish by depth (deeper vs. nearshore), is represented in the area south of lat 40°10'N.

| | Total observed landings | 2003–17 percentage observed catch by depth (fth) | | | | Fleet landings | 2017 fleet landings reallocated by depth (fth) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0–10 | 10–20 | 20–30 | >30 | | 0–10 | 10–20 | 20–30 | >30 |
| **North of lat 40°10'N** | | | | | | | | | | |
| Black rf. (CA) | 78.86 | 40.9% | 56.5% | 2.4% | 0.3% | 38.98 | 15.94 | 22.02 | 0.92 | 0.10 |
| Black rf. (OR) | 131.01 | 46.0% | 51.4% | 2.2% | 0.5% | 106.61 | 49.00 | 54.77 | 2.33 | 0.50 |
| Cabezon (CA) | 2.72 | 37.7% | 53.8% | 8.5% | 0.1% | 0.81 | 0.31 | 0.44 | 0.07 | 0.00 |
| Cabezon (OR) | 29.68 | 31.1% | 64.8% | 3.4% | 0.7% | 25.14 | 7.82 | 16.29 | 0.86 | 0.17 |
| Lingcod (N of 40°10'N) | 49.89 | 29.1% | 62.1% | 8.4% | 0.4% | 55.05 | 16.04 | 34.20 | 4.60 | 0.21 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | |
| Black and yellow rf. | 0.07 | 33.6% | 66.4% | — | — | 0.01 | 0.00 | 0.01 | — | — |
| Blue/deacon rf. | 18.92 | 20.8% | 69.7% | 9.1% | 0.4% | 9.07 | 1.89 | 6.32 | 0.82 | 0.04 |
| Brown rf. | 0.31 | 10.6% | 33.2% | 56.2% | — | 0.04 | 0.00 | 0.01 | 0.02 | — |
| China rf. | 7.76 | 28.8% | 65.1% | 5.7% | 0.4% | 3.92 | 1.13 | 2.55 | 0.23 | 0.01 |
| Copper rf. | 2.08 | 12.3% | 69.4% | 18.3% | 0.0% | 2.92 | 0.36 | 2.03 | 0.53 | 0.00 |
| Gopher rf. | 0.07 | 36.8% | 59.2% | 4.0% | — | 0.03 | 0.01 | 0.02 | 0.00 | — |
| Grass rf. | 0.49 | 88.7% | 10.5% | 0.6% | 0.1% | 0.10 | 0.09 | 0.01 | 0.00 | 0.00 |
| Olive rf. | 0.20 | 17.8% | 63.9% | 17.0% | 1.4% | 0.08 | 0.01 | 0.05 | 0.01 | 0.00 |
| Quillback rf. | 3.02 | 9.9% | 63.0% | 26.6% | 0.6% | 2.81 | 0.28 | 1.77 | 0.75 | 0.02 |
| Other groundfish | | | | | | | | | | |
| Kelp greenling (CA) | 0.80 | 30.9% | 68.1% | 0.5% | 0.5% | 0.26 | 0.08 | 0.18 | 0.00 | 0.00 |
| Kelp greenling (OR) | 18.02 | 47.5% | 50.7% | 1.3% | 0.6% | 8.21 | 3.90 | 4.16 | 0.11 | 0.05 |
| **South of lat 40°10'N** | | | | | | | | | | |
| Black rf. (CA) | 2.21 | 48.7% | 49.0% | 1.7% | 0.6% | 2.69 | 1.31 | 1.32 | 0.05 | 0.02 |
| Cabezon (CA) | 8.04 | 87.6% | 11.1% | 0.3% | 1.0% | 20.04 | 17.56 | 2.23 | 0.05 | 0.20 |
| CA scorpionfish (S of 34°27'N) | 0.63 | 2.9% | 1.0% | 30.8% | 65.2% | 0.08 | 0.00 | 0.00 | 0.02 | 0.05 |
| Deeper ns. rf. | | | | | | | | | | |
| Blue/deacon rf. | 1.69 | 33.8% | 53.3% | 10.0% | 2.9% | 7.53 | 2.55 | 4.01 | 0.75 | 0.22 |
| Brown rf. | 13.09 | 22.6% | 66.4% | 10.2% | 0.8% | 17.84 | 4.03 | 11.85 | 1.81 | 0.14 |
| Copper rf. | 0.99 | 12.5% | 57.2% | 21.3% | 9.0% | 7.10 | 0.89 | 4.07 | 1.51 | 0.64 |
| Nearshore rf., unid. | 0.57 | 34.1% | 22.7% | 29.2% | 14.0% | 0.20 | 0.07 | 0.04 | 0.06 | 0.03 |
| Olive rf. | 0.58 | 20.8% | 57.1% | 21.1% | 1.0% | 0.23 | 0.05 | 0.13 | 0.05 | 0.00 |
| Quillback rf. | 0.16 | — | 45.6% | 53.2% | 1.1% | 0.32 | — | 0.15 | 0.17 | 0.00 |
| Treefish rf. | 0.32 | 39.3% | 54.4% | 2.4% | 4.0% | 2.31 | 0.91 | 1.26 | 0.05 | 0.09 |

Table 10 (continued). Commercial landings of nearshore species (mt) in Oregon and California during 2017, partitioned by depth interval and groundfish management area based on observed catch, 2003–17.

| | Total observed landings | 2003–17 percentage observed catch by depth (fth) | | | | Fleet landings | 2017 fleet landings reallocated by depth (fth) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0–10 | 10–20 | 20–30 | >30 | | 0–10 | 10–20 | 20–30 | >30 |
| **South of lat 40°10'N** | | | | | | | | | | |
| Lingcod (S of 40°10'N) | 9.82 | 34.0% | 56.1% | 9.1% | 0.8% | 22.57 | 7.66 | 12.66 | 2.06 | 0.18 |
| Other groundfish | | | | | | | | | | |
| Kelp greenling (CA) | 1.58 | 50.0% | 47.7% | 1.5% | 0.8% | 3.26 | 1.63 | 1.55 | 0.05 | 0.02 |
| Other rockfish | | | | | | | | | | |
| Rockfish, unid. | 0.10 | 34.3% | 28.3% | — | 37.3% | 0.27 | 0.09 | 0.08 | — | 0.10 |
| Shallow ns. rf. | | | | | | | | | | |
| Black and yellow rf. | 2.49 | 85.8% | 12.2% | 0.3% | 1.7% | 12.87 | 11.04 | 1.57 | 0.04 | 0.22 |
| China rf. | 0.72 | 28.3% | 51.4% | 19.6% | 0.7% | 1.25 | 0.35 | 0.64 | 0.25 | 0.01 |
| Gopher rf. | 7.30 | 46.8% | 45.9% | 6.6% | 0.8% | 25.42 | 11.89 | 11.66 | 1.67 | 0.20 |
| Grass rf. | 1.04 | 96.5% | 3.0% | 0.3% | 0.2% | 10.42 | 10.06 | 0.31 | 0.03 | 0.02 |
| Kelp rf. | 0.21 | 64.8% | 34.5% | 0.5% | 0.2% | 0.68 | 0.44 | 0.24 | 0.00 | 0.00 |
| Nearshore rf., unid. | 0.27 | 61.7% | 29.8% | 1.7% | 6.8% | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other nongroundfish | | | | | | | | | | |
| CA sheephead | 22.02 | 67.8% | 30.3% | 1.6% | 0.3% | 19.90 | 13.49 | 6.02 | 0.33 | 0.05 |

Table 11. Observed discard CVs from the commercial nearshore fixed gear fishery by groundfish management area and depth. Because the strata at which discard ratios, estimates, and mortality rates applied were confidential, we report CVs at the finest possible level of aggregated state and depth strata. Aggregated mortality estimates are reported in Tables 12a and 12b. The California state-permit framework is represented in the area south of lat 40°10'N. Some listed species are under state nearshore fixed gear management, but not included in the groundfish FMP.

| Nearshore Fixed Gear Fishery | North of 40°10'N | | | | | | | | | South of 40°10'N | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | | | 10–20 fth | | | >20 fth | | | 0–10 fth | | | 10–20 fth | | | 20–30 fth | | | >30 fth | | |
| | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets |
| Expansion factor | 41 | 80 | 92 | 47 | 132 | 159 | 16 | 26 | 27 | 17 | 20 | 25 | 20 | 62 | 69 | 5 | 6 | 6 | 6 | 12 | 19 |
| Fleet landings of ns. species (mt) | | 97 | | | 145 | | | 12 | | | 101 | | | 60 | | | 9 | | | 2 | |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Big skate | | — | | | — | | | — | | | — | | | — | | | 0.1342 | | | — | |
| Black rf. (CA) | | 0.1222 | | | 0.4406 | | | 0.4077 | | | — | | | 0.3903 | | | 0.2503 | | | — | |
| Black rf. (OR) | | 0.3721 | | | 0.2495 | | | 0.2230 | | | — | | | — | | | — | | | — | |
| Cabezon (CA) | | — | | | — | | | 0.0642 | | | — | | | 0.6296 | | | 0.3104 | | | — | |
| Cabezon (OR) | | 0.2983 | | | 0.2088 | | | 0.2674 | | | — | | | — | | | — | | | — | |
| CA scorpionfish (S of 34°27'N) | | — | | | — | | | — | | | 0.6284 | | | 0.1976 | | | 0.1342 | | | — | |
| Canary rf. | | 0.3562 | | | 0.2183 | | | 0.2486 | | | 0.4182 | | | 0.1976 | | | 0.4543 | | | — | |
| Deeper ns. rf. | | | | | | | | | | | | | | | | | | | | | |
| Blue/deacon rf. | | — | | | — | | | — | | | — | | | 0.3973 | | | 0.3623 | | | 0.5443 | |
| Brown rf. | | — | | | — | | | — | | | 0.4335 | | | 0.3530 | | | 0.2174 | | | — | |
| Calico rf. | | — | | | — | | | — | | | — | | | 0.1976 | | | 0.3515 | | | — | |
| Copper rf. | | — | | | — | | | — | | | 0.3362 | | | 0.4034 | | | 0.3217 | | | 0.4281 | |
| Olive rf. | | — | | | — | | | — | | | — | | | 0.3888 | | | 0.5034 | | | — | |
| Treefish rf. | | — | | | — | | | — | | | — | | | 0.3363 | | | 0.2427 | | | 0.4281 | |
| ECS | | | | | | | | | | | | | | | | | | | | | |
| CA skate | | — | | | — | | | — | | | 0.4488 | | | — | | | — | | | — | |
| Soupfin shark | | — | | | — | | | — | | | 0.6134 | | | — | | | — | | | — | |
| Spotted ratfish | | 0.4998 | | | — | | | — | | | 0.4411 | | | — | | | — | | | — | |
| English sole | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Lingcod (N of 40°10'N) | | 0.6189 | | | 0.2277 | | | 0.1763 | | | — | | | — | | | — | | | — | |
| Lingcod (S of 40°10'N) | | — | | | — | | | — | | | 0.4078 | | | 0.3105 | | | 0.2067 | | | 0.5297 | |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Blue/deacon rf. | | 0.3924 | | | 0.2295 | | | 0.1736 | | | — | | | — | | | — | | | — | |
| China rf. | | 0.3872 | | | 0.3394 | | | 0.1602 | | | — | | | — | | | — | | | — | |
| Copper rf. | | 0.4003 | | | — | | | 0.2750 | | | — | | | — | | | — | | | — | |
| Gopher rf. | | — | | | — | | | 0.0642 | | | — | | | — | | | — | | | — | |
| Olive rf. | | — | | | — | | | 0.0642 | | | — | | | — | | | — | | | — | |
| Quillback rf. | | 0.4293 | | | 0.3021 | | | 0.1592 | | | — | | | — | | | — | | | — | |

Table 11 (continued). Observed discard CVs from the commercial nearshore fixed gear fishery by groundfish management area and depth.

| Nearshore Fixed Gear Fishery | North of 40°10'N | | | | | | | | | South of 40°10'N | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | | | 10–20 fth | | | >20 fth | | | 0–10 fth | | | 10–20 fth | | | 20–30 fth | | | >30 fth | | |
| | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets |
| Expansion factor | 41 | 80 | 92 | 47 | 132 | 159 | 16 | 26 | 27 | 17 | 20 | 25 | 20 | 62 | 69 | 5 | 6 | 6 | 6 | 12 | 19 |
| Fleet landings of ns. species (mt) | | 97 | | | 145 | | | 12 | | | 101 | | | 60 | | | 9 | | | 2 | |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Rosethorn rf. | | — | | | — | | | 0.0642 | | | — | | | — | | | — | | | — | |
| Rosy rf. | | 0.4678 | | | — | | | 0.0642 | | | — | | | — | | | — | | | — | |
| Vermilion rf. | | 0.4165 | | | 0.0786 | | | 0.5118 | | | — | | | — | | | — | | | — | |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Bronzespotted rf. | | — | | | — | | | — | | | — | | | — | | | 0.1342 | | | — | |
| Flag rf. | | — | | | — | | | — | | | 0.3931 | | | — | | | — | | | — | |
| Freckled rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Greenspotted rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Greenstriped rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Halfbanded rf. | | — | | | — | | | — | | | 0.5167 | | | — | | | — | | | — | |
| Honeycomb rf. | | — | | | — | | | — | | | 0.4089 | | | — | | | 0.1342 | | | — | |
| Mexican rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Rosethorn rf. | | — | | | — | | | — | | | — | | | 0.1976 | | | — | | | — | |
| Rosy rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | 0.1342 | | | 0.4281 | |
| Squarespot rf. | | — | | | — | | | — | | | — | | | — | | | — | | | 0.4281 | |
| Starry rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | 0.1342 | | | — | |
| Swordspine rf. | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Vermilion rf. | | — | | | — | | | — | | | — | | | — | | | 0.3716 | | | — | |
| Yellowtail rf. | | — | | | — | | | — | | | 0.6243 | | | 0.1976 | | | 0.2740 | | | 0.4281 | |
| Other flatfish | | | | | | | | | | | | | | | | | | | | | |
| Pacific sanddab | | — | | | — | | | — | | | 0.4666 | | | — | | | 0.1342 | | | 0.4281 | |
| Rock sole | | — | | | — | | | 0.0642 | | | — | | | — | | | 0.2956 | | | — | |
| Sand sole | | — | | | 0.0786 | | | — | | | — | | | — | | | — | | | — | |
| Other groundfish | | | | | | | | | | | | | | | | | | | | | |
| Kelp greenling (CA) | | — | | | — | | | 0.4367 | | | — | | | 0.1976 | | | 0.2997 | | | 0.4281 | |
| Kelp greenling (OR) | | 0.3218 | | | 0.1854 | | | 0.2169 | | | — | | | — | | | — | | | — | |

Table 11 (continued). Observed discard CVs from the commercial nearshore fixed gear fishery by groundfish management area and depth.

| Nearshore Fixed Gear Fishery | North of 40°10'N | | | | | | | | | South of 40°10'N | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | | | 10–20 fth | | | >20 fth | | | 0–10 fth | | | 10–20 fth | | | 20–30 fth | | | >30 fth | | |
| | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets | Obs'd vessels | Obs'd trips | Obs'd sets |
| Expansion factor | **41** | **80** | **92** | **47** | **132** | **159** | **16** | **26** | **27** | **17** | **20** | **25** | **20** | **62** | **69** | **5** | **6** | **6** | **6** | **12** | **19** |
| Fleet landings of ns. species (mt) | | **97** | | | **145** | | | **12** | | | **101** | | | **60** | | | **9** | | | **2** | |
| Black and yellow rf. | | — | | | — | | | — | | | — | | | 0.4736 | | | 0.3679 | | | — | |
| China rf. | | — | | | — | | | — | | | 0.6353 | | | 0.4031 | | | 0.2418 | | | 0.7350 | |
| Gopher rf. | | — | | | — | | | — | | | 0.3987 | | | 0.3432 | | | 0.2244 | | | 0.5401 | |
| Grass rf. | | — | | | — | | | — | | | — | | | 0.1976 | | | — | | | — | |
| Kelp rf. | | — | | | — | | | — | | | — | | | 0.4125 | | | — | | | — | |
| Spiny dogfish | | — | | | — | | | — | | | 0.4890 | | | — | | | 0.3445 | | | — | |
| Widow rf. | | 0.4367 | | | 0.0786 | | | 0.3200 | | | 0.3362 | | | — | | | — | | | 0.4281 | |
| YELLOWEYE RF. | | 0.3206 | | | 0.2657 | | | 0.1642 | | | — | | | — | | | 0.1342 | | | 0.4281 | |
| Yellowtail rf. (N of 40°10'N) | | 0.2593 | | | 0.4653 | | | 0.1717 | | | — | | | — | | | — | | | — | |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Dungeness crab | | — | | | — | | | 0.5880 | | | — | | | 0.1976 | | | 0.2948 | | | — | |
| Other nongroundfish | | | | | | | | | | | | | | | | | | | | | |
| Brown Irish lord sculpin | | — | | | — | | | 0.0642 | | | — | | | — | | | 0.3716 | | | — | |
| Buffalo sculpin | | — | | | 0.3245 | | | 0.6283 | | | — | | | — | | | — | | | — | |
| CA sheephead | | — | | | — | | | — | | | 0.3362 | | | 0.3444 | | | 0.3663 | | | — | |
| Red Irish lord sculpin | | 0.3822 | | | 0.1913 | | | 0.2094 | | | — | | | — | | | — | | | — | |
| Sculpin, unid. | | 0.5754 | | | — | | | 0.5718 | | | — | | | 0.1976 | | | 0.3456 | | | — | |
| Starry skate | | — | | | — | | | — | | | 0.3362 | | | — | | | — | | | — | |
| Shared ECS | | | | | | | | | | | | | | | | | | | | | |
| Pacific saury | | — | | | — | | | — | | | — | | | — | | | 0.1342 | | | — | |

Table 12a. Gross estimated discard (mt), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) at non-confidential depth strata for the commercial nearshore fixed gear fishery north of lat 40°10'N. Mortality rates applied (at finer, confidential strata) are reported in Table A-4. Some listed species are under state nearshore fixed gear management, but not included in the groundfish FMP.

| Nearshore Fixed Gear Fishery North of 40°10'N | Gross estimated discard by depth | | | Estimated discard mortality by depth | | | Estimated discard mortality | Fleet landings | Estimated fishing mortality |
|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | 10–20 fth | >20 fth | 0–10 fth | 10–20 fth | >20 fth | | | |
| **Groundfish species** | | | | | | | | | |
| Big skate | — | — | — | — | — | — | — | 0.06 | 0.06 |
| Black rf. (CA) | 0.59 | 0.33 | 0.00 | 0.11 | 0.09 | 0.00 | 0.20 | 38.98 | 39.18 |
| Black rf. (OR) | 3.96 | 3.09 | 0.10 | 0.71 | 0.87 | 0.05 | 1.63 | 106.61 | 108.23 |
| Cabezon (CA) | — | 0.02 | — | — | 0.00 | — | 0.00 | 0.81 | 0.81 |
| Cabezon (OR) | 0.51 | 0.78 | 0.02 | 0.04 | 0.05 | 0.00 | 0.09 | 25.14 | 25.23 |
| Canary rf. | 0.14 | 0.47 | 0.06 | 0.04 | 0.20 | 0.04 | 0.28 | 2.87 | 3.15 |
| ECS | | | | | | | | | |
| Soupfin shark | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Spotted ratfish | — | — | 0.02 | — | — | 0.00 | 0.00 | — | 0.00 |
| Lingcod | 10.63 | 15.18 | 1.07 | 0.74 | 1.06 | 0.07 | 1.88 | 55.05 | 56.94 |
| Longnose skate | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Minor ns. rf. | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Blue/deacon rf. | 2.06 | 3.78 | 0.32 | 0.52 | 1.40 | 0.18 | 2.10 | 9.07 | 11.16 |
| Brown rf. | — | — | — | — | — | — | — | 0.04 | 0.04 |
| China rf. | 0.21 | 0.68 | 0.02 | 0.04 | 0.21 | 0.01 | 0.26 | 3.92 | 4.19 |
| Copper rf. | — | 0.09 | 0.01 | — | 0.03 | 0.01 | 0.04 | 2.92 | 2.96 |
| Gopher rf. | — | 0.00 | — | — | 0.00 | — | 0.00 | 0.03 | 0.03 |
| Grass rf. | — | — | — | — | — | — | — | 0.10 | 0.10 |
| Olive rf. | — | 0.00 | — | — | 0.00 | — | 0.00 | 0.08 | 0.08 |
| Quillback rf. | 0.08 | 0.36 | 0.02 | 0.02 | 0.15 | 0.01 | 0.18 | 2.81 | 2.99 |
| Minor sh. rf. | | | | | | | | | |
| Bocaccio rf. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Greenspotted rf. | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Greenstriped rf. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Rosethorn rf. | — | 0.01 | — | — | 0.01 | — | 0.01 | — | 0.01 |
| Rosy rf. | — | 0.02 | 0.02 | — | 0.02 | 0.02 | 0.03 | 0.00 | 0.03 |
| Shelf rf. , unid. | — | — | — | — | — | — | — | 0.07 | 0.07 |
| Tiger rf. | — | — | — | — | — | — | — | 0.25 | 0.25 |
| Vermilion rf. | 0.00 | 0.18 | 0.05 | 0.00 | 0.07 | 0.03 | 0.10 | 3.91 | 4.02 |

Table 12a (continued). Gross estimated discard (mt), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) at non-confidential depth strata for the commercial nearshore fixed gear fishery north of lat 40°10'N.

| Nearshore Fixed Gear Fishery North of 40°10'N | Gross estimated discard by depth | | | Estimated discard mortality by depth | | | Estimated discard mortality | Fleet landings | Estimated fishing mortality |
|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | 10–20 fth | >20 fth | 0–10 fth | 10–20 fth | >20 fth | | | |
| **Groundfish species** | | | | | | | | | |
| Minor sl. rf. | | | | | | | | | |
| Slope rf., unid. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Other flatfish | | | | | | | | | |
| Pacific sanddab | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Rock sole | — | 0.00 | — | — | 0.00 | — | 0.00 | 0.00 | 0.00 |
| Sand sole | 0.01 | — | — | 0.00 | — | — | 0.00 | 0.00 | 0.00 |
| Sanddab, unid. | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Other groundfish | | | | | | | | | |
| Kelp greenling (CA) | — | 0.00 | — | — | 0.00 | — | 0.00 | 0.26 | 0.26 |
| Kelp greenling (OR) | 0.17 | 0.25 | 0.02 | 0.01 | 0.02 | 0.00 | 0.03 | 8.21 | 8.24 |
| Petrale sole | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Sablefish (N of 36°N) | — | — | — | — | — | — | — | 0.10 | 0.10 |
| Spiny dogfish | — | — | — | — | — | — | — | 0.05 | 0.05 |
| Starry flounder | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Widow rf. | 0.01 | 0.00 | 0.03 | 0.00 | 0.00 | 0.02 | 0.03 | 0.16 | 0.18 |
| Yelloweye rf. | 0.18 | 2.81 | 1.04 | 0.05 | 1.27 | 0.70 | 2.02 | 0.00 | 2.02 |
| Yellowtail rf. | 0.31 | 0.43 | 0.02 | 0.05 | 0.11 | 0.01 | 0.17 | 1.11 | 1.28 |
| **Nongroundfish species** | | | | | | | | | |
| Dungeness crab | — | 0.00 | — | — | 0.00 | — | 0.00 | 1.17 | 1.17 |
| Other nongroundfish | | | | | | | | | |
| Brown Irish lord sculpin | — | 0.00 | — | — | 0.00 | — | 0.00 | — | 0.00 |
| Buffalo sculpin | 0.02 | 0.15 | — | 0.02 | 0.15 | — | 0.17 | — | 0.17 |
| Red Irish lord sculpin | 0.05 | 0.07 | 0.00 | 0.05 | 0.07 | 0.00 | 0.12 | — | 0.12 |
| Sculpin, unid. | — | 0.01 | 0.00 | — | 0.01 | 0.00 | 0.01 | — | 0.01 |
| Skate, unid. | — | — | — | — | — | — | — | 0.10 | 0.10 |

Table 12b. Gross estimated discard (mt), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) at non-confidential depth strata for the commercial nearshore fixed gear fishery south of lat 40°10'N. The California state-permit framework is also represented. Mortality rates applied (at finer, confidential strata) are reported in Table A-4. Some listed species are under state nearshore fixed gear management, but not included in the groundfish FMP.

| Nearshore Fixed Gear Fishery South of 40°10'N | Gross estimated discard by depth | | | | Estimated discard mortality by depth | | | | Estimated discard mortality | Fleet landings | Estimated fishing mortality |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | | | |
| **Groundfish species** | | | | | | | | | | | |
| Big skate | — | 0.43 | — | — | — | 0.03 | — | — | 0.03 | — | 0.03 |
| Black rf. (CA) | 0.19 | 0.11 | — | — | 0.10 | 0.07 | — | — | 0.17 | 2.69 | 2.86 |
| Bocaccio rf. | — | — | — | — | — | — | — | — | — | 0.77 | 0.77 |
| Cabezon (CA) | 1.52 | 0.81 | — | — | 0.11 | 0.06 | — | — | 0.16 | 20.04 | 20.20 |
| CA scorpionfish (N of 34°27'N) | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| CA scorpionfish (S of 34°27'N) | 0.04 | 0.06 | — | 0.39 | 0.00 | 0.00 | — | 0.03 | 0.03 | 0.08 | 0.11 |
| Canary rf. | 0.01 | 2.27 | — | 0.43 | 0.01 | 1.61 | — | 0.43 | 2.05 | 1.66 | 3.70 |
| Chilipepper rf. | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Deeper ns. rf. | | | | | | | | | | | |
| Blue/deacon rf. | 0.58 | 0.71 | 0.15 | — | 0.33 | 0.48 | 0.11 | — | 0.92 | 7.53 | 8.45 |
| Brown rf. | 0.22 | 1.71 | — | 0.10 | 0.12 | 1.09 | — | 0.10 | 1.32 | 17.84 | 19.16 |
| Calico rf. | 0.00 | 0.00 | — | — | 0.00 | 0.00 | — | — | 0.01 | — | 0.01 |
| Copper rf. | 0.02 | 0.06 | 0.08 | 0.04 | 0.01 | 0.04 | 0.06 | 0.04 | 0.15 | 7.10 | 7.26 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | — | 0.20 | 0.20 |
| Olive rf. | 0.11 | 0.01 | — | — | 0.07 | 0.01 | — | — | 0.08 | 0.23 | 0.31 |
| Quillback rf. | — | — | — | — | — | — | — | — | — | 0.32 | 0.32 |
| Treefish rf. | 0.30 | 0.32 | 0.03 | — | 0.16 | 0.21 | 0.02 | — | 0.40 | 2.31 | 2.71 |
| ECS | | | | | | | | | | | |
| CA skate | — | — | — | 0.03 | — | — | — | 0.00 | 0.00 | — | 0.00 |
| Soupfin shark | — | — | — | 0.05 | — | — | — | 0.00 | 0.00 | 0.65 | 0.65 |
| Spotted ratfish | — | — | — | 0.08 | — | — | — | 0.01 | 0.01 | 0.00 | 0.01 |
| English sole | — | — | — | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 |
| Lingcod | 0.99 | 10.07 | 2.03 | 0.24 | 0.07 | 0.70 | 0.14 | 0.02 | 0.93 | 22.57 | 23.50 |
| LST (N of 34°27'N) | — | — | — | — | — | — | — | — | — | 0.47 | 0.47 |

Table 12b (continued). Gross estimated discard (mt), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) at non-confidential depth strata for the commercial nearshore fixed gear fishery south of lat 40°10'N.

| Nearshore Fixed Gear Fishery South of 40°10'N | Gross estimated discard by depth | | | | Estimated discard mortality by depth | | | | Estimated discard mortality | Fleet landings | Estimated fishing mortality |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | | | |
| **Groundfish species** | | | | | | | | | | | |
| Minor sh. rf. | | | | | | | | | | | |
| Bronzespotted rf. | — | 0.10 | — | — | — | 0.10 | — | — | 0.10 | — | 0.10 |
| Flag rf. | — | — | — | 0.00 | — | — | — | 0.00 | 0.00 | 0.04 | 0.04 |
| Freckled rf. | — | — | — | 0.01 | — | — | — | 0.01 | 0.01 | — | 0.01 |
| Greenspotted rf. | — | — | — | 0.02 | — | — | — | 0.02 | 0.02 | 0.11 | 0.13 |
| Greenstriped rf. | — | — | — | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 |
| Halfbanded rf. | — | — | — | 0.03 | — | — | — | 0.03 | 0.03 | — | 0.03 |
| Honeycomb rf. | — | 0.00 | — | 0.01 | — | 0.00 | — | 0.01 | 0.01 | 0.00 | 0.01 |
| Mexican rf. | — | — | — | 0.00 | — | — | — | 0.00 | 0.00 | 0.07 | 0.07 |
| Pink rf. | — | — | — | — | — | — | — | — | — | 0.03 | 0.03 |
| Rosethorn rf. | 0.00 | — | — | — | 0.00 | — | — | — | 0.00 | 0.05 | 0.06 |
| Rosy rf. | — | 0.01 | 0.01 | 0.00 | — | 0.01 | 0.01 | 0.00 | 0.02 | 0.09 | 0.11 |
| Shelf rf., unid. | — | — | — | — | — | — | — | — | — | 0.35 | 0.35 |
| Speckled rf. | — | — | — | — | — | — | — | — | — | 0.13 | 0.13 |
| Squarespot rf. | — | — | 0.01 | — | — | — | 0.01 | — | 0.01 | 0.02 | 0.03 |
| Starry rf. | — | 0.02 | — | 0.00 | — | 0.02 | — | 0.00 | 0.02 | 0.30 | 0.32 |
| Swordspine rf. | — | — | — | 0.00 | — | — | — | 0.00 | 0.00 | — | 0.00 |
| Vermilion rf. | — | 0.02 | — | — | — | 0.01 | — | — | 0.01 | 10.98 | 10.99 |
| Yellowtail rf. | 0.01 | 0.04 | 0.24 | 0.02 | 0.00 | 0.03 | 0.16 | 0.02 | 0.21 | 0.64 | 0.85 |
| Minor sl. rf. | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Bank rf. | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Blackgill rf. | — | — | — | — | — | — | — | — | — | 0.93 | 0.93 |
| Slope rf., unid. | — | — | — | — | — | — | — | — | — | 0.06 | 0.06 |
| Mixed thornyheads | | | | | | | | | | | |
| SST/LST | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Other flatfish | | | | | | | | | | | |
| Curlfin sole | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Flatfish, unid. | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Pacific sanddab | — | 0.00 | 0.01 | 0.10 | — | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 |
| Rock sole | — | 0.01 | — | — | — | 0.00 | — | — | 0.00 | 0.03 | 0.03 |
| Sand sole | — | — | — | — | — | — | — | — | — | 0.14 | 0.14 |
| Sanddab, unid. | — | — | — | — | — | — | — | — | — | 0.14 | 0.14 |

Table 12b (continued). Gross estimated discard (mt), estimated discard mortality (mt), fleet landings (mt), and fishing mortality estimates (mt) at non-confidential depth strata for the commercial nearshore fixed gear fishery south of lat 40°10'N.

| Nearshore Fixed Gear Fishery South of 40°10'N | Gross estimated discard by depth | | | | Estimated discard mortality by depth | | | | Estimated discard mortality | Fleet landings | Estimated fishing mortality |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | 0–10 fth | 10–20 fth | 20–30 fth | >30 fth | | | |
| **Groundfish species** | | | | | | | | | | | |
| Other groundfish | | | | | | | | | | | |
| Kelp greenling (CA) | 0.00 | 0.17 | 0.07 | — | 0.00 | 0.01 | 0.00 | — | 0.02 | 3.26 | 3.27 |
| Leopard shark | — | — | — | — | — | — | — | — | — | 0.41 | 0.41 |
| Other rockfish | | | | | | | | | | | |
| Rockfish, unid. | — | — | — | — | — | — | — | — | — | 0.27 | 0.27 |
| Sablefish (N of 36°N) | — | — | — | — | — | — | — | — | — | 0.99 | 0.99 |
| Sablefish (S of 36°N) | — | — | — | — | — | — | — | — | — | 12.53 | 12.53 |
| Shallow ns. rf. | | | | | | | | | | | |
| Black and yellow rf. | 0.36 | 0.08 | — | — | 0.19 | 0.05 | — | — | 0.24 | 12.87 | 13.11 |
| China rf. | 0.04 | 0.63 | 0.28 | 0.04 | 0.02 | 0.41 | 0.20 | 0.04 | 0.68 | 1.25 | 1.93 |
| Gopher rf. | 0.35 | 1.02 | 0.54 | 0.02 | 0.20 | 0.70 | 0.42 | 0.02 | 1.34 | 25.42 | 26.76 |
| Grass rf. | 0.05 | — | — | — | 0.03 | — | — | — | 0.03 | 10.42 | 10.45 |
| Kelp rf. | 0.05 | — | — | — | 0.03 | — | — | — | 0.03 | 0.68 | 0.71 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| SST (N of 34°27'N) | — | — | — | — | — | — | — | — | — | 3.38 | 3.38 |
| SST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Spiny dogfish shark | — | 0.70 | — | 0.64 | — | 0.05 | — | 0.04 | 0.09 | 0.02 | 0.11 |
| Splitnose rf. | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 |
| Starry flounder | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| Widow rf. | — | — | 0.03 | 0.01 | — | — | 0.03 | 0.01 | 0.04 | 0.58 | 0.62 |
| Yelloweye rf. | — | 0.10 | 0.02 | — | — | 0.07 | 0.02 | — | 0.09 | 0.01 | 0.10 |
| CA halibut | — | — | — | — | — | — | — | — | — | 0.53 | 0.53 |
| **Nongroundfish species** | | | | | | | | | | | |
| Dungeness crab | 0.06 | 0.05 | — | — | 0.06 | 0.05 | — | — | 0.12 | 0.92 | 1.03 |
| Other nongroundfish | | | | | | | | | | | |
| Brown irish lord sculpin | — | 0.01 | — | — | — | 0.01 | — | — | 0.01 | — | 0.01 |
| CA sheephead | 40.93 | 16.12 | — | 0.00 | 40.93 | 16.12 | — | 0.00 | 57.05 | 19.90 | 76.95 |
| Sculpin unid | 0.08 | 0.05 | — | — | 0.08 | 0.05 | — | — | 0.14 | — | 0.14 |
| Skate unid | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Starry skate | — | — | — | 0.01 | — | — | — | 0.01 | 0.01 | — | 0.01 |
| Shared ECS | | | | | | | | | | | |
| Pacific saury | — | 0.00 | — | — | — | 0.00 | — | — | 0.00 | — | 0.00 |

Table 13. Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP. *Key*: OA = open access, FG = fixed gear. Weights are provided in metric tons (mt).

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Arrowtooth flounder | — | — | — | — | — | — | 1.13 | — | 1.13 | 0.01 | — | 0.01 | 32.53 | 2.57 | 35.10 | 15.35 | 0.89 | 16.24 | — | — | — |
| Big skate | 18.06 | 1.92 | 19.98 | 0.06 | — | 0.06 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | 2.16 | 3.99 | 6.14 | 0.18 | 0.72 | 0.91 | 0.03 | 0.06 | 0.09 |
| Black rf. (CA) | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.02 | 11.50 | 11.52 | — | — | — | 0.37 | 41.68 | 42.05 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Black rf. (OR) | — | — | — | — | — | — | — | — | — | — | — | — | — | 3.15 | 3.15 | — | — | — | 1.63 | 106.61 | 108.23 |
| Bocaccio rf. (S of 40°10'N) | — | — | — | 0.00 | — | 0.00 | 0.12 | — | 0.12 | 0.15 | 0.00 | 0.15 | 0.15 | 5.36 | 5.52 | — | — | — | — | 0.77 | 0.77 |
| Cabezon (CA) | 0.01 | — | 0.01 | — | — | — | — | — | — | 0.01 | 0.00 | 0.02 | 0.64 | 2.17 | 2.82 | — | — | — | 0.17 | 20.85 | 21.02 |
| Cabezon (OR) | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.15 | 0.15 | — | — | — | 0.09 | 25.14 | 25.23 |
| CA scorpionfish (N of 34°27'N) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| CA scorpionfish (S of 34°27'N) | 0.40 | — | 0.40 | 0.16 | — | 0.16 | — | — | — | 0.77 | 0.14 | 0.92 | 0.01 | 1.12 | 1.13 | — | — | — | 0.03 | 0.08 | 0.11 |
| Canary rf. | 0.01 | — | 0.01 | — | — | — | 0.07 | — | 0.07 | 0.01 | — | 0.01 | 0.84 | 4.20 | 5.03 | 0.02 | 0.22 | 0.24 | 2.32 | 4.53 | 6.85 |
| Chilipepper rf. (S of 40°10'N) | 0.01 | — | 0.01 | 0.01 | — | 0.01 | 1.07 | — | 1.07 | 0.65 | — | 0.65 | 0.11 | 0.91 | 1.02 | — | — | — | — | 0.01 | 0.01 |
| Cowcod rf. (S of 40°10'N) | — | — | — | — | — | — | 0.09 | — | 0.09 | 0.07 | — | 0.07 | — | — | — | — | — | — | — | — | — |
| Darkblotched rf. | — | — | — | 0.00 | — | 0.00 | 6.05 | — | 6.05 | 0.01 | — | 0.01 | 1.03 | 4.50 | 5.54 | 0.63 | 0.06 | 0.69 | — | — | — |
| Dover sole | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 | 4.56 | — | 4.56 | 10.52 | 0.01 | 10.52 | 2.90 | 3.18 | 6.09 | 0.17 | 0.04 | 0.22 | — | — | — |
| ECS | | | | | | | | | | | | | | | | | | | | | |
| Aleutian skate | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.08 | — | 0.08 | — | — | — | — | — | — |
| Black skate | — | — | — | — | — | — | — | — | — | — | — | — | 5.38 | 0.01 | 5.40 | — | — | — | — | — | — |
| CA grenadier | — | — | — | — | — | — | — | — | — | — | — | — | 0.18 | — | 0.18 | — | — | — | — | — | — |
| CA skate | 19.95 | 0.14 | 20.08 | 1.58 | — | 1.58 | 0.03 | — | 0.03 | 1.09 | — | 1.09 | 0.12 | 0.01 | 0.12 | — | — | — | 0.00 | — | 0.00 |
| Giant grenadier | — | — | — | — | — | — | — | — | — | — | — | — | 8.12 | 0.32 | 8.43 | — | — | — | — | — | — |
| Grenadier, unid. | — | — | — | — | — | — | — | — | — | — | — | — | 3.51 | 18.49 | 22.00 | — | — | — | — | — | — |
| Pacific flatnose | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.40 | — | 0.40 | — | — | — | — | — | — |
| Pacific grenadier | — | — | — | — | — | — | — | — | — | — | — | — | 9.07 | 0.66 | 9.73 | — | — | — | — | — | — |
| Sandpaper skate | 0.00 | — | 0.00 | — | — | — | 0.05 | — | 0.05 | — | — | — | 2.94 | — | 2.94 | 0.13 | — | 0.13 | — | — | — |
| Smooth grenadier | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | — | — | — |
| Soupfin shark | 0.90 | 0.03 | 0.93 | — | — | — | 0.00 | — | 0.00 | 0.04 | — | 0.04 | 0.47 | 0.30 | 0.77 | — | — | — | 0.00 | 0.66 | 0.67 |
| Spotted ratfish | 0.01 | — | 0.01 | — | — | — | 0.16 | — | 0.16 | 0.73 | — | 0.73 | 3.91 | — | 3.91 | 0.20 | — | 0.20 | 0.01 | 0.00 | 0.01 |
| English sole | 2.42 | 0.07 | 2.49 | 1.35 | 0.02 | 1.38 | 0.04 | — | 0.04 | 22.00 | 0.80 | 22.80 | — | 0.00 | 0.00 | — | — | — | 0.00 | 0.00 | 0.00 |
| Lingcod (N of 40°10'N) | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | 0.58 | 54.48 | 55.06 | 0.01 | 1.45 | 1.46 | 1.88 | 55.05 | 56.94 |
| Lingcod (S of 40°10'N) | 0.48 | 0.60 | 1.09 | 0.04 | — | 0.04 | — | — | — | 0.35 | 0.05 | 0.40 | 0.32 | 36.01 | 36.33 | — | — | — | 0.93 | 22.57 | 23.50 |
| Longnose skate | 0.22 | — | 0.22 | 0.02 | — | 0.02 | 0.49 | — | 0.49 | 0.38 | 0.01 | 0.39 | 59.92 | 46.53 | 106.45 | 4.02 | 3.04 | 7.06 | — | 0.02 | 0.02 |
| LST (N of 34°27'N) | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 3.37 | 4.06 | 7.43 | — | — | — | — | 0.47 | 0.47 |
| LST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | — | — | — | 0.79 | 11.25 | 12.04 | — | — | — | — | — | — |

Table 13 (continued). Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP.

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Blue/deacon rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.02 | 0.79 | 0.81 | — | — | — | 2.10 | 9.07 | 11.16 |
| Brown rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| China rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.03 | 0.03 | — | — | — | 0.26 | 3.92 | 4.19 |
| Copper rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.20 | 0.24 | — | — | — | 0.04 | 2.92 | 2.96 |
| Gopher rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.03 | 0.03 |
| Grass rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | — | 0.10 | 0.10 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — |
| Olive rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | 0.00 | 0.08 | 0.08 |
| Quillback rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.28 | 0.29 | — | — | — | 0.18 | 2.81 | 2.99 |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.06 | 1.76 | 1.82 | — | — | — | 0.24 | 12.87 | 13.11 |
| Blue/deacon rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.03 | 0.05 | — | — | — | 0.92 | 7.53 | 8.45 |
| Brown rf. | 0.18 | 0.00 | 0.18 | — | 0.00 | 0.00 | — | — | — | 0.01 | 0.00 | 0.02 | 0.04 | 0.04 | 0.08 | — | — | — | 1.32 | 17.84 | 19.16 |
| Calico rf. | 0.01 | — | 0.01 | 0.05 | — | 0.05 | — | — | — | 0.10 | — | 0.10 | — | — | — | — | — | — | 0.01 | — | 0.01 |
| China rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.24 | 0.24 | — | — | — | 0.68 | 1.25 | 1.93 |
| Copper rf. | 0.01 | 0.00 | 0.01 | 0.11 | 0.01 | 0.12 | — | — | — | 0.02 | — | 0.02 | 0.06 | 1.17 | 1.23 | — | — | — | 0.15 | 7.10 | 7.26 |
| Gopher rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 1.39 | 1.40 | — | — | — | 1.34 | 25.42 | 26.76 |
| Grass rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.19 | 0.20 | — | — | — | 0.03 | 10.42 | 10.45 |
| Kelp rf. | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 | — | 0.06 | 0.06 | — | — | — | 0.03 | 0.68 | 0.71 |
| Nearshore rf., unid. | — | — | — | — | — | — | 0.28 | — | 0.28 | — | — | — | — | 0.01 | 0.01 | — | — | — | — | 0.20 | 0.20 |
| Olive rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.00 | 0.02 | — | — | — | 0.08 | 0.23 | 0.31 |
| Quillback rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | 0.49 | 0.49 | — | — | — | — | 0.32 | 0.32 |
| Treefish rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.05 | 0.00 | 0.05 | — | — | — | 0.40 | 2.31 | 2.71 |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Bocaccio rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.07 | 0.60 | 0.68 | — | 0.05 | 0.05 | — | 0.00 | 0.00 |
| Chilipepper rf. | — | — | — | — | — | — | 1.49 | — | 1.49 | — | — | — | 0.12 | 0.43 | 0.55 | — | 0.00 | 0.00 | — | — | — |
| Cowcod rf. | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | 0.02 | — | 0.02 | — | — | — | — | — | — |
| Flag rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.08 | 0.08 | — | — | — | — | — | — |
| Greenspotted rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.00 | 0.01 | — | — | — | — | 0.01 | 0.01 |
| Greenstriped rf. | — | — | — | — | — | — | 0.68 | — | 0.68 | — | — | — | 1.01 | 0.19 | 1.20 | 0.05 | 0.00 | 0.06 | — | 0.00 | 0.00 |
| Halfbanded rf. | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — |

Table 13 (continued). Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP.

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Puget sound rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Pygmy rf. | — | — | — | — | — | — | 0.17 | — | 0.17 | — | — | — | — | — | — | — | — | — | — | — | — |
| Redstripe rf. | — | — | — | — | — | — | 0.17 | — | 0.17 | — | — | — | 0.05 | — | 0.05 | — | — | — | — | — | — |
| Rosethorn rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.38 | 0.11 | 0.49 | 0.01 | 0.02 | 0.03 | 0.01 | — | 0.01 |
| Rosy rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | 0.03 | 0.00 | 0.03 |
| Shelf rf., unid. | — | — | — | — | — | — | 2.15 | — | 2.15 | — | — | — | 0.13 | 0.44 | 0.57 | — | — | — | — | 0.07 | 0.07 |
| Silvergray rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.65 | 0.69 | 1.34 | — | 0.18 | 0.18 | — | — | — |
| Squarespot rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Stripetail rf. | — | — | — | — | — | — | 3.44 | — | 3.44 | — | — | — | — | — | — | — | — | — | — | — | — |
| Tiger rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | 0.01 | 0.01 | — | — | — | — | 0.25 | 0.25 |
| Vermilion rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | 0.27 | 0.27 | — | 0.01 | 0.01 | 0.10 | 3.91 | 4.02 |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Bronzespotted rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.10 | — | 0.10 |
| Flag rf. | — | — | — | — | — | — | — | — | — | 0.01 | — | 0.01 | — | 0.14 | 0.14 | — | — | — | 0.00 | 0.04 | 0.04 |
| Freckled rf. | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.02 | — | 0.02 | — | — | — | — | — | — | 0.01 | — | 0.01 |
| Greenblotched rf. | — | — | — | — | — | — | — | — | — | 0.08 | — | 0.08 | 0.00 | 0.05 | 0.05 | — | — | — | — | — | — |
| Greenspotted rf. | — | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | — | — | — | 0.02 | — | 0.02 | — | 1.58 | 1.58 | — | — | — | 0.02 | 0.11 | 0.13 |
| Greenstriped rf. | — | — | — | — | — | — | — | — | — | 0.05 | — | 0.05 | 0.01 | 0.13 | 0.14 | — | — | — | 0.00 | 0.00 | 0.00 |
| Halfbanded rf. | 0.00 | — | 0.00 | 0.64 | — | 0.64 | 0.01 | — | 0.01 | 4.14 | — | 4.14 | — | — | — | — | — | — | 0.03 | — | 0.03 |
| Honeycomb rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | — | — | — | 0.01 | 0.00 | 0.01 |
| Mexican rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | 0.02 | — | 0.02 | — | 0.74 | 0.74 | — | — | — | 0.00 | 0.07 | 0.07 |
| Pink rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.21 | 0.21 | — | — | — | — | 0.03 | 0.03 |
| Redstripe rf. | — | — | — | — | — | — | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — |
| Rosethorn rf. | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | 0.09 | 0.09 | — | — | — | 0.00 | 0.05 | 0.06 |
| Rosy rf. | 0.00 | — | 0.00 | — | — | — | — | — | — | 0.00 | — | 0.00 | 0.01 | 0.07 | 0.08 | — | — | — | 0.02 | 0.09 | 0.11 |
| Shelf rf., unid. | — | — | — | — | — | — | 0.58 | — | 0.58 | 0.63 | 0.04 | 0.67 | — | 0.77 | 0.77 | — | — | — | — | 0.35 | 0.35 |
| Speckled rf. | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 | — | 0.30 | 0.30 | — | — | — | — | 0.13 | 0.13 |
| Spotted rf., unid. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Squarespot rf. | — | — | — | 0.02 | — | 0.02 | 0.02 | — | 0.02 | 0.05 | — | 0.05 | — | 0.08 | 0.08 | — | — | — | 0.01 | 0.02 | 0.03 |
| Starry rf. | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | 0.71 | 0.71 | — | — | — | 0.02 | 0.30 | 0.32 |
| Stripetail rf. | 0.00 | — | 0.00 | 0.06 | — | 0.06 | 4.36 | — | 4.36 | 4.96 | — | 4.96 | — | — | — | — | — | — | — | — | — |
| Swordspine rf. | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Vermilion rf. | 0.01 | 0.00 | 0.02 | 0.03 | 0.00 | 0.04 | — | — | — | 0.56 | 0.01 | 0.57 | — | 33.55 | 33.55 | — | — | — | 0.01 | 10.98 | 10.99 |
| Yellowtail rf. | 0.01 | — | 0.01 | — | — | — | — | — | — | — | — | — | 0.01 | 2.68 | 2.69 | — | — | — | 0.21 | 0.64 | 0.85 |

Table 13 (continued). Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP.

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | 0.03 | 0.09 | 0.12 | — | 0.00 | 0.00 | — | — | — |
| Bank rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.00 | 0.01 | — | — | — | — | — | — |
| Blackgill rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.59 | 3.21 | 3.80 | — | 0.00 | 0.00 | — | — | — |
| Redbanded rf. | — | — | — | — | — | — | 0.14 | — | 0.14 | — | — | — | 8.52 | 18.04 | 26.57 | 0.06 | 0.30 | 0.36 | — | — | — |
| Rougheye/blackspotted rf. | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | 30.43 | 30.53 | 60.96 | 3.47 | 1.20 | 4.67 | — | — | — |
| Sharpchin rf. | — | — | — | — | — | — | 0.26 | — | 0.26 | — | — | — | 0.01 | 0.00 | 0.01 | — | — | — | — | — | — |
| Shortraker rf. | — | — | — | — | — | — | — | — | — | — | — | — | 1.74 | 2.23 | 3.97 | 0.12 | 0.05 | 0.18 | — | — | — |
| Shortraker/rougheye/blackspotted rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.90 | — | 0.90 | 1.73 | — | 1.73 | — | — | — |
| Slope rf., unid. | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 1.72 | 1.74 | 0.03 | 0.07 | 0.10 | — | 0.00 | 0.00 |
| Splitnose rf. | — | — | — | — | — | — | 0.87 | — | 0.87 | — | — | — | 0.04 | 0.05 | 0.09 | — | 0.00 | 0.00 | — | — | — |
| Yellowmouth rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 1.83 | 1.83 | 0.02 | 0.02 | 0.04 | — | — | — |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | | |
| Aurora rf. | — | — | — | — | — | — | 0.38 | — | 0.38 | 0.06 | — | 0.06 | 0.03 | 0.71 | 0.74 | — | — | — | — | 0.01 | 0.01 |
| Bank rf. | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 | — | 0.32 | 0.32 | — | — | — | — | 0.02 | 0.02 |
| Blackgill rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.46 | 26.06 | 26.53 | — | — | — | — | 0.93 | 0.93 |
| Redbanded rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.15 | 0.13 | 0.27 | — | — | — | — | — | — |
| Rougheye/blackspotted rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.06 | 0.01 | 0.07 | — | — | — | — | — | — |
| Shortraker rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — |
| Shortraker/rougheye/blackspotted rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.28 | — | 0.28 | — | — | — | — | — | — |
| Slope rf., unid. | — | — | — | — | — | — | — | — | — | 0.01 | 0.04 | 0.05 | 0.01 | 3.20 | 3.21 | — | — | — | — | 0.06 | 0.06 |
| Mixed thornyheads | | | | | | | | | | | | | | | | | | | | | |
| SST/LST | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 | 0.52 | 1.17 | 1.70 | — | — | — | — | 0.01 | 0.01 |
| Other flatfish | | | | | | | | | | | | | | | | | | | | | |
| Curlfin sole | 1.56 | 0.51 | 2.07 | 0.01 | — | 0.01 | — | — | — | 0.06 | 0.00 | 0.07 | — | 0.03 | 0.03 | — | — | — | — | 0.00 | 0.00 |
| Flatfish, unid. | 0.02 | 0.13 | 0.15 | 0.00 | 0.01 | 0.01 | 2.11 | — | 2.11 | 1.88 | 1.04 | 2.92 | — | 0.04 | 0.04 | — | — | — | — | 0.02 | 0.02 |
| Flathead sole | — | — | — | — | — | — | 0.63 | — | 0.63 | — | — | — | — | — | — | — | — | — | — | — | — |
| Pacific sanddab | 1.16 | 0.04 | 1.20 | 0.20 | 0.00 | 0.20 | 2.67 | — | 2.67 | 33.66 | 0.09 | 33.75 | 0.01 | 2.79 | 2.79 | — | — | — | 0.01 | 0.01 | 0.02 |
| Rex sole | 0.03 | — | 0.03 | — | — | — | 31.08 | — | 31.08 | 0.57 | — | 0.57 | — | — | — | — | — | — | — | — | — |
| Rock sole | 0.03 | 0.19 | 0.22 | — | — | — | 0.00 | — | 0.00 | — | 0.11 | 0.11 | — | 0.04 | 0.04 | — | — | — | 0.00 | 0.03 | 0.03 |
| Sand sole | 0.68 | 4.75 | 5.43 | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 | — | — | — | 0.00 | 0.14 | 0.14 |
| Sanddab, unid. | — | 0.00 | 0.00 | — | 0.00 | 0.00 | — | — | — | — | 0.63 | 0.63 | — | 3.63 | 3.63 | — | — | — | — | 0.14 | 0.14 |

Table 13 (continued). Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP.

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. | Disc. | Land. | Est. |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Other groundfish | | | | | | | | | | | | | | | | | | | | | |
| Kelp greenling (CA) | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | 0.01 | 0.87 | 0.88 | — | — | — | 0.02 | 3.52 | 3.53 |
| Kelp greenling (OR) | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 | — | — | — | 0.03 | 8.21 | 8.24 |
| Leopard shark | 5.54 | — | 5.54 | — | — | — | — | — | — | — | — | — | — | 0.56 | 0.56 | — | — | — | — | 0.41 | 0.41 |
| Other rockfish | | | | | | | | | | | | | | | | | | | | | |
| Rockfish, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.16 | 0.16 | — | — | — | — | 0.27 | 0.27 |
| Pacific cod | — | — | — | — | — | — | 0.01 | — | 0.01 | — | — | — | 0.21 | 1.71 | 1.92 | — | 0.05 | 0.05 | — | — | — |
| Pacific hake | 0.00 | — | 0.00 | — | — | — | 375.24 | — | 375.24 | 17.05 | 0.04 | 17.09 | 1.47 | 0.25 | 1.72 | 0.29 | 0.03 | 0.32 | — | — | — |
| Pacific ocean perch (N of 40°10'N) | — | — | — | — | — | — | 0.23 | — | 0.23 | — | — | — | 0.08 | 0.20 | 0.28 | 0.02 | 0.02 | 0.04 | — | — | — |
| Petrale sole | 0.51 | 2.64 | 3.15 | 0.01 | 0.00 | 0.01 | 0.30 | — | 0.30 | 0.83 | 0.43 | 1.26 | 0.35 | 1.67 | 2.03 | 0.17 | 0.07 | 0.25 | — | 0.00 | 0.00 |
| Roundfish, unid. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Sablefish (N of 36°N) | — | — | — | — | — | — | 0.19 | — | 0.19 | — | — | — | 74.08 | 2,053.02 | 2,127.11 | 9.87 | 32.65 | 42.52 | — | 1.10 | 1.10 |
| Sablefish (S of 36°N) | — | — | — | — | — | — | 0.01 | — | 0.01 | 0.05 | 0.00 | 0.05 | 3.90 | 332.80 | 336.70 | — | — | — | — | 12.53 | 12.53 |
| Shortbelly rf. | — | — | — | 0.00 | — | 0.00 | 21.50 | — | 21.50 | 0.03 | — | 0.03 | — | — | — | — | — | — | — | — | — |
| SST (N of 34°27'N) | — | — | — | — | — | — | 0.04 | — | 0.04 | — | — | — | 5.12 | 55.81 | 60.93 | 0.75 | 0.13 | 0.87 | — | 3.38 | 3.38 |
| SST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | — | — | — | 3.76 | 136.44 | 140.20 | — | — | — | — | 0.00 | 0.00 |
| Spiny dogfish shark | 5.56 | — | 5.56 | 0.17 | — | 0.17 | 0.01 | — | 0.01 | 0.38 | — | 0.38 | 65.06 | 2.96 | 68.01 | 0.19 | 0.03 | 0.22 | 0.09 | 0.06 | 0.16 |
| Splitnose rf. (S of 40°10'N) | — | — | — | — | — | — | 2.88 | — | 2.88 | 0.02 | — | 0.02 | — | 0.08 | 0.08 | — | — | — | — | 0.02 | 0.02 |
| Starry flounder | 1.03 | 3.53 | 4.56 | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 | — | — | — | — | 0.04 | 0.04 |
| Widow rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.10 | 1.45 | 1.55 | 0.02 | 0.01 | 0.03 | 0.06 | 0.74 | 0.80 |
| YELLOWEYE RF. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 2.22 | 0.07 | 2.29 | 0.68 | — | 0.68 | 2.11 | 0.01 | 2.12 |
| Yellowtail rf. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.44 | 0.69 | 1.13 | 0.04 | 0.04 | 0.08 | 0.17 | 1.11 | 1.28 |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | | |
| CA halibut | 20.01 | 96.43 | 116.44 | — | — | — | — | — | — | 0.05 | 2.04 | 2.09 | — | 1.63 | 1.63 | — | — | — | — | 0.53 | 0.53 |
| Dungeness crab | 114.54 | — | 114.54 | — | — | — | 0.00 | — | 0.00 | — | — | — | 0.67 | 3.91 | 4.57 | 0.02 | — | 0.02 | 0.12 | 2.08 | 2.21 |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | | | | |
| Deepsea sole | — | — | — | — | — | — | 0.11 | — | 0.11 | — | — | — | 0.03 | — | 0.03 | — | — | — | — | — | — |
| Diamond turbot | 0.04 | — | 0.04 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Hornyhead turbot | 1.37 | 0.00 | 1.37 | 0.16 | 0.00 | 0.16 | — | — | — | 1.73 | — | 1.73 | — | — | — | — | — | — | — | — | — |
| Longfin sanddab | 0.25 | — | 0.25 | 0.15 | — | 0.15 | 0.00 | — | 0.00 | 1.78 | — | 1.78 | — | — | — | — | — | — | — | — | — |
| Slender sole | 0.00 | 0.07 | 0.07 | — | — | — | 71.45 | — | 71.45 | 2.49 | — | 2.49 | — | — | — | — | — | — | — | — | — |
| Speckled sanddab | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

Table 13 (continued). Estimated discard (*disc.*), landings (*land.*), and estimated total fishing mortality (*est.*) of west coast groundfish species in non-IFQ fisheries/groundfish sectors observed by the WCGOP.

| | OA CA halibut | | | Sea cucumber | | | Pink shrimp | | | Ridgeback prawn | | | Non-nearshore FG | | | Directed Pacific halibut | | | Nearshore FG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weight | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** | **Disc.** | **Land.** | **Est.** |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | | |
| Other nongroundfish | | | | | | | | | | | | | | | | | | | | | |
| Brown irish lord sculpin | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | — | 0.01 |
| Buffalo sculpin | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.17 | — | 0.17 |
| CA sheephead | — | — | — | — | — | — | — | — | — | — | — | — | 3.41 | 0.10 | 3.51 | — | — | — | 57.05 | 19.90 | 76.95 |
| Red irish lord sculpin | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.12 | — | 0.12 |
| Sculpin, unid. | 0.05 | — | 0.05 | 0.08 | — | 0.08 | 0.20 | — | 0.20 | 0.08 | 0.02 | 0.10 | 0.00 | — | 0.00 | — | — | — | 0.15 | — | 0.15 |
| Skate, unid. | 0.00 | 0.40 | 0.41 | — | — | — | 0.00 | — | 0.00 | 0.02 | 1.01 | 1.03 | 4.32 | 0.75 | 5.07 | 2.70 | 0.66 | 3.36 | — | 0.11 | 0.11 |
| Squid, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.02 | — | — | — | — | — | — |
| Starry skate | 0.29 | 0.00 | 0.29 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | — | 0.01 |
| Shared ECS | | | | | | | | | | | | | | | | | | | | | |
| Barracudina, unid. | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — |
| Lanternfish, unid. | — | — | — | — | — | — | 0.02 | — | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — |
| Non-eulachon smelt, unid. | — | — | — | — | — | — | 1.04 | — | 1.04 | 0.03 | — | 0.03 | — | — | — | — | — | — | — | — | — |
| Non-Humboldt squid, unid. | 0.03 | — | 0.03 | 0.00 | — | 0.00 | 6.08 | — | 6.08 | 0.36 | — | 0.36 | — | — | — | — | — | — | — | — | — |
| Pacific sandlance | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Pacific saury | — | — | — | — | — | — | 0.00 | — | 0.00 | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Smelt, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.05 | 0.05 | — | — | — | — | — | — |

## Other Commercial Data Summaries

Landings of groundfish species from other nongroundfish fisheries operating under federal OA landing limits, which are mostly state-managed, and a small number of EFPs outside of the EM program are summarized by gear group (Table 14). Other than observed non-EM EFP trips, catch summaries of incidental fisheries are based exclusively on fish ticket data and therefore do not include any estimates of discards at sea.

Landings of groundfish species from the Washington tribal shorebased fisheries are included in Table 15. The Washington tribal data are based exclusively on fish ticket data, because tribal directed groundfish fisheries employ full retention requirements. In addition, both the Makah bottom trawl and midwater (targeting yellowtail rockfish) trawl sectors are monitored at a target tribal observation rate of 15%. In tribal management, discard mortality of fixed gear sablefish is accounted for by PFMC reducing the tribal allocation. For more information on discard and retention in tribal sablefish fisheries and Makah trawl observations, see Appendix B of the 2011–12 groundfish harvest specifications (PFMC and NMFS 2012).

Groundfish species catch from research activities and each state's recreational fisheries, combined across all gear types, is also summarized in Table 15.

Bycatch estimation and summaries for managed and protected fish species observed by WCGOP and A-SHOP are available in separate reports: Pacific halibut (Jannot et al. 2018), salmon species (Somers et al. 2015, Somers et al. 2018b), green sturgeon (Lee et al. 2017), and eulachon (Gustafson et al. 2017). Updates to all of these reports will be available in spring of 2019. Mortality estimations for all nonprotected fish species from 2002–17 are available in the Groundfish Expanded Mortality Multiyear (GEMM) product (Somers et al. 2019, and available on the FRAM Data Warehouse[4]).

## Cumulative Mortality Estimation Methods

We calculated the cumulative mortality for each species in a sector as the sum of the total discard mortality (with mortality rate applied) and retained weight. To calculate the cumulative mortality across all sectors, we summed the estimated discard mortality and retained weight from all observed sectors, the retained weight from unobserved incidental fisheries (as described above), and the mortality estimates from research and recreational catch (Table 15).

[4] https://www.nwfsc.noaa.gov/data

Table 14. Incidental landings (mt) of groundfish from unobserved shoreside commercial fisheries by gear group. To maintain confidentiality, discard and landings from non-EM exempted fishing permits are incorporated.

| | Shoreside Commercial Landings (mt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bottom trawl | Hook and line | Other misc. gears | Other net gears | Pot | Shrimp trawl | Troll | Total Incidental Estimate |
| **Groundfish species** | | | | | | | | |
| Arrowtooth flounder | — | 0.89 | — | — | — | — | — | 0.89 |
| Big skate | 0.04 | 0.72 | — | — | — | — | — | 0.76 |
| Black rf. (CA) | — | 0.09 | 0.00 | 0.03 | — | — | 0.02 | 0.14 |
| Black rf. (OR) | — | 14.05 | — | — | — | — | 0.19 | 14.23 |
| Bocaccio rf. (S of 40°10'N) | 1.55 | 0.34 | 0.01 | 0.00 | — | — | 0.03 | 1.93 |
| Cabezon (CA) | — | 0.03 | 0.04 | 0.04 | 0.09 | — | 0.01 | 0.20 |
| Cabezon (OR) | — | 3.21 | — | — | — | — | — | 3.21 |
| Canary rf. | 0.05 | 0.57 | 0.07 | 0.00 | 0.01 | — | 0.30 | 1.00 |
| Chilipepper rf. (S of 40°10'N) | 9.86 | 1.81 | — | — | — | — | 0.21 | 11.88 |
| Cowcod rf. (S of 40°10'N) | — | 0.00 | — | — | — | — | — | 0.00 |
| Darkblotched rf. | 0.01 | 0.06 | — | — | — | — | — | 0.07 |
| Dover sole | 7.85 | 0.07 | — | 13.74 | — | 0.01 | — | 21.66 |
| ECS | | | | | | | | |
| Black skate | — | 0.00 | — | — | — | — | — | 0.00 |
| California skate | 0.01 | — | — | 0.28 | 0.01 | — | — | 0.29 |
| Grenadier, unid. | — | — | 0.02 | — | — | — | 0.01 | 0.03 |
| Pacific grenadier | 0.05 | — | — | — | — | — | — | 0.05 |
| Soupfin shark | 0.09 | 0.19 | — | 4.39 | — | 0.00 | — | 4.68 |
| Spotted ratfish | — | — | — | 0.00 | — | — | — | 0.00 |
| English sole | 0.14 | — | — | 0.01 | — | 0.29 | — | 0.44 |
| Lingcod (N of 40°10'N) | — | 7.55 | — | — | 0.22 | — | 2.99 | 10.76 |
| Lingcod (S of 40°10'N) | 0.99 | 1.61 | 2.15 | 0.11 | 0.19 | — | 1.69 | 6.74 |
| Longnose skate | 0.05 | 3.21 | 0.01 | — | — | — | — | 3.28 |
| LST (N of 34°27'N) | 4.51 | — | 0.00 | — | — | — | 0.01 | 4.52 |
| LST (S of 34°27'N) | — | 0.22 | — | 0.02 | — | — | — | 0.24 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | |
| Black and yellow rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Blue/deacon rf. | — | 0.57 | — | — | — | — | — | 0.57 |
| Brown rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| China rf. | — | 0.61 | — | — | — | — | — | 0.61 |
| Copper rf. | — | 0.16 | — | — | — | — | — | 0.16 |
| Gopher rf. | — | 0.01 | — | — | — | — | — | 0.01 |
| Grass rf. | — | 0.03 | — | — | — | — | — | 0.03 |
| Olive rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Quillback rf. | — | 0.26 | — | — | — | — | — | 0.26 |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | |
| Black and yellow rf. | — | 0.00 | 0.07 | — | 0.08 | — | 0.01 | 0.15 |
| Blue/deacon rf. | — | 0.02 | 0.01 | 0.01 | — | — | 0.02 | 0.06 |
| Brown rf. | 0.00 | 0.02 | — | 0.15 | — | 0.00 | 0.01 | 0.19 |
| Calico rf. | — | — | — | — | — | — | 0.00 | 0.00 |
| China rf. | — | 0.00 | 0.01 | — | — | — | 0.00 | 0.01 |
| Copper rf. | 0.02 | 0.00 | 0.04 | — | — | — | 0.00 | 0.05 |
| Gopher rf. | — | 0.09 | 0.03 | — | 0.01 | — | 0.03 | 0.16 |
| Grass rf. | — | — | 0.02 | — | 0.01 | — | — | 0.03 |
| Kelp rf. | — | — | — | — | 0.00 | — | — | 0.00 |
| Olive rf. | — | 0.00 | 0.00 | 0.00 | — | — | 0.00 | 0.01 |
| Treefish rf. | — | 0.00 | 0.00 | — | — | — | 0.01 | 0.01 |

Table 14 (continued). Incidental landings of groundfish from unobserved shoreside commercial fisheries by gear group.

| | Shoreside Commercial Landings (mt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bottom trawl | Hook and line | Other misc. gears | Other net gears | Pot | Shrimp trawl | Troll | Total Incidental Estimate |
| **Groundfish species** | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | |
| Bocaccio rf. | — | 0.05 | — | — | — | — | — | 0.05 |
| Chilipepper rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Greenspotted rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Greenstriped rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Rosethorn rf. | — | 0.02 | — | — | — | — | — | 0.02 |
| Silvergray rf. | — | 0.18 | — | — | — | — | — | 0.18 |
| Tiger rf. | — | 0.02 | — | — | — | — | — | 0.02 |
| Vermilion rf. | — | 0.26 | — | — | 0.00 | — | — | 0.26 |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | |
| Flag rf. | 0.00 | 0.01 | 0.00 | — | — | — | — | 0.02 |
| Greenblotched rf. | 0.00 | 0.00 | — | — | — | — | — | 0.00 |
| Greenspotted rf. | 0.01 | 0.03 | 0.02 | — | — | — | — | 0.06 |
| Rosy rf. | — | — | — | — | — | — | 0.01 | 0.01 |
| Shelf rf., unid. | — | 0.25 | 0.00 | — | — | 0.00 | 0.01 | 0.26 |
| Speckled rf. | — | 0.01 | 0.00 | — | — | — | — | 0.01 |
| Squarespot rf. | — | 0.02 | — | — | — | — | — | 0.02 |
| Starry rf. | — | 0.03 | 0.00 | 0.01 | — | — | — | 0.05 |
| Vermilion rf. | 0.04 | 0.72 | 0.14 | 0.02 | 0.01 | 0.02 | 0.46 | 1.41 |
| Yellowtail rf. | 0.00 | 1.85 | 0.00 | 0.02 | — | — | 0.14 | 2.01 |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | |
| Aurora rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Blackgill rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Redbanded rf. | — | 0.33 | — | — | — | — | — | 0.33 |
| Rougheye/blackspotted rf. | — | 1.38 | — | — | — | — | 0.06 | 1.44 |
| Shortraker rf. | — | 0.06 | — | — | — | — | — | 0.06 |
| Slope rf., unid. | — | 0.07 | — | — | 0.02 | — | — | 0.09 |
| Splitnose rf. | — | 0.00 | — | — | — | — | — | 0.00 |
| Yellowmouth rf. | — | 0.02 | — | — | — | — | — | 0.02 |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | |
| Aurora rf. | — | 0.01 | — | — | — | — | — | 0.01 |
| Blackgill rf. | 0.93 | 0.06 | 0.01 | — | — | — | — | 1.00 |
| Redbanded rf. | 0.09 | 0.00 | — | — | — | — | — | 0.09 |
| Slope rf., unid. | — | 0.01 | 0.00 | — | — | 0.00 | 0.02 | 0.03 |
| Mixed thornyheads | | | | | | | | |
| SST/LST | — | 0.07 | 0.03 | — | — | — | — | 0.10 |
| Other flatfish | | | | | | | | |
| Curlfin sole | 0.05 | — | — | — | — | 0.01 | — | 0.05 |
| Flatfish, unid. | 0.09 | 0.02 | — | 0.26 | 0.01 | 0.03 | 0.01 | 0.42 |
| Flathead sole | 0.01 | — | — | — | — | — | — | 0.01 |
| Pacific sanddab | 0.09 | 0.02 | — | 0.00 | 0.00 | — | — | 0.12 |
| Rex sole | 0.63 | — | — | — | — | — | — | 0.63 |
| Rock sole | 0.04 | 0.00 | — | 0.01 | 0.00 | 0.21 | 0.00 | 0.26 |
| Sand sole | 0.66 | — | — | 0.12 | — | 0.03 | 0.00 | 0.81 |
| Sanddab, unid. | 0.14 | 0.08 | — | 0.07 | — | 0.08 | 0.11 | 0.48 |

Table 14 (continued). Incidental landings of groundfish from unobserved shoreside commercial fisheries by gear group.

| | Shoreside Commercial Landings (mt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bottom trawl | Hook and line | Other misc. gears | Other net gears | Pot | Shrimp trawl | Troll | Total Incidental Estimate |
| **Groundfish species** | | | | | | | | |
| Other groundfish | | | | | | | | |
| Kelp greenling (california) | — | 0.00 | 0.00 | 0.00 | 0.02 | — | 0.00 | 0.02 |
| Kelp greenling (oregon) | — | 2.23 | — | — | — | — | — | 2.23 |
| Leopard shark | 0.01 | 0.02 | — | 3.37 | 0.02 | 0.01 | — | 3.43 |
| Other rockfish | | | | | | | | |
| Rockfish, unid. | — | 0.01 | — | — | — | — | 0.01 | 0.02 |
| Pacific cod | — | 0.08 | — | — | — | — | — | 0.08 |
| Pacific hake | 0.00 | 0.03 | 0.00 | — | — | — | — | 0.03 |
| Pacific ocean perch (N of 40°10'N) | — | 0.02 | — | — | — | — | — | 0.02 |
| Petrale sole | 5.25 | 0.08 | — | 0.03 | 0.01 | 0.49 | 0.01 | 5.87 |
| Sablefish (N of 36°N) | 5.38 | 33.86 | 0.70 | 0.02 | 0.56 | 0.69 | — | 41.21 |
| Sablefish (S of 36°N) | — | 2.44 | 0.72 | 0.22 | — | — | 0.06 | 3.44 |
| SST (N of 34°27'N) | 0.87 | 0.18 | 0.06 | — | — | — | — | 1.10 |
| SST (S of 34°27'N) | — | 1.49 | 0.01 | — | — | — | — | 1.50 |
| Spiny dogfish shark | 0.05 | 0.03 | — | 0.11 | 0.04 | 0.04 | — | 0.27 |
| Starry flounder | 1.53 | 0.05 | — | 0.02 | — | — | — | 1.60 |
| Widow rf. | 0.01 | 0.37 | — | — | — | — | 0.06 | 0.44 |
| Yelloweye rf. | — | 0.02 | — | — | — | — | — | 0.02 |
| Yellowtail rf. (N of 40°10'N) | — | 0.14 | — | — | — | — | 1.66 | 1.80 |
| CA scorpionfish (S of 34°27'N) | — | — | — | 0.03 | — | 0.07 | — | 0.09 |
| **Nongroundfish species** | | | | | | | | |
| California halibut | 15.91 | 67.50 | 0.04 | 53.87 | 0.15 | 15.43 | 1.25 | 154.14 |
| Dungeness crab | 0.08 | 3.08 | 41.23 | 1.60 | 21,818.39 | — | 1.29 | 21,865.66 |
| Non-FMP flatfish | | | | | | | | |
| Hornyhead turbot | 0.00 | — | — | 0.00 | — | — | — | 0.01 |
| Other nongroundfish | | | | | | | | |
| California sheephead | — | 0.01 | 0.02 | 0.15 | 1.68 | 0.05 | 0.02 | 1.93 |
| Sculpin, unid. | 0.19 | — | 0.00 | — | — | 0.01 | — | 0.20 |
| Skate, unid. | 0.04 | 0.66 | — | 2.70 | — | 1.21 | — | 4.62 |
| Squid, unid. | — | — | — | 10.83 | — | — | — | 10.83 |
| Shared ECS | | | | | | | | |
| Round herring | — | — | — | 0.81 | — | — | — | 0.81 |
| Smelt, unid. | — | 2.56 | — | 131.87 | 0.70 | — | 0.04 | 135.17 |

Table 15. Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector. *Key*: IFQ = individual fishing quota, BT = bottom trawl, FG = fixed gear, MW = midwater, SS = shoreside, A-S = at-sea, CP = catcher–processor, MSCV = mothership catcher vessel, OA = open access, SC = sea cucumber, PS = pink shrimp, RP = ridgeback prawn, Dir. PHLB = directed Pacific halibut fishery, IF = incidental fisheries, Res. = research, EFM = estimated fishing mortality.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Arrowtooth flounder | 1,355.34 | 4.09 | 0.78 | 6.85 | 13.86 | 3.65 | — | — | 1.13 | 0.01 | 35.10 | 16.24 | — | 0.89 | 0.44 | — | 0.13 | 0.00 | 7.32 | 1,445.84 |
| Big skate | 220.48 | 0.13 | 1.26 | 1.34 | 2.14 | 0.64 | 19.98 | 0.06 | 0.00 | 0.00 | 6.14 | 0.91 | 0.09 | 0.76 | 0.14 | — | 0.39 | 0.00 | 5.46 | 259.93 |
| Black rf. (CA) | — | — | — | — | — | — | — | — | — | 0.00 | 11.52 | — | 42.05 | 0.14 | — | — | — | 97.29 | 0.08 | 151.09 |
| Black rf. (OR) | 0.00 | — | 0.00 | — | — | — | — | — | — | — | 3.15 | — | 108.23 | 14.23 | — | — | 418.22 | — | 0.08 | 543.92 |
| Black rf. (WA) | 0.23 | — | 0.00 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | 247.56 | — | — | 0.09 | 247.89 |
| Bocaccio rf. (S of 40°10'N) | 87.55 | 0.06 | — | — | — | — | — | 0.00 | 0.12 | 0.15 | 5.52 | — | 0.77 | 1.93 | — | — | — | 125.75 | 3.21 | 225.07 |
| Cabezon (CA) | — | — | — | — | — | — | 0.01 | — | — | 0.02 | 2.82 | — | 21.02 | 0.20 | — | — | — | 31.34 | 0.01 | 55.40 |
| Cabezon (OR) | — | — | — | — | — | — | — | — | — | — | 0.15 | — | 25.23 | 3.21 | — | — | 22.31 | — | 0.00 | 50.91 |
| CA scorpionfish (N of 34°27'N) | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | — | — | — | — | — | — | 0.01 |
| CA scorpionfish (S of 34°27'N) | — | — | — | — | — | — | 0.40 | 0.16 | — | 0.92 | 1.13 | — | 0.11 | 0.09 | — | — | — | 82.99 | 0.15 | 85.94 |
| Canary rf. | 133.19 | 0.01 | 34.40 | 74.27 | 2.06 | 4.50 | 0.01 | - | 0.07 | 0.01 | 5.03 | 0.24 | 6.85 | 1.00 | 13.63 | 5.03 | 28.35 | 82.05 | 10.09 | 400.80 |
| Chilipepper rf. (S of 40°10'N) | 105.49 | — | — | — | — | — | 0.01 | 0.01 | 1.07 | 0.65 | 1.02 | — | 0.01 | 11.88 | — | — | — | 2.62 | 5.05 | 127.80 |
| Cowcod rf. (S of 40°10'N) | 0.42 | — | — | — | — | — | — | — | 0.09 | 0.07 | — | — | — | 0.00 | — | — | — | 0.80 | 0.35 | 1.73 |
| Darkblotched rf. | 150.49 | 0.08 | 0.19 | 33.02 | 32.00 | 7.64 | — | 0.00 | 6.05 | 0.01 | 5.54 | 0.69 | — | 0.07 | 0.32 | — | 0.00 | — | 1.67 | 237.77 |
| Dover sole | 7,338.57 | 1.62 | 0.05 | 0.01 | 0.36 | 0.11 | 0.00 | 0.05 | 4.56 | 10.52 | 6.09 | 0.22 | — | 21.66 | 124.00 | — | 0.19 | 0.00 | 38.73 | 7,546.74 |
| ECS | | | | | | | | | | | | | | | | | | | | |
| Aleutian skate | 0.63 | — | — | — | 0.00 | 0.00 | — | — | 0.00 | — | 0.08 | — | — | — | — | — | — | — | 0.00 | 0.71 |
| Black skate | 10.72 | 0.17 | — | — | — | — | — | — | — | — | 5.40 | — | — | 0.00 | — | — | — | — | 0.62 | 16.91 |
| CA grenadier | 0.08 | — | — | — | — | — | — | — | — | — | 0.18 | — | — | — | — | — | — | — | 0.06 | 0.32 |
| CA skate | 1.22 | — | — | — | 0.00 | 0.02 | 20.08 | 1.58 | 0.03 | 1.09 | 0.12 | — | 0.00 | 0.29 | — | — | — | 0.00 | 0.32 | 24.76 |
| Deepsea skate | 0.07 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.12 |
| Giant grenadier | 44.57 | 1.03 | — | — | — | — | — | — | — | — | 8.43 | — | — | — | — | — | — | — | 1.91 | 55.95 |
| Grenadier, unid. | 13.39 | 0.03 | — | — | 1.01 | 0.09 | — | — | — | — | 22.00 | — | — | 0.03 | — | — | — | — | 0.04 | 36.59 |
| Pacific flatnose | 0.27 | 0.04 | — | — | 0.00 | — | — | — | 0.00 | — | 0.40 | — | — | — | — | — | — | — | 0.17 | 0.87 |
| Pacific grenadier | 17.52 | 1.17 | — | — | — | — | — | — | — | — | 9.73 | — | — | 0.05 | — | — | — | — | 4.61 | 33.07 |
| Popeye grenadier | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Sandpaper skate | 49.12 | 0.24 | 0.13 | — | 0.00 | — | 0.00 | — | 0.05 | — | 2.94 | 0.13 | — | — | — | — | — | — | 0.90 | 53.52 |
| Shark and skate, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.40 | 0.40 |
| Shoulderspot grenadier | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Smooth grenadier | 0.00 | — | — | — | — | — | — | — | — | — | 0.01 | — | — | — | — | — | — | — | 0.03 | 0.04 |
| Soupfin shark | 0.91 | — | 0.02 | 0.54 | 0.97 | 0.91 | 0.93 | — | 0.00 | 0.04 | 0.77 | — | 0.67 | 4.68 | 0.02 | — | — | 0.00 | 1.00 | 11.47 |
| Spotted ratfish | 79.66 | 0.08 | 0.89 | — | 0.00 | — | 0.01 | — | 0.16 | 0.73 | 3.91 | 0.20 | 0.01 | 0.00 | — | — | — | 0.00 | 3.62 | 89.28 |

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| English sole | 246.29 | 0.00 | 0.23 | 0.01 | 0.04 | 0.01 | 2.49 | 1.38 | 0.04 | 22.80 | 0.00 | — | 0.00 | 0.44 | 71.11 | — | — | — | 4.05 | 348.89 |
| Groundfish, unid. | — | — | — | 0.19 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.19 |
| Lingcod (N of 40°10'N) | 593.14 | 3.05 | 2.43 | 7.91 | 0.13 | 0.85 | — | — | 0.01 | — | 55.06 | 1.46 | 56.94 | 10.76 | 23.34 | 167.57 | 178.23 | 63.18 | 3.28 | 1,167.34 |
| Lingcod (S of 40°10'N) | 22.24 | 0.34 | — | — | — | — | 1.09 | 0.04 | — | 0.40 | 36.33 | — | 23.50 | 6.74 | — | — | — | 446.46 | 1.67 | 538.81 |
| Longnose skate | 756.64 | 5.62 | 1.51 | 0.42 | 0.45 | 0.52 | 0.22 | 0.02 | 0.49 | 0.39 | 106.45 | 7.06 | 0.02 | 3.28 | 7.00 | — | 0.21 | 0.00 | 9.44 | 899.72 |
| LST (N of 34°27'N) | 803.43 | 0.03 | 0.05 | 0.00 | 0.00 | — | — | — | 0.00 | — | 7.43 | — | 0.47 | 4.52 | 0.11 | — | — | — | 17.26 | 833.28 |
| LST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | — | 12.04 | — | — | 0.24 | — | — | — | — | 1.25 | 13.53 |
| Minor ns. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.00 | — | — | 0.01 | 0.01 | — | 0.03 |
| Blue/deacon rf. | 0.00 | — | — | 0.00 | — | — | — | — | 0.00 | — | 0.81 | — | 11.16 | 0.57 | — | 1.51 | 24.42 | 5.70 | 0.30 | 44.48 |
| Brown rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.00 | — | — | 0.11 | 0.45 | — | 0.60 |
| China rf. | — | — | — | — | — | — | — | — | — | — | 0.03 | — | 4.19 | 0.61 | — | 1.34 | 2.24 | 0.87 | 0.01 | 9.28 |
| Copper rf. | 0.00 | — | — | — | — | — | — | — | — | — | 0.24 | — | 2.96 | 0.16 | 0.01 | 1.03 | 7.48 | 6.33 | 0.06 | 18.27 |
| Gopher rf. | — | — | — | — | — | — | — | — | — | — | — | — | 0.03 | 0.01 | — | — | 0.00 | 0.05 | — | 0.09 |
| Grass rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.10 | 0.03 | — | — | 0.04 | 0.11 | — | 0.29 |
| Nearshore rf., unid. | 0.00 | — | — | 0.00 | — | — | — | — | — | — | 0.02 | — | — | — | 0.00 | — | — | — | 0.00 | 0.02 |
| Olive rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.08 | 0.00 | — | — | 0.16 | 0.56 | 0.00 | 0.81 |
| Quillback rf. | 0.06 | — | — | — | — | — | — | — | — | — | 0.29 | — | 2.99 | 0.26 | 0.05 | 1.59 | 6.82 | 4.22 | 0.09 | 16.36 |
| Minor ns. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Black and yellow rf. | — | — | — | — | — | — | — | — | — | — | 1.82 | — | 13.11 | 0.15 | — | — | — | 10.61 | — | 25.70 |
| Blue/deacon rf. | — | — | — | — | — | — | — | — | — | — | 0.05 | — | 8.45 | 0.06 | — | — | — | 184.37 | 0.08 | 193.01 |
| Brown rf. | 0.00 | — | — | — | — | — | 0.18 | 0.00 | — | 0.02 | 0.08 | — | 19.16 | 0.19 | — | — | — | 69.54 | 0.02 | 89.19 |
| Calico rf. | — | — | — | — | — | — | 0.01 | 0.05 | — | 0.10 | — | — | 0.01 | 0.00 | — | — | — | 0.64 | 0.00 | 0.81 |
| China rf. | — | — | — | — | — | — | — | — | — | — | 0.24 | — | 1.93 | 0.01 | — | — | — | 11.28 | 0.01 | 13.47 |
| Copper rf. | — | 0.00 | — | — | — | — | 0.01 | 0.12 | — | 0.02 | 1.23 | — | 7.26 | 0.05 | — | — | — | 209.58 | 0.52 | 218.80 |
| Gopher rf. | — | — | — | — | — | — | — | — | — | — | 1.40 | — | 26.76 | 0.16 | — | — | — | 50.06 | 0.02 | 78.40 |
| Grass rf. | — | — | — | — | — | — | — | — | — | — | 0.20 | — | 10.45 | 0.03 | — | — | — | 10.80 | — | 21.49 |
| Kelp rf. | — | — | — | — | — | — | — | — | — | 0.00 | 0.06 | — | 0.71 | 0.00 | — | — | — | 12.65 | — | 13.44 |
| Nearshore rf., unid. | — | — | — | — | — | — | — | — | 0.28 | — | 0.01 | — | 0.20 | — | — | — | — | — | 0.00 | 0.49 |
| Olive rf. | — | — | — | — | — | — | — | — | — | — | 0.02 | — | 0.31 | 0.01 | — | — | — | 35.32 | 0.09 | 35.74 |
| Quillback rf. | — | — | — | — | — | — | 0.00 | — | — | — | 0.49 | — | 0.32 | — | — | — | — | 5.44 | 0.01 | 6.26 |
| Treefish rf. | — | — | — | — | — | — | — | — | — | — | 0.05 | — | 2.71 | 0.01 | — | — | — | 13.38 | — | 16.16 |

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Minor sh. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Bocaccio rf. | 20.69 | 0.00 | 2.82 | 4.77 | 0.38 | 0.35 | — | — | 0.00 | — | 0.68 | 0.05 | 0.00 | 0.05 | 7.20 | 1.22 | 0.08 | 0.10 | 0.28 | 38.65 |
| Chilipepper rf. | 24.91 | — | 4.24 | 51.22 | 1.29 | 11.32 | — | — | 1.49 | — | 0.55 | 0.00 | — | 0.00 | — | — | — | — | 0.61 | 95.64 |
| Cowcod rf. | 0.00 | — | — | — | — | — | — | — | 0.01 | — | 0.02 | — | — | — | — | — | — | 0.00 | — | 0.03 |
| Flag rf. | — | — | — | — | — | — | — | — | — | — | 0.08 | — | — | — | — | — | — | — | — | 0.08 |
| Greenblotched rf. | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Greenspotted rf. | 0.12 | — | 0.00 | — | — | — | — | — | — | — | 0.01 | — | 0.01 | 0.00 | — | — | 0.01 | — | 0.10 | 0.25 |
| Greenstriped rf. | 45.48 | 0.01 | 0.12 | 0.10 | — | — | — | — | 0.68 | — | 1.20 | 0.06 | 0.00 | 0.00 | 0.50 | — | 0.01 | — | 2.12 | 50.28 |
| Halfbanded rf. | 0.00 | — | — | — | — | — | — | — | 0.01 | — | — | — | — | — | — | — | — | — | 0.00 | 0.01 |
| Harlequin rf. | 0.00 | — | 0.02 | 0.08 | 0.01 | 0.01 | — | — | — | — | — | — | — | — | 0.00 | — | — | — | — | 0.11 |
| Puget sound rf. | — | — | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Pygmy rf. | 0.02 | — | — | — | — | — | — | — | 0.17 | — | — | — | — | — | — | — | — | — | 0.13 | 0.32 |
| Redstripe rf. | 3.94 | — | 10.02 | 15.99 | 0.77 | 0.20 | — | — | 0.17 | — | 0.05 | — | — | — | 0.48 | — | 0.04 | — | 2.56 | 34.22 |
| Rosethorn rf. | 3.30 | 0.05 | 0.00 | — | 0.00 | — | — | — | 0.00 | — | 0.49 | 0.03 | 0.01 | 0.02 | 0.36 | — | 0.06 | — | 0.58 | 4.89 |
| Rosy rf. | 0.02 | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.03 | — | — | — | 0.00 | 0.02 | 0.00 | 0.08 |
| Shelf rf., unid. | 24.54 | 0.00 | 0.04 | 0.02 | — | — | — | — | 2.15 | — | 0.57 | — | 0.07 | — | 0.12 | — | — | — | — | 27.51 |
| Silvergray rf. | 1.19 | 0.01 | 0.59 | 4.17 | 0.77 | 0.41 | — | — | — | — | 1.34 | 0.18 | — | 0.18 | 5.56 | — | 0.04 | — | 1.12 | 15.54 |
| Squarespot rf. | — | — | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Starry rf. | 0.03 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.03 |
| Stripetail rf. | 22.43 | — | 0.02 | — | 0.00 | 0.00 | — | — | 3.44 | — | — | — | — | — | — | — | — | — | 3.49 | 29.38 |
| Tiger rf. | 0.00 | — | — | — | — | — | — | — | 0.00 | — | 0.01 | — | 0.25 | 0.02 | — | 0.15 | 0.79 | 0.34 | 0.01 | 1.57 |
| Vermilion rf. | — | — | — | — | — | — | — | — | 0.00 | — | 0.27 | 0.01 | 4.02 | 0.26 | — | 1.05 | 8.83 | 6.49 | 0.03 | 20.95 |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Bronzespotted rf. | — | — | — | — | — | — | 0.00 | — | — | — | — | — | 0.10 | — | — | — | — | — | 0.01 | 0.11 |
| Flag rf. | — | 0.00 | — | — | — | — | — | — | — | 0.01 | 0.14 | — | 0.04 | 0.02 | — | — | — | 10.86 | 0.02 | 11.09 |
| Freckled rf. | — | — | — | — | — | — | — | 0.00 | — | 0.02 | — | — | 0.01 | — | — | — | — | — | 0.00 | 0.03 |
| Greenblotched rf. | 0.02 | — | — | — | — | — | — | — | — | 0.08 | 0.05 | — | — | 0.00 | — | — | — | 0.41 | 0.01 | 0.57 |
| Greenspotted rf. | 0.31 | — | — | — | — | — | 0.00 | 0.01 | — | 0.02 | 1.58 | — | 0.13 | 0.06 | — | — | — | 16.89 | 0.50 | 19.50 |
| Greenstriped rf. | 0.69 | — | — | — | — | — | — | — | — | 0.05 | 0.14 | — | 0.00 | — | — | — | — | 0.86 | 0.20 | 1.94 |
| Halfbanded rf. | 0.00 | — | — | — | — | — | 0.00 | 0.64 | 0.01 | 4.14 | — | — | 0.03 | — | — | — | — | 1.33 | 1.01 | 7.16 |
| Honeycomb rf. | — | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.01 | — | — | — | — | 6.03 | 0.00 | 6.05 |
| Mexican rf. | 0.03 | — | — | — | — | — | 0.00 | — | — | 0.02 | 0.74 | — | 0.07 | — | — | — | — | 0.00 | 0.01 | 0.88 |
| Pink rf. | 0.02 | — | — | — | — | — | — | — | — | — | 0.21 | — | 0.03 | — | — | — | — | — | 0.02 | 0.28 |

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Minor sh. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Pinkrose rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Redstripe rf. | — | — | — | — | — | — | — | — | 0.01 | 0.01 | — | — | — | — | — | — | — | — | 0.00 | 0.01 |
| Rosethorn rf. | 0.01 | — | — | — | — | — | — | 0.00 | — | — | 0.09 | — | 0.06 | — | — | — | — | — | 0.01 | 0.17 |
| Rosy rf. | 0.00 | — | — | — | — | — | 0.00 | — | — | 0.00 | 0.08 | — | 0.11 | 0.01 | — | — | — | 12.64 | 0.20 | 13.03 |
| Shelf rf., unid. | 0.06 | — | — | — | — | — | — | — | 0.58 | 0.67 | 0.77 | — | 0.35 | 0.26 | — | — | — | — | — | 2.70 |
| Silvergray rf. | 0.04 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.04 |
| Speckled rf. | — | — | — | — | — | — | — | — | — | 0.00 | 0.30 | — | 0.13 | 0.01 | — | — | — | 8.91 | 0.27 | 9.62 |
| Spotted rf., unid. | — | — | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Squarespot rf. | — | — | — | — | — | — | — | 0.02 | 0.02 | 0.05 | 0.08 | — | 0.03 | 0.02 | — | — | — | 17.87 | 0.29 | 18.39 |
| Starry rf. | — | — | — | — | — | — | — | 0.00 | — | — | 0.71 | — | 0.32 | 0.05 | — | — | — | 48.36 | 0.12 | 49.55 |
| Stripetail rf. | 0.67 | — | — | — | — | — | 0.00 | 0.06 | 4.36 | 4.96 | — | — | — | — | — | — | — | 0.00 | 0.77 | 10.83 |
| Swordspine rf. | — | — | — | — | — | — | — | — | — | 0.00 | — | — | 0.00 | — | — | — | — | 0.01 | 0.03 | 0.04 |
| Tiger rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.26 | — | 0.26 |
| Vermilion rf. | 0.06 | 0.22 | — | — | — | — | 0.02 | 0.04 | — | 0.57 | 33.55 | — | 10.99 | 1.41 | — | — | — | 288.34 | 5.52 | 340.72 |
| Yellowtail rf. | 0.04 | — | — | — | — | — | 0.01 | — | — | — | 2.69 | — | 0.85 | 2.01 | — | — | — | 72.48 | 0.38 | 78.45 |
| Minor sl. rf. (N of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Aurora rf. | 25.32 | 0.03 | 0.02 | 0.38 | 0.01 | — | — | — | 0.01 | — | 0.12 | 0.00 | — | 0.00 | 0.02 | — | — | — | 0.21 | 26.12 |
| Bank rf. | 2.45 | 0.00 | 0.02 | — | 0.05 | 0.01 | — | — | — | — | 0.01 | — | — | — | — | — | — | — | — | 2.55 |
| Blackgill rf. | 4.93 | 0.03 | 0.02 | — | 0.00 | 0.01 | — | — | — | — | 3.80 | 0.00 | — | 0.00 | 0.09 | — | — | — | — | 8.88 |
| Redbanded rf. | 6.42 | 1.17 | 0.00 | — | 0.03 | 0.03 | — | — | 0.14 | — | 26.57 | 0.36 | — | 0.33 | 12.46 | — | — | — | 0.04 | 47.54 |
| Rougheye/blackspotted rf. | 24.63 | 7.94 | 0.43 | 2.49 | 33.87 | 4.27 | — | — | 0.01 | — | 60.96 | 4.67 | — | 1.44 | 16.62 | — | — | — | 0.25 | 157.58 |
| Sharpchin rf. | 4.15 | 0.00 | 0.13 | 3.15 | 0.03 | 0.00 | — | — | 0.26 | — | 0.01 | — | — | — | — | — | — | — | — | 7.74 |
| Shortraker rf. | 8.14 | 0.87 | 0.02 | 0.07 | 0.03 | 0.00 | — | — | — | — | 3.97 | 0.18 | — | 0.06 | 1.09 | — | — | — | 0.04 | 14.46 |
| Shortraker/rougheye/blackspotted rf. | — | 0.05 | — | — | — | — | — | — | — | — | 0.90 | 1.73 | — | — | — | — | — | — | — | 2.68 |
| Slope rf., unid. | 1.60 | 0.10 | 0.19 | 5.47 | — | — | — | — | — | — | 1.74 | 0.10 | 0.00 | 0.09 | 0.01 | — | — | — | — | 9.30 |
| Splitnose rf. | 22.14 | 0.00 | 1.12 | 37.02 | 62.55 | 22.67 | — | — | 0.87 | — | 0.09 | 0.00 | — | 0.00 | 0.04 | — | — | — | 0.00 | 146.50 |
| Yellowmouth rf. | 4.53 | 0.00 | 0.02 | 0.04 | 0.38 | 0.00 | — | — | — | — | 1.83 | 0.04 | — | 0.02 | 0.00 | — | — | — | — | 6.86 |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Aurora rf. | 6.12 | 0.01 | — | — | — | — | — | — | 0.38 | 0.06 | 0.74 | — | 0.01 | 0.01 | — | — | — | — | 0.53 | 7.85 |
| Bank rf. | 33.49 | — | — | — | — | — | — | — | — | 0.00 | 0.32 | — | 0.02 | — | — | — | — | 0.62 | 0.48 | 34.94 |
| Blackgill rf. | 19.59 | 0.64 | — | — | — | — | — | — | — | — | 26.53 | — | 0.93 | 1.00 | — | — | — | — | 0.44 | 49.12 |
| Pacific ocean perch | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Minor sl. rf. (S of 40°10'N) | | | | | | | | | | | | | | | | | | | | |
| Redbanded rf. | 0.37 | — | — | — | — | — | — | — | — | — | 0.27 | — | — | 0.09 | — | — | — | — | 0.12 | 0.85 |
| Rougheye/blackspotted rf. | 0.02 | — | — | — | — | — | — | — | — | — | 0.07 | — | — | — | — | — | — | — | 0.12 | 0.21 |
| Sharpchin rf. | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 16.42 | 16.43 |
| Shortraker rf. | 0.01 | — | — | — | — | — | — | — | — | — | 0.01 | — | — | — | — | — | — | — | 0.05 | 0.06 |
| Shortraker/rougheye/blackspotted rf. | — | — | — | — | — | — | — | — | — | — | 0.28 | — | — | — | — | — | — | — | — | 0.28 |
| Slope rf., unid. | 0.12 | — | — | — | — | — | — | — | — | 0.05 | 3.21 | — | 0.06 | 0.03 | — | — | — | — | — | 3.46 |
| Yellowmouth rf. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| Mixed thornyheads | | | | | | | | | | | | | | | | | | | | |
| SST/LST | 0.23 | 0.02 | — | — | — | — | — | — | — | 0.01 | 1.70 | — | 0.01 | 0.10 | — | — | — | — | — | 2.07 |
| Other flatfish | | | | | | | | | | | | | | | | | | | | |
| Butter sole | 0.03 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | — | 0.01 | 0.08 |
| Curlfin sole | 0.64 | — | 0.00 | — | — | — | 2.07 | 0.01 | — | 0.07 | 0.03 | — | 0.00 | 0.05 | — | — | — | 0.00 | 0.13 | 3.00 |
| Flatfish, unid. | 3.13 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.15 | 0.01 | 2.11 | 2.92 | 0.04 | — | 0.02 | 0.42 | 29.85 | — | — | 0.00 | — | 38.67 |
| Flathead sole | 40.75 | — | 0.27 | 0.00 | 0.00 | 0.01 | — | — | 0.63 | — | — | — | — | 0.01 | — | — | — | — | 0.62 | 42.29 |
| Pacific sanddab | 121.97 | — | 0.02 | 0.00 | — | 0.00 | 1.20 | 0.20 | 2.67 | 33.75 | 2.79 | — | 0.02 | 0.12 | — | — | 2.44 | 32.34 | 8.78 | 206.31 |
| Rex sole | 549.76 | 0.00 | 0.80 | 0.05 | 7.34 | 1.12 | 0.03 | — | 31.08 | 0.57 | — | — | — | 0.63 | 77.64 | — | — | — | 10.51 | 679.52 |
| Rock sole | 1.47 | — | 0.00 | 0.00 | — | — | 0.22 | — | 0.00 | 0.11 | 0.04 | — | 0.03 | 0.26 | 7.26 | — | 0.03 | 1.31 | 0.17 | 10.92 |
| Sand sole | 5.80 | — | — | — | — | — | 5.43 | — | — | — | 0.02 | — | 0.14 | 0.81 | 0.11 | — | 0.41 | 0.11 | — | 12.82 |
| Sanddab, unid. | 4.31 | — | — | — | — | — | 0.00 | 0.00 | — | 0.63 | 3.63 | — | 0.14 | 0.48 | 0.07 | — | — | 0.00 | 0.01 | 9.28 |
| Other groundfish | | | | | | | | | | | | | | | | | | | | |
| Cabezon (WA) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 6.05 | — | — | 0.01 | 6.06 |
| Greenling, unid. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.64 | 0.05 | — | 0.69 |
| Kelp greenling (CA) | — | — | — | — | — | — | 0.00 | — | — | — | 0.88 | — | 3.53 | 0.02 | — | — | — | 11.97 | 0.00 | 16.42 |
| Kelp greenling (OR) | 0.02 | — | — | — | — | — | — | — | — | — | 0.02 | — | 8.24 | 2.23 | — | — | 16.38 | — | 0.06 | 26.96 |
| Kelp greenling (WA) | 0.10 | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | 1.51 | — | — | 0.35 | 1.97 |
| Leopard shark | — | — | — | — | — | — | 5.54 | — | — | — | 0.56 | — | 0.41 | 3.43 | — | — | — | 46.84 | 0.14 | 56.92 |
| Other rockfish | | | | | | | | | | | | | | | | | | | | |
| Rockfish, unid. | 0.19 | 0.00 | 0.68 | 0.01 | — | — | — | — | — | — | 0.16 | — | 0.27 | 0.02 | — | — | 0.09 | 0.00 | — | 1.43 |
| Pacific cod | 41.68 | 0.00 | 0.65 | 0.71 | 0.01 | 0.18 | — | — | 0.01 | — | 1.92 | 0.05 | — | 0.08 | 112.53 | 0.77 | 0.08 | — | 0.30 | 158.97 |
| Pacific hake | 348.73 | 0.01 | 304.09 | 1,459.15[a] | 1,371.29[a] | 662.57[a] | 0.00 | — | 375.24 | 17.09 | 1.72 | 0.32 | — | 0.03 | 6,405.50 | — | 0.03 | 0.00 | 83.80 | 3,568.38[a] |
| Pacific ocean perch (N of 40°10'N) | 46.68 | 0.01 | 0.21 | 47.44 | 20.33 | 5.93 | — | — | 0.23 | — | 0.28 | 0.04 | — | 0.02 | 1.32 | — | — | — | 1.12 | 123.63 |

[a] Numbers in these cells should be multiplied by 100.

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Groundfish species** | | | | | | | | | | | | | | | | | | | | |
| Petrale sole | 2,731.71 | 0.12 | 0.19 | 0.04 | 0.00 | — | 3.15 | 0.01 | 0.30 | 1.26 | 2.03 | 0.25 | 0.00 | 5.87 | 183.31 | — | 3.48 | 2.09 | 9.96 | 2,943.76 |
| Roundfish, unid. | — | — | — | 0.02 | 0.59 | — | — | — | 0.00 | — | — | — | — | — | — | — | 0.00 | — | — | 0.61 |
| Sablefish (N of 36°N) | 1,538.72 | 850.20 | 0.42 | 98.51 | 67.48 | 85.79 | — | — | 0.19 | — | 2,127.11 | 42.52 | 1.10 | 41.21 | 466.36 | — | 3.72 | 0.00 | 22.46 | 5,345.78 |
| Sablefish (S of 36°N) | 1.00 | 110.37 | — | — | — | — | — | — | 0.01 | 0.05 | 336.70 | — | 12.53 | 3.44 | — | — | — | — | 1.26 | 465.36 |
| Shortbelly rf. | 0.58 | — | 3.64 | 125.31 | 140.81 | 27.73 | — | 0.00 | 21.50 | 0.03 | — | — | — | — | 0.01 | — | — | — | 0.57 | 320.17 |
| SST (N of 34°27'N) | 736.32 | 6.64 | 0.03 | 1.06 | 24.79 | 3.18 | — | — | 0.04 | — | 60.93 | 0.87 | 3.38 | 1.10 | 43.02 | — | — | — | 5.51 | 886.89 |
| SST (S of 34°27'N) | — | — | — | — | — | — | — | — | — | — | 140.20 | — | 0.00 | 1.50 | — | — | — | — | 0.49 | 142.19 |
| Spiny dogfish shark | 146.92 | 6.92 | 0.17 | 101.66 | 108.19 | 31.70 | 5.56 | 0.17 | 0.01 | 0.38 | 68.01 | 0.22 | 0.16 | 0.27 | 7.28 | 0.21 | 0.01 | 2.98 | 16.05 | 496.86 |
| Splitnose rf. (S of 40°10'N) | 12.54 | — | — | — | — | — | — | — | 2.88 | 0.02 | 0.08 | — | 0.02 | — | — | — | — | — | 11.17 | 26.69 |
| Starry flounder | 9.56 | — | 0.00 | — | — | — | 4.56 | — | — | — | 0.04 | — | 0.04 | 1.60 | 0.01 | — | 0.05 | 3.58 | 0.05 | 19.49 |
| Widow rf. | 33.89 | — | 4,857.27 | 973.15 | 409.88 | 66.11 | — | — | 0.00 | — | 1.55 | 0.03 | 0.80 | 0.44 | 10.64 | — | 1.55 | 4.87 | 6.02 | 6,366.20 |
| Yelloweye rf. | 0.14 | 0.01 | 0.00 | 0.00 | — | 0.00 | — | — | 0.00 | — | 2.29 | 0.68 | 2.12 | 0.02 | 0.61 | 3.15 | 3.60 | 4.48 | 0.90 | 18.02 |
| Yellowtail rf. (N of 40°10'N) | 199.74 | 0.16 | 953.70 | 1,305.09 | 130.22 | 147.93 | — | — | 0.00 | — | 1.13 | 0.08 | 1.28 | 1.80 | 244.34 | 49.74 | 13.78 | 0.51 | 10.10 | 3,059.60 |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | |
| CA halibut | — | — | — | — | — | — | 116.44 | — | — | 2.09 | 1.63 | — | 0.53 | 154.14 | — | — | 0.07 | 129.90 | — | 404.79 |
| Dungeness crab | 171.96 | 1.36 | 0.10 | 0.00 | — | — | 114.54 | — | 0.00 | — | 4.57 | 0.02 | 2.21 | 218.65[a] | 1,376.48 | — | — | — | 0.00 | 235.36[a] |
| Non-FMP flatfish | | | | | | | | | | | | | | | | | | | | |
| Deepsea sole | 5.82 | 0.00 | — | — | — | — | — | — | 0.11 | — | 0.03 | — | — | — | — | — | — | — | — | 5.96 |
| Diamond turbot | — | — | — | — | — | — | 0.04 | — | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.04 |
| Hornyhead turbot | — | — | — | — | — | — | 1.37 | 0.16 | — | 1.73 | — | — | — | 0.01 | — | — | — | — | — | 3.26 |
| Longfin sanddab | — | — | — | — | — | — | 0.25 | 0.15 | 0.00 | 1.78 | — | — | — | — | — | — | — | 0.00 | 0.00 | 2.18 |
| Slender sole | 61.44 | — | 0.00 | — | 0.00 | 0.00 | 0.07 | — | 71.45 | 2.49 | — | — | — | — | — | — | — | — | — | 135.47 |
| Speckled sanddab | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | 0.00 | — | 0.00 |
| Other nongroundfish | | | | | | | | | | | | | | | | | | | | |
| Brown Irish lord sculpin | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | — | — | — | — | 0.00 | 0.00 | 0.01 |
| Buffalo sculpin | — | — | — | — | — | — | — | — | — | — | — | — | 0.17 | — | — | — | 0.01 | 0.02 | — | 0.20 |
| CA sheephead | — | — | — | — | — | — | — | — | — | — | 3.51 | — | 76.95 | 1.93 | — | — | — | 53.15 | 0.01 | 135.55 |
| Red Irish lord sculpin | — | — | — | — | — | — | — | — | — | — | — | — | 0.12 | — | — | — | 0.03 | 0.00 | — | 0.15 |
| Sculpin, unid. | 0.76 | — | 0.00 | — | — | — | 0.05 | 0.08 | 0.20 | 0.10 | 0.00 | — | 0.15 | 0.20 | — | — | 0.00 | 0.00 | — | 1.54 |
| Skate, unid. | 18.68 | 0.01 | 0.01 | 0.12 | — | — | 0.41 | — | 0.00 | 1.03 | 5.07 | 3.36 | 0.11 | 4.62 | 120.13 | — | — | 0.00 | 0.00 | 153.54 |
| Squid, unid. | 1.57 | — | 0.05 | 18.03 | 170.87 | 28.24 | — | — | — | — | 0.02 | — | — | 10.83 | 0.04 | — | — | — | 0.07 | 229.72 |
| Starry skate | 0.09 | — | — | — | — | — | 0.29 | — | — | — | — | — | 0.01 | — | — | — | — | 0.00 | 0.04 | 0.43 |

[a] Numbers in these cells should be multiplied by 100.

Table 15 (continued). Estimated fishing mortality (mt) of groundfish and a subset of nongroundfish species, by sector.

| | Commercial Fisheries | | | | | | | | | | | | | | | Recreational fishing mortality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IFQ/co-op Management | | | | | | Non-IFQ | | | | | | | | | | | | | |
| | BT | FG | MW rf. | SS MW hake | A-S MW CP | A-S MW MSCV | OA CA halibut | SC | PS | RP | Non-ns. FG | Dir. PHLB | Ns. FG | IF | WA total SS | WA | OR | CA | Res. | EFM |
| **Nongroundfish species** | | | | | | | | | | | | | | | | | | | | |
| Shared ECS | | | | | | | | | | | | | | | | | | | | |
| Barracudina, unid. | — | — | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Blacksmelt, unid. | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Bristlemouth, unid. | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Deepsea smelt, unid. | 0.00 | — | — | — | 0.04 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 | 0.06 |
| Duckbill barracudina | — | — | — | — | 0.69 | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.71 |
| Lanternfish, unid. | 0.00 | — | — | — | 0.47 | 0.00 | — | — | 0.02 | — | — | — | — | — | — | — | — | — | 0.03 | 0.53 |
| Lightfish, unid. | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Non-eulachon smelt, unid. | 0.01 | — | — | — | — | — | — | — | 1.04 | 0.03 | — | — | — | — | — | — | — | — | — | 1.08 |
| Non-Humboldt squid, unid. | 11.75 | 0.00 | 0.09 | 0.07 | — | — | 0.03 | 0.00 | 6.08 | 0.36 | — | — | — | — | — | — | — | — | — | 18.37 |
| Pacific sandlance | — | — | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 |
| Pacific saury | 0.00 | — | — | — | 0.00 | 0.00 | — | — | 0.00 | — | — | — | 0.00 | — | — | — | — | — | — | 0.01 |
| Round herring | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.81 | — | — | — | — | — | 0.81 |
| Slender barracudina | — | — | — | — | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Smelt, unid. | — | 2.16 | — | — | — | — | — | — | — | — | 0.05 | — | — | 135.17 | 0.00 | — | — | — | — | 137.38 |
| Surf smelt | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| White barracudina | — | — | — | — | 0.02 | 0.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.02 |
| Whitebait smelt | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |

# Results

Fishing mortality estimates for all groundfish catch combined were higher in 2017 than in 2016 in the at-sea hake CP and MSCV, catch shares pot and bottom trawl, and OA fixed gear sectors (Table 15; Somers et al. 2017). Estimated fishing mortality of all groundfish species and complexes were lower than 2016 levels in the catch shares hook-and-line, sablefish primary, nearshore, and pink shrimp sectors.

The percentage of all shoreside catch share sectors (except midwater rockfish) using EM systems increased from 2016 to 2017 (Tables 2a–2e;, Somers et al. 2018a). In both 2016 and 2017, the pot gear portion of the fleet landed ~860 mt of groundfish across both EM and observer-monitored trips, with a slight increase in the percentage of landings using EM from 55% in 2016 to 58% in 2017. The hook-and-line gear portion of the fleet has not adopted EM, and landings decreased by ~80 mt from 2016 to 2017. Landings by the catch share bottom trawl sector in 2017 were ~700 mt greater than those in 2016, and approximately 12% of the bottom trawl sector used EM, an increase of about 2% over 2016. Landings by the midwater rockfish fleet increased more than five times to almost 6,000 mt of groundfish in 2017, reflecting the recent redevelopment of the midwater rockfish fleet as the primary targets, widow and yellowtail rockfish, have rebuilt and quotas have subsequently increased. The portion of the midwater rockfish fleet using EM simultaneously decreased from about two-thirds to one-fourth, potentially related to the recent increase in quota. In 2017, the shoreside midwater hake fleet continued to increase to more than twice the landings in 2015: almost 150,000 mt. The proportion of those landings covered by EM increased slightly, to 92% of the fleet. Landings by the at-sea hake fishery also increased from 2016 to 2017, by ~30,000 mt and ~1,600 mt in the CP and MSCV sectors, respectively; in both portions of the fleet, less than 1% of catch was unsampled.

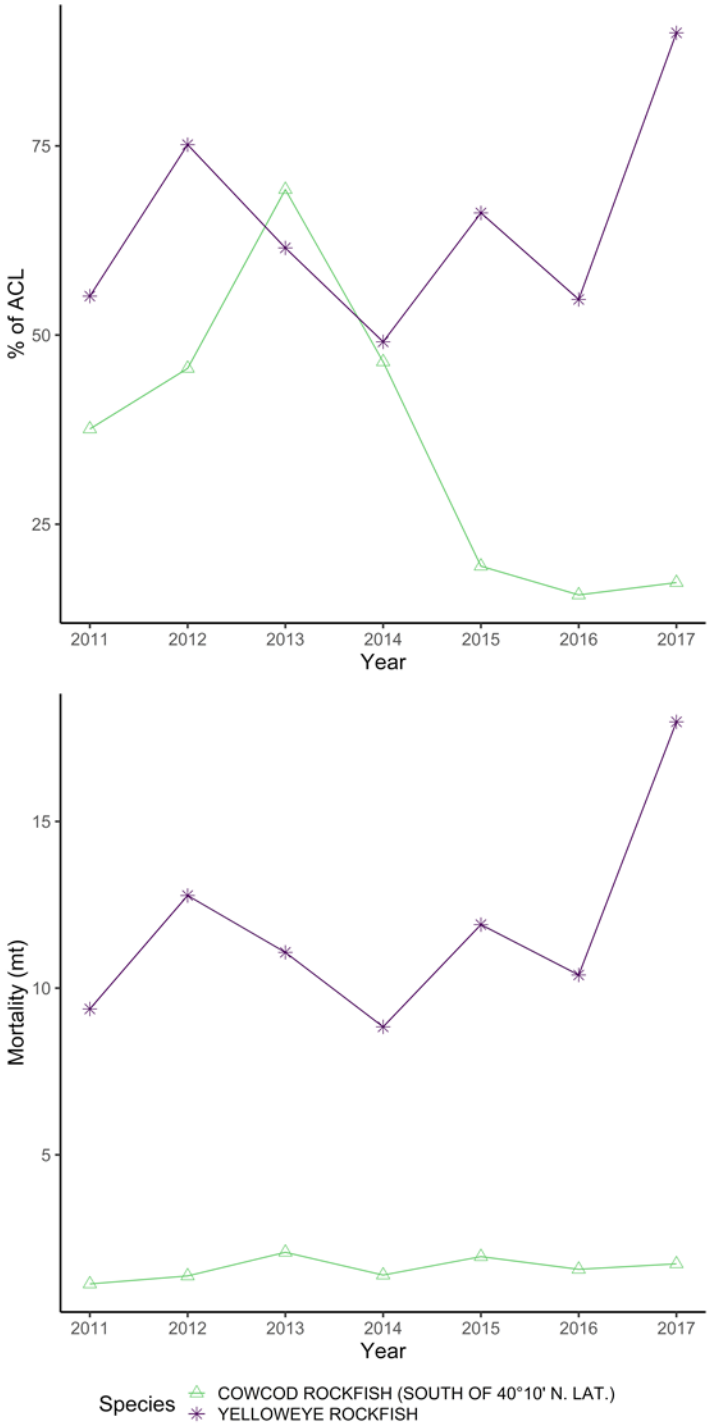


Figure 2. Estimated mortality and percentage of ACL for the two groundfish species that PFMC continued to define as rebuilding in 2017.

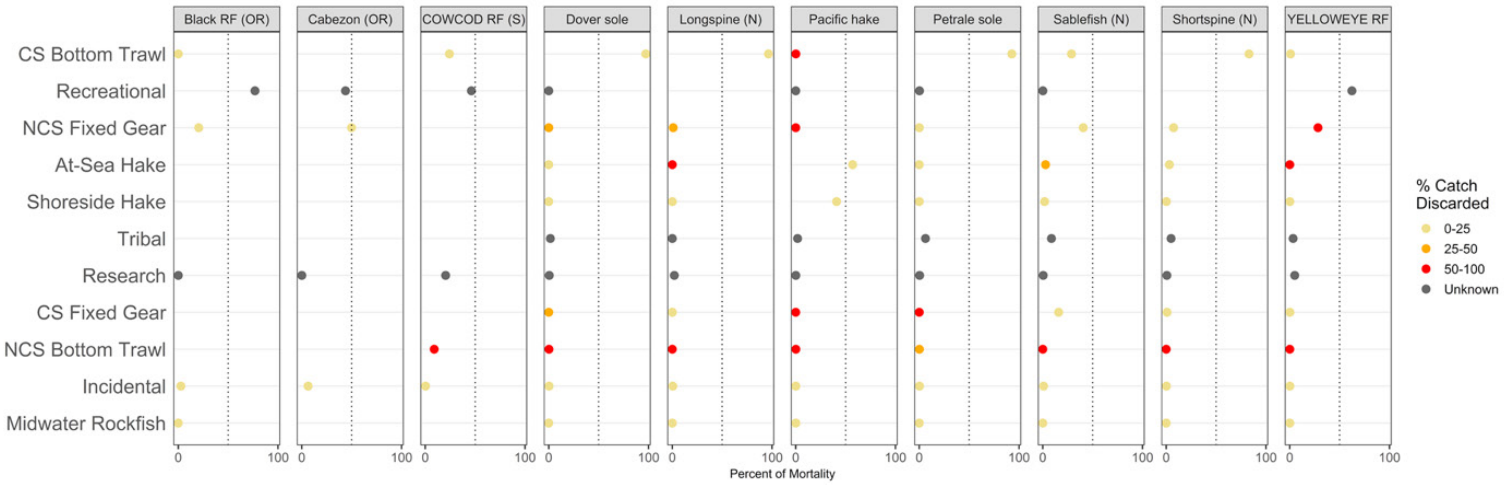


Figure 3. Percentage of mortality contributed by each sector to 2017 mortality for: the two rebuilding species (cowcod and yelloweye rockfish, capitalized), five of the most targeted groundfish species (Pacific hake, dover sole, sablefish in the north, and shortspine and longspine thornyheads in the north), and the three other highly attained species (black rockfish in Oregon, cabezon in Oregon, and petrale sole). Sectors with no dot represent zero contribution; dotted line specifies 50% of mortality. Sectors are ordered by mean percent contribution to mortality across all species displayed, with greatest contributors at the top of the panels. NCS Fixed Gear includes all non-nearshore and nearshore fixed gear; NCS Bottom Trawl includes California halibut, pink shrimp, ridgeback prawn, and sea cucumber trawl.

Two elements which affect WCGOP fleetwide discard estimates are the discard ratio and the expansion factor used to generate the fleetwide estimates. Changes in expansion factors are tracked by reviewing the fleetwide landing trends in each observed fishery. In state fisheries which are observed for incidental groundfish interactions, total 2017 landings in the OA California halibut trawl fishery were similar to those in 2016, with only 6.8 more mt of California halibut caught (Table 4a; Somers et al. 2018a). Only ~14 mt of sea cucumbers were landed in 2017, which was less than half of 2016 landings and a historic low since 2002 (Table 4b; Somers et al. 2018b). Landings in the pink shrimp fishery decreased in Washington by ~3,000 mt and in Oregon by ~5,600 mt, and increased in California by ~100 mt from 2016 to 2017 (Table 5a; Somers et al. 2018a). Ridgeback prawn landings in 2017 were 40 mt lower than those in 2016 but less than half of the historic high seen in 2015 (Table 5b; Somers et al. 2018a).

Groundfish landings, unlike total mortality estimates, by the longline portion of the LE sablefish primary fishery increased from 2016 to 2017 by ~50 mt, while the pot gear portion was comparable across years (Table 6; Somers et al. 2018a). Landings by both pot and line gears in the LE, nonendorsed portion of the non-nearshore fixed gear fleet were similar in 2016 and 2017 (Table 7; Somers et al. 2018a), while landings by the OA longline gear fleet increased by ~60 mt while pot gear remained similar (Tables 8a and 8b; Somers et al. 2018a). Pacific halibut fishery landings of Pacific halibut were 6 mt greater than in 2016, reflecting a high total allowable catch and making 2017 landings the highest since 2002 (Table 9b; Somers et al. 2018a). Nearshore fixed gear landings decreased by 17.5 mt from 2016 to 2017 coastwide; nearshore landings in Oregon increased by about 20 mt, close to the 2002–17 mean value, and in California decreased by about 40 mt, following a near-historic high in 2015 (Table 11; Somers et al. 2018a).

Fishing mortality estimates are evaluated in terms of 2017 ACL, acceptable biological catch (ABC), and overfishing limit (OFL) harvest specifications from federal groundfish regulations (USOFR 2017). Only two species remain PFMC-defined as rebuilding: cowcod rockfish south of lat 40°10'N and yelloweye rockfish. The ACL percentages increased for both of these species; cowcod increased from 13 to 17%, while yelloweye rockfish showed a much greater increase, from 50 to 90% (Figure 2). In both cases, the greatest contribution to mortality came from recreational fishing (Figure 4). The next largest contributors to cowcod mortality were catch share bottom trawl and research effort, while yelloweye's second greatest contributor was non-catch share fixed gear (Figure 3).

Overall, the attainments of ACLs for the managed groundfish species and complexes in 2017 were similar to those in 2016, although a greater number of species exceeded 90% of their ACLs (Figure 4). Petrale sole achieved 91% of its ACL harvest goal in 2016 and 94% in 2017, with nearly all mortality coming from the catch share bottom trawl sector (Figure 3). Attainment of the ACL for sablefish north of lat 36°N increased from 92% in 2016 to 102% in 2017, with the greatest contribution from non-catch shares fixed gear, followed by catch share bottom trawl and then catch share fixed gear and tribal effort (Figure 3). The management groupings for black rockfish were changed to state areas in 2017, and black rockfish in Oregon achieved 103% of its ACL goal, three-quarters of which came from the recreational sector (Figure 3). Forty-five percent and 78% of the black rockfish ACLs in California and Washington, respectivley, were achieved. Finally, achievement of ACL for cabezon in Oregon

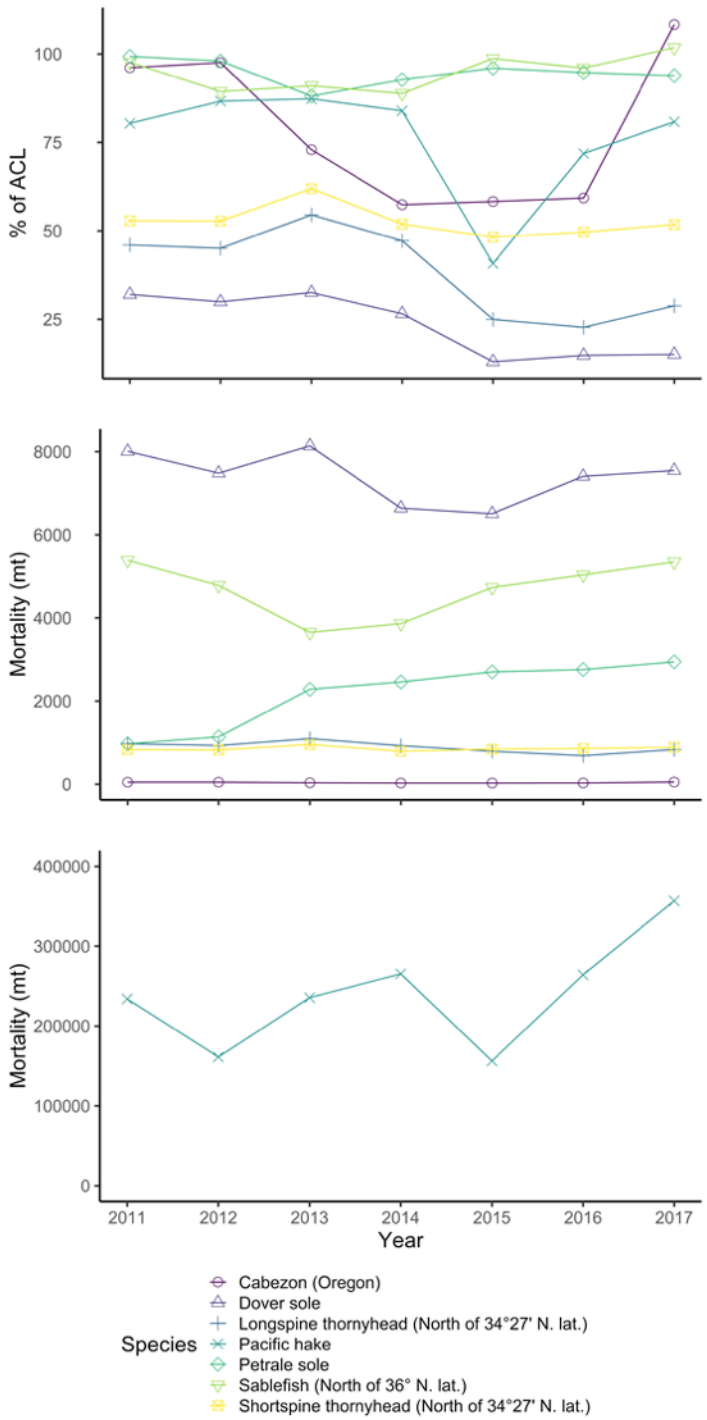


Figure 4. Estimated mortality and percentage of ACL for five of the most targeted groundfish species (Pacific hake, Dover sole, sablefish in the north, and shortspine and longspine thornyhead in the north) and the two other highly attained species (cabezon in Oregon, and petrale sole). Black rockfish in Oregon was also highly attained, but ACLs at the state level were only defined in 2017, so cannot be compared across years. Pacific hake mortality is shown in a separate panel due to the greater magnitude.

increased greatly, from 59% in 2016 to 108% in 2017; most of this mortality was evenly split between the recreational and the non-nearshore fixed gear sectors (Figure 4). Twenty-nine of the groundfish species or complexes (71%) had fishing mortality estimates which were less than 50% of 2017 ACL harvest goals (Table 16).

Of the 45 management groupings that were consistent and so could be compared across 2016 and 2017, 35 showed greater catch in 2017. Shortbelly rockfish showed the greatest relative increase, with 2017 mortality levels almost ten times those of 2016, which was primarily due to increased catch in the at-sea and shoreside-processed midwater hake fisheries. Widow rockfish (~6×, ~5,300 mt), canary rockfish (~5×, ~320 mt), and yellowtail rockfish (~2×, ~1,530 mt) also increased from 2016 to 2017, reflecting the increase in effort in the midwater rockfish fishery. Pacific hake increased the most from 2016 in total weight, by almost 93,000 mt; both the CP and MSCV portions of the at-sea hake fleet showed the greatest landings since before 2002.

Of the 10 groupings that showed lower catch in 2017, Pacific cod decreased the most both proportionally and by weight, with 2017 mortality ~27% of 2016 levels, a decrease of ~425 mt. Spiny dogfish also decreased to ~61% of 2016 levels, representing a decrease of more than 300 mt. Mortality of sablefish south of lat 36°N, English sole, and cabezon in California in 2017 were all ~70% of 2016 levels, or around a 130–140 mt decrease for each grouping.

Table 16. Estimated fishing mortality (mt) of major west coast groundfish species and corresponding management reference points (harvest specifications). Values greater than 90–100% relative to a management reference point are highlighted in yellow. Values greater than 100% relative to a mangement reference point are highlighted in red. *Key*: EFM = estimated fishing mortality, ACL = annual catch limit, ABC = acceptable biological catch, OFL = overfishing limit, TAC = total allowable catch.

| | | Management reference points (harvest specifications) | | | | | |
|---|---|---|---|---|---|---|---|
| | **Total EFM** | **ACL** | **EFM (% of ACL)** | **ABC** | **EFM (% of ABC)** | **OFL** | **EFM (% of OFL)** |
| Arrowtooth flounder | **1,446** | 13,804 | 10 | 13,804 | 10 | 16,571 | 9 |
| Big skate | **260** | 494 | 53 | 494 | 53 | 541 | 48 |
| Black rf. (CA) | **151** | 334 | 45 | 334 | 45 | 349 | 43 |
| Black rf. (OR) | **544** | 527 | 103 | 527 | 103 | 577 | 94 |
| Black rf. (WA) | **248** | 319 | 78 | 305 | 81 | 305 | 81 |
| Bocaccio rf. (S of 40°10'N) | **225** | 790 | 28 | 2,044 | 11 | 2,139 | 11 |
| Cabezon (CA) | **55** | 150 | 37 | 150 | 37 | 157 | 35 |
| Cabezon (OR) | **51** | 47 | 108 | 47 | 108 | 49 | 104 |
| CA scorpionfish (S of 34°27'N) | **86** | 150 | 57 | 264 | 33 | 289 | 30 |
| Canary rf. | **401** | 1,714 | 23 | 1,714 | 23 | 1,793 | 22 |
| Chilipepper rf. (S of 40°10'N) | **128** | 2,607 | 5 | 2,607 | 5 | 2,727 | 5 |
| Cowcod rf. (S of 40°10'N) | **2** | 10 | 17 | 63 | 3 | 70 | 2 |
| Darkblotched rf. | **238** | 641 | 37 | 641 | 37 | 671 | 35 |
| Dover sole | **7,547** | 50,000 | 15 | 85,755 | 9 | 89,702 | 8 |
| English sole | **349** | 9,964 | 4 | 9,964 | 4 | 10,914 | 3 |
| Lingcod (N of 40°10'N) | **1,167** | 3,333 | 35 | 3,333 | 35 | 3,549 | 33 |
| Lingcod (S of 40°10'N) | **539** | 1,251 | 43 | 1,251 | 43 | 1,502 | 36 |
| Longnose skate | **900** | 2,000 | 45 | 2,444 | 37 | 2,556 | 35 |
| Minor rockfish (N of 40°10'N) | **840** | 3,909 | 21 | 3,909 | 21 | 4,318 | 19 |
| Nearshore | **90** | 105 | 86 | 105 | 86 | 118 | 76 |
| Shelf | **320** | 2,049 | 16 | 2,049 | 16 | 2,303 | 14 |
| Slope | **430** | 1,755 | 25 | 1,755 | 25 | 1,897 | 23 |
| Minor rockfish (S of 40°10'N) | **1,398** | 3,493 | 40 | 3,508 | 40 | 4,073 | 34 |
| Nearshore | **713** | 1,163 | 61 | 1,166 | 61 | 1,329 | 54 |
| Shelf | **571** | 1,623 | 35 | 1,624 | 35 | 1,917 | 30 |
| Slope | **113** | 707 | 16 | 718 | 16 | 827 | 14 |
| Other flatfish | **1,003** | 8,510 | 12 | 8,510 | 12 | 11,165 | 9 |
| Other groundfish | **109** | 474 | 23 | 474 | 23 | 537 | 20 |
| Pacific cod | **159** | 1,600 | 10 | 2,221 | 7 | 3,200 | 5 |
| Pacific hake | **356,839** | 2017 U.S. TAC = 441,433 mt, 81% of U.S. TAC | | | | | |
| Pacific ocean perch (N of 40°10'N) | **124** | 281 | 44 | 922 | 13 | 964 | 13 |
| Petrale sole | **2,944** | 3,136 | 94 | 3,136 | 94 | 3,280 | 90 |
| Sablefish (N of 36°N) | **5,346** | 5,252 | 102 | 7,350 | 79 | 8,050 | 72 |
| Sablefish (S of 36°N) | **465** | 1,864 | 25 | | | | |
| Shortbelly rf. | **320** | 500 | 64 | 5,789 | 6 | 6,950 | 5 |
| Spiny dogfish | **497** | 2,094 | 24 | 2,094 | 24 | 2,514 | 20 |
| Splitnose rf. (S of 40°10'N) | **27** | 1,760 | 2 | 1,760 | 2 | 1,841 | 1 |
| Starry flounder | **19** | 1,282 | 2 | 1,282 | 2 | 1,847 | 1 |
| Thornyheads | | | | | | | |
| LST (N of 34°27'N) | **833** | 2,894 | 29 | 3,808 | 22 | 4,571 | 19 |
| LST (S of 34°27'N) | **14** | 914 | 1 | | | | |
| SST (N of 34°27'N) | **887** | 1,713 | 52 | 2,619 | 39 | 3,144 | 33 |
| SST (S of 34°27'N) | **142** | 906 | 16 | | | | |
| Mixed thornyheads | **2** | | | | | | |
| Widow rf. | **6,366** | 13,508 | 47 | 13,508 | 47 | 14,130 | 45 |
| Yelloweye rf. | **18** | 20 | 90 | 47 | 38 | 57 | 32 |
| Yellowtail rf. (N of 40°10'N) | **3,060** | 6,196 | 49 | 6,196 | 49 | 6,786 | 45 |

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# Appendix A:
# Discard Mortality Analysis Details/Protocol

The tables in this appendix (filename: `TM-NWFSC-150.xlsx`) can be downloaded from the report's NOAA Institutional Repository[1] record by clicking on the "Supporting Files" tab.

Table A-1. Species identification codes used in the Pacific Coast Fisheries Information Network (PacFIN) database and assigned to WCGOP data. Columns on the far right specify which species were defined as groundfish (as identified in the Pacific Coast Groundfish FMP), as nearshore species, as IFQ managed species or categories, or as rebuilding species in 2017.

Table A-2. Species belonging to each WCGOP unsampled IFQ catch category. Species belonging to each WCGOP unsampled IFQ catch category. The IFQM catch category includes all 2016 IFQ species, and the NIFQ category includes all fish species except 2016 IFQ species.

Table A-3. Mortality rates applied in bottom trawl and fixed gear fisheries. Unlisted species were assumed to have 100% mortality rate. Rates are provided by GMT.

Table A-4. Depth-dependent mortality rates applied in the nearshore fixed gear fishery. Unlisted species were assumed to have 100% mortality rate or were not observed in the given strata across all years of WCGOP data. Rates are provided by GMT and were updated in June 2017.

Table A-5. Updates to analysis used in this report.

Table A-6. In-season adjustments to 2017 west coast groundfish fisheries. A complete list of NMFS Public Notices and a complete list of Federal Register Notices can be found at www.westcoast.fisheries.noaa.gov. Provided by T. Phillips/GMT.

[1] https://repository.library.noaa.gov/

# Appendix B:
# PacFIN Data Processing Protocol

## Fish Ticket Data Retrieval and Processing

The basic protocol we employ using Oracle SQL developer and R software is as follows:

1. Run an SQL query to retrieve PacFIN data from 2002 through previous year and output an initial data file (.csv file).
2. Postprocess the PacFIN data internally.
3. Utilize postprocessed PacFIN data files in analyses and groundfish mortality (GM) reporting.

Prior to PacFIN fish ticket data retrieval (from PacFIN website):

Landings can be recorded within the PacFIN system in very general categories consisting of many species, and others not as general but consisting of two or more species. Within the fish ticket tables, these are known as a fish ticket market category, or "category" for short. Examples in the PacFIN system are names such as "unspecified slope rockfish," "nominal yellowtail rockfish," and "unspecified small reds rockfish."

These market categories are sampled regularly, resulting in proportions that describe the composition of these various categories in terms of the actual species observed. This market category sampling occurs in various ports and for distinct gear types, producing proportions for individual species by port (or port group), gear (or gear group), and month (or quarter). For some PacFIN data sources, area is also a sampling dimension.

The PacFIN system combines monthly summations of market categories with corresponding species composition proportions to produce the best estimate of catch for individual species, where possible. If all possible combinations of market category, gear type, port, month, and area (where applicable) were actually sampled, then the resulting PacFIN reports/data would contain catch for only individual scientifically defined species. As it is, there are situations that result in unsampled strata and thus, PacFIN reports/data potentially include both individual species as well as market categories.

We selected from all data from 2002–17 from one view created by PacFIN, `WCGOP_COMPFT_FEDPERMITS_V2`, which joins permits tables to the comprehensive fish ticket table.

Prior to running the code below, edits are made to the downloaded PacFIN data, including:

- Correcting gear, vessel ID, IFQ landing, ticket date, and removal type fields based on intense QAQC of observer data.
- Removing duplicated tickets.
- Adding salmon counts based on electronic fish tickets data.
- Incorporating state permit data.

## Explicit WCGOP postprocessing of PacFIN fish ticket data output from query above

This procedure will identify sectors, as shown in Figure 1.

Add field YMD and calculate:
([YEAR] × 10,000) + ([MONTH] × 100) + [DAY])

Add field VIDYMD and calculate:
[DRVID] & [YMD]

Select Tribal landings as PARGRP = *I.*
Assign sector "Tribal Commercial" and summarized with "Tribal landings."

Select Research landings as REMOVAL_TYPE = *R* and IFQ_LANDING = *FALSE.*
Assign sector "Commercial Research."

*Note: Commercial research data are provided by WCR for GM reports, and thus the data from this step are omitted. Further, IFQ trips in early years of the program were often incorrectly identified as research, so we ignore overlap between those two fields.*

Select Non-Research landings as !(REMOVAL_TYPE = *R* and IFQ_LANDING = *FALSE*).

Select fish tickets not identified to an entity/vessel in Non-Research as DRVID = *MISSING*, *UNKNOWN*, or blank.
Assign sector "Non-Identified Vessel/Entity."

Select fish tickets identified to an entity/vessel in Non-Research as DRVID ≠ *MISSING*, *UNKNOWN*, or blank.

Select non-IFQ EFP landings from Non-Research, Vessel ID known as REMOVAL_TYPE = *E* and IFQ_LANDING = *FALSE*.
Assign sector "Commercial EFP."

*Note: We ignore the EFP flag where IFQ_LANDING =* TRUE*, because this field is not always correct. Instead, we use a separate list from PSMFC to identify EM and other EFP tickets under the IFQ program. In 2017, the gear modification EFP trip was included in the IFQ catch share program as EM or observed, as appropriate.*

2002–2010:
If ADJ_GRID = MDT, summarized with "Non-tribal shoreside hake."
If ADJ_GRID ≠ MDT, summarized with "Incidental fisheries" or as "EFP."

Select non-EFP and IFQ EFP from Non-Research, Vessel ID known as REMOVAL_TYPE ≠ *E* or REMOVAL_TYPE = *E* and IFQ_LANDING = *TRUE*.

Select Individual Fishing Quota (IFQ) landings from Non-Research, Vessel ID known as IFQ_LANDING = *TRUE*.

Identify hake sector for all IFQ midwater tickets:
Landed ≥ 50% hake on VIDYMD, hake sector = "Midwater Hake."
Landed < 50% hake on VIDYMD, hake sector = "Midwater Rockfish."

Identify non-EM EFP fleet:
If not in EM list from PSMFC:
If fishing non-midwater, assign sector "Catch Shares."
If fishing midwater 2011–14 and observer identified as non-hake trip, assign sector "Catch Shares."
If fishing midwater 2011–14 and observer identified as hake trip, assign sector "Shoreside Hake."
If fishing midwater 2015–forward, assign sector "Midwater Hake" or "Midwater Rockfish" based on hake sector above.

If in EM list from PSMFC:
If fishing non-midwater, assign sector "Catch Shares EM."
If fishing midwater, assign "Midwater Hake EM" or "Midwater Rockfish EM" based on hake sector field above.

Select non-IFQ landings from Non-Research, Non-EFP, Vessel ID known: IFQ_LANDING = *FALSE.*

Select Gear Group Shrimp trawl landings from non-IFQ that landed more Pink Shrimp (PS) than not, fished with a state PS permit between April and November:
GRGROUP = *TWS* and PS permit and MONTH in 4–11.
Assign sector "Commercial Shrimp Trawl."
Summarized as "Pink Shrimp."

Select Gear Group Shrimp trawl landings from non-IFQ that did not land more Pink Shrimp (PS) than not, did not fish with a state PS permit, and/or fished outside of April to November:
GRGROUP = *TWS* and no PS permit or MONTH in 1–3, 12.

Select landed ridgeback prawn and no sea cucumber, had state permit, and fished in MONTH 1–5:
Assign sector "Commercial Prawn Trawl."

Select landed sea cucumber and no ridgeback prawn and had state permit:
Assign sector "Commercial Sea Cucumber Trawl."

Select landed sea cucumber and ridgeback prawn and had both state permits:

Select landed more ridgeback prawn:
Assign sector "Commercial Prawn Trawl."

Select landed more sea cucumber:
Assign sector "Commercial Sea Cucumber Trawl."

Select landed more of anything other than ridgeback prawn or sea cucumber:
Assign sector "Commercial Group Others."
Summarized with "Incidental fisheries."

Select did not land ridgeback or sea cucumber:
Assign sector "Commercial Group Others."
Summarized with "Incidental fisheries."

Select Gear Group Other landings from Non-Research/EFP Commercial:
(GRGROUP ≠ *HKL*) & (GRGROUP ≠ *POT*) & (GRGROUP ≠ *TWL*) & (GRGROUP ≠ *TWS*)
Assign sector "Commercial Group Others."
Summarized with "Incidental fisheries."

Select Gear Group Trawl landings from Non-IFQ:
GRGROUP = *TWL*.

Select Limited Entry permitted:
PERM1 ≠ [blank]

Select Midwater:
ADJ_GRID = *MDT.*
Assign sector "Commercial LE Trawl Midwater."
2002–2010:
Summarized with "Non-tribal shoreside hake."
2011–present:
If sector present, indicates an error that needs to be corrected. Often unlabeled research trip.

Select Non-Midwater:
ADJ_GRID ≠ *MDT.*
Assign sector "Commercial LE Trawl Non-midwater."

Select CA halibut:
2002–2006 based on CA halibut weight > 150 lb:
(SPID %in% c(*CHLB*, *CHL1*)) & (LWT_LBS > 150)
2007–present based on CA halibut on ticket and vessel carrying a year-specific CA halibut permit and CA halibut weight > 150 lb:
(SPID %in% c(*CHLB*, *CHL1*)) & (LWT_LBS > 150) & (DRVID %in% unique(FT.perm$DRVID))
Assign to "LE CA Halibut."

Select non-CA halibut:
Likely permit was not used for given landing. Assign to "Commercial OA Trawl Non-Midwater" and summarized with "Incidental fisheries."

Select Non-LE permitted (Open Access):
PERM1 = [blank]

Select Midwater:
ADJ_GRID = *MDT*.
Assign sector "Commercial OA Trawl Midwater."
Summarized with "Incidental fisheries."

Select Non-Midwater:
ADJ_GRID ≠ *MDT*.
Assign sector "Commercial OA Trawl Non-midwater."

Select CA halibut:
2002–2006 based on CA halibut weight > 150 lb:
(SPID %in% c(*CHLB*, *CHL1*)) & (LWT_LBS > 150)
2007–present based on CA halibut on ticket and vessel carrying a year-specific CA halibut permit:
(SPID %in% c(*CHLB*, *CHL1*)) & (DRVID %in% unique(FT.perm$DRVID))
Assign to "OA CA Halibut."

Select non-OA CA Halibut:

Select landed ridgeback prawn and no sea cucumber, had state permit, and fished in MONTH 1–5:
Assign sector "Commercial Prawn Trawl."

Select landed sea cucumber and no ridgeback prawn and had state permit:
Assign sector "Commercial Sea Cucumber Trawl."

Select landed sea cucumber and ridgeback prawn and had both state permits:

Select landed more ridgeback prawn:
Assign sector "Commercial Prawn Trawl."

Select landed more sea cucumber:
Assign sector "Commercial Sea Cucumber Trawl."

Select landed more of anything other than ridgeback prawn or sea cucumber:
Assign sector "Commercial OA Trawl Non-midwater."
Summarized with "Incidental fisheries."

Select any remaining:
Assign sector "Commercial OA Trawl Non-midwater."
Summarized with "Incidental fisheries."

Select Gear Group Fixed Gear landings from Non-IFQ/Research/EFP Commercial:
(GRGROUP = *HKL*) | (GRGROUP = *POT*)

Select Nearshore Species on FT:
SPID %in% c(*BLCK*, *BLK1*, *RCK9*, *RCK7*, *RCK2*, *BYEL*, *BYL1*, *BLU1*, *BLUR*, *BRW1*, *BRWN*, *CLC1*, *CLCO*, *SCOR*, *SCR1*, *CHN1*, *CHNA*, *COP1*, *COPP*, *GPH1*, *GPHR*, *GRAS*, *GRS1*, *KLP1*, *KLPR*, *OLV1*, *OLVE*, *QLB1*, *QLBK*, *TRE1*, *TREE*, *NSHR*, *NUSR*, *SSHR*, *SUSR*, *USHR*, *CBZ1*, *CBZN*, *KGL1*, *KLPG*, *SHPD*, *SHP1*, *UDNR*, *SSRS*, *SSRD*, *BISC*, *BSCL*, *RSCL*, *UGLG*)

Compile unique vessel landing date (VIDYMD) values for those FTs with Nearshore Species.

Retrieve all FTs (and all FT line items) for those VIDYMD values (so obtaining *all* fish tickets for a vessel's landing date if one or more of the vessel's fish tickets on that date had a nearshore species recorded on it).

2002–2003:
If not landed in WA, assign to "Nearshore."

2004–present:
If not landed in WA and had active Nearshore permit for given year, assign to "Nearshore."

Of the remaining Non-Nearshore Fixed Gear landings:

1. Create a catch variable for Groundfish (based on a GF_ID in a separate file maintained by WCGOP), and summarize RWT_LBS of groundfish and nongroundfish for each unique VIDYMD.
   If weight of nonsablefish groundfish weight is greater than nongroundfish weight in a unique fishing day for a vessel (VIDYMD), include in "Fixed Gear Sablefish Landings."
   GFLB.Sum ≥ NonGFLB.Sum
2. Select all VIDYMD if sablefish is a line item of catch on a FT:
   SPID = *SABL*
3. Compile unique VIDYMDs that fit either criteria of 1) sablefish landings, or 2) groundfish greater than nongroundfish.
   Retrieve all FT line items for those VIDYMD values. (See next section for more processing of these Fixed Gear Sablefish Landings).

Remaining not identified in Step 3 are Non-Nearshore, Non-Sablefish Fixed Gear landings:

Select Limited Entry permitted:
PERM1 ≠ [blank]

Select if Tier Endorsed:
SABL1 ≠ *0* | SABL2 ≠ *0* | SABL3 ≠ *0* | SABL4 ≠ *0*
Assign sector "Commercial Fixed-Gear Non-Nearshore Non-Sablefish LE Tier."

Select if Not Tier Endorsed:
SABL1 = *0* & SABL2 = *0* & SABL3 = *0* & SABL4 = *0*
Assign sector "Commercial Fixed-Gear Non-Nearshore Non-Sablefish LE 0 Tier."

Select Non-LE permitted (Open Access):
PERM1 = [blank]
Assign sector "Commercial Fixed-Gear Non-Nearshore Non-Sablefish OA."
Summarize with "Incidental fisheries."

Fixed Gear Sablefish landing FTs (see above for initial Steps 1–3 to identify):

Select Limited Entry permitted:
PERM1 ≠ [blank]
Assign sector "Commercial Fixed-Gear LE Sablefish."

Select if Tier Endorsed:
SABL1 ≠ *0* | SABL2 ≠ *0* | SABL3 ≠ *0* | SABL4 ≠ *0*
(See below for additional steps.)

Select if Not Tier Endorsed:
SABL1 = *0* & SABL2 = *0* & SABL3 = *0* & SABL4 = *0*

Select if Pot gear (LE 0 Tier cannot fish pot gear, so thus OA):
GRGROUP = *POT*
Assign sub-sector "Sable OA."
Summarize with "Non-nearshore fixed gear" (and "OA Fixed Gear" prior).
GRGROUP ≠ *POT*
Assign sub-sector "LE 0 Tier."
Summarize with "Non-nearshore fixed gear" (and "LE Non-primary" prior).

Select Non-LE permitted (Open Access):
PERM1 = [blank]
Assign sector "Commercial Fixed-Gear OA Sablefish."
Assign sub-sector "Sable OA."
Summarize with "Non-nearshore fixed gear" (and "OA Fixed Gear" prior).

For LE Tier Endorsed FTs, to determine if:
a) landings are assigned to the primary fishery (Primary Season Attaining Quota),
b) landings were made in the non-season fishery (Non-season DTL), or
c) if the vessel fished in the primary season but had already reached their tier limit and landings should be assigned to the DTL fishery (Primary Season Reached Quota DTL):

Table B-1. Annual tier quota and daily trip limit (DTL) maximums, in pounds (lb), for the limited entry sablefish primary fishery.

| Year | Tier 1 quota | Tier 2 quota | Tier 3 quota | DTL maximum landing | Federal Register reference |
|---|---|---|---|---|---|
| 2002 | 36,000 | 16,500 | 9,500 | 1,050 | 67 FR 10490 |
| 2003 | 53,000 | 24,000 | 14,000 | 1,050 | 68 FR 11182 |
| 2004 | 64,300 | 29,200 | 16,700 | 1,050 | 69 FR 11064 |
| 2005 | 64,000 | 29,100 | 16,600 | 1,050 | 69 FR 77012 |
| 2006 | 62,700 | 28,500 | 16,300 | 1,050 | 69 FR 77012 |
| 2007 | 48,500 | 22,000 | 12,500 | 1,050 | 71 FR 78638 |
| 2008 | 48,500 | 22,000 | 12,500 | 1,050 | 71 FR 78638 |
| 2009 | 61,296 | 27,862 | 15,921 | 1,000 | 73 FR 80516 |
| 2010 | 56,081 | 25,492 | 14,567 | 3,000 | 73 FR 80516 |
| 2011a | 41,379 | 18,809 | 10,748 | 2,000 | 76 FR 11381 |
| 2011b | 47,697 | 21,680 | 12,389 | 2,000 | 76 FR 34910 |
| 2012 | 46,238 | 21,017 | 12,010 | 1,800 | 76 FR 77415 |
| 2013 | 34,513 | 15,688 | 8,964 | 1,880 | 78 FR 49190 |
| 2014 | 37,441 | 17,019 | 9,725 | 2,000 | 78 FR 580 |
| 2015 | 41,175 | 18,716 | 10,695 | 2,000 | 80 FR 12567 |
| 2016 | 45,053 | 20,479 | 11,702 | 1,275 | 80 FR 12567 |
| 2017 | 45,120 | 20,509 | 11,720 | 1,275 | 82 FR 9634 |

Select if definitely non-primary season (with 5 days buffer at end of the season to evaluate those FTs at the "borderline" which could fall into either primary or non-season):

(MONTH < 4) | (MD > 1105)

*Note: MD is a concatenated field with Month and Day.*

Assign sub-sector "LE SAB NonPSeason."

Summarize with "Non-nearshore fixed gear" (and "LE Non-primary" prior)

Select if primary season (with 5-day buffer at end of season to evaluate those FTs at the "borderline" which could fall into either primary or non-season):

(MONTH ≥ 4) & (MD ≤ 1105)

Order multiple landings on a day from greatest sablefish landing to smallest sablefish landing to ensure consistent results across different years of analysis.

Add fields SABL1_Lim, SABL2_Lim, SABL3_Lim, etc., and calculate using year-specific tier limits:

2002–present except 2011 (repeated for each sabletier undelimited data field; SABL1, etc.):

SABL1_Lim [which(SABL = 1)] = Tier1Quota

SABL2_Lim [which(SABL = 2)] = Tier2Quota

SABL3_Lim [which(SABL = 3)] = Tier3Quota

For 2011, tier limits were increased midseason, taking effect 11 June:
SABL1_Lim [which((SABL = 1) & (MD < 0611))] = Tier1Quota for 2011a
SABL2_Lim [which((SABL = 2) & (MD < 0611))] = Tier2Quota for 2011a
SABL3_Lim [which((SABL = 3) & (MD < 0611))] = Tier3Quota for 2011a
SABL1_Lim [which((SABL = 1) & (MD ≥ 0611))] = Tier1Quota for 2011b
SABL2_Lim [which((SABL = 2) & (MD ≥ 0611))] = Tier2Quota for 2011b
SABL3_Lim [which((SABL = 3) & (MD ≥ 0611))] = Tier3Quota for 2011b

Add field QUOTA and calculate:
[SABL1_Lim] + [SABL2_Lim] + [SABL3_Lim]

Add field SABL_LND and for weight of sablefish landings for each line:
SABL_LND = *0*
SABL_LND [which(SPID = *SABL*)] = RWT_LBS[which(SPID = *SABL*)]

Select out just those FT line items with Sablefish:
SPID = *SABL*

Add field CUMSABL and calculate the cumulative sablefish weight landed by a vessel (each fish ticket line item of sablefish weight gets added up over time to see how the vessel's sablefish landings move toward attaining their total quota limit).

Add field PROPORTION and calculate the proportion of sablefish weight caught relative to their total tier quota weight:
[CUMSABL] / [QUOTA]

Select if the vessel is over their tier quota:
PROPORTION > 1

Select by criteria to identify the DTL sector, based on a "cushion" of sablefish quota overage weight (PROPORTION > 1.15) to allow for vessels that have reached their quota and are landing below the annual maximum DTL weekly limit:
(PROPORTION > 1.15 and SABL_LND < 1880 "DTL Max from above") or
YMD > 20131105

Compile unique FTID values for the FTs selected in the "Select by criteria" step above.

Retrieve all FT line items for those FTID values (for the DTL sectors).
Assign sub-sector "LE SAB DTL."
Summarize with "Non-nearshore fixed gear" (and "LE Non-primary" prior).

Remaining are Sablefish Primary Season Attaining Quota landings.

One more step is used to place these into season vs. non-season landings.

Select if in Primary Season:
YMD < 20131101
Assign sub-sector "LE SAB Primary."
Summarize with "Non-nearshore fixed gear" (and "LE Sablefish Primary" prior).

Select if outside Primary Season (non-season):
YMD ≥ 20131101
Assign sub-sector "LE SAB NonPSeason."
Summarize with "Non-nearshore fixed gear" (and "LE Non-primary" prior).

All data segments are combined together to reproduce the original dataset. If a SubSector value was not designated in the processing above, it is given the value from the SECTOR field.

All additional data processing steps that were applied during the discard estimation process are described in Methods. Of these, specific identification and removal of commercial directed Pacific halibut fixed gear landings is as follows:

If SubSector equals "Sable OA," "LE 0 Tier," "LE SAB NonPSeason," "LE SAB DTL," or "LE SAB Primary":

For 2002–16: If listed by the International Pacific Halibut Commission (IPHC) as a directed PHLB ticket, summarize with "Directed PHLB."

For most recent year of data, IPHC's list is not yet available, and IPHC does not currently track directed PHLB landings in California. In the most recent year, for all states, FTID had recorded PHLB catch landed on one of the specific calendar year 10-hour openings, plus two days post (to allow for any subsequent deliveries):
Summarize with "Directed PHLB."

2017:
((MONTH = 6) & (DAY %in% 28:30)) |
((MONTH = 7) & (DAY %in% 12:14)) |
((MONTH = 7) & (DAY %in% 26:28))

In addition, California FTID had recorded PHLB catch landed on one of the specific calendar year 10-hour openings, plus two days post (to allow for any subsequent deliveries):

2016:
((MONTH = 6) & (DAY %in% 21:23)) |
((MONTH = 7) & (DAY %in% 5:7)) |
((MONTH = 7) & (DAY %in% 19:21))

```
2015:
    ((MONTH = 6) & (DAY %in% 23:25)) |
    ((MONTH = 7) & (DAY %in% 7:9))

2014:
    ((MONTH = 6) & (DAY %in% 25:27)) |
    ((MONTH = 7) & (DAY %in% 9:11))

2013:
    ((MONTH = 6) & (DAY %in% 26:28)) |
    ((MONTH = 7) & (DAY %in% 10:12))

2012:
    ((MONTH = 6) & (DAY %in% 27:29)) |
    ((MONTH = 7) & (DAY %in% 11:13))

2011:
    ((MONTH = 6) & (DAY %in% 29:30)) |
    ((MONTH = 7) & (DAY = 1)) |
    ((MONTH = 7) & (DAY %in% 13:15)) |
    ((MONTH = 7) & (DAY %in% 27:29)) |
    ((MONTH = 8) & (DAY %in% 10:12)) |
    ((MONTH = 8) & (DAY %in% 24:26)) |
    ((MONTH = 9) & (DAY %in% 7:9)) |
    ((MONTH = 9) & (DAY %in% 21:23))

2010:
    ((MONTH = 6) & (DAY %in% 30:31)) |
    ((MONTH = 7) & (DAY %in% 1:2))

2009:
    ((MONTH = 6) & (DAY %in% 24:26)) |
    ((MONTH = 7) & (DAY %in% 8:10))

2008:
    ((MONTH = 6) & (DAY %in% 11:13)) |
    ((MONTH = 6) & (DAY %in% 25:27)) |
    ((MONTH = 7) & (DAY %in% 9:11)) |
    ((MONTH = 7) & (DAY %in% 23:25))

2007:
    ((MONTH = 6) & (DAY %in% 27:29)) |
    ((MONTH = 7) & (DAY %in% 11:13)) |
    ((MONTH = 7) & (DAY %in% 25:27)) |
    ((MONTH = 8) & (DAY %in% 8:10))
```

2006:

```
((MONTH = 6) & (DAY %in% 28:30)) |
((MONTH = 7) & (DAY %in% 12:14)) |
((MONTH = 7) & (DAY %in% 26:28))
```

2005:

```
((MONTH = 6) & (DAY %in% 29:30)) |
((MONTH = 7) & (DAY = 1)) |
((MONTH = 7) & (DAY %in% 13:15)) |
((MONTH = 7) & (DAY %in% 27:29)) |
((MONTH = 8) & (DAY %in% 10:12))
```

2004:

```
((MONTH = 6) & (DAY %in% 23:25)) |
((MONTH = 7) & (DAY %in% 14:16)) |
((MONTH = 7) & (DAY %in% 28:30)) |
((MONTH = 8) & (DAY %in% 11:13))
```

2003:

```
((MONTH = 6) & (DAY %in% 25:27)) |
((MONTH = 7) & (DAY %in% 9:11)) |
((MONTH = 7) & (DAY %in% 23:25)) |
((MONTH = 8) & (DAY %in% 6:8))
```

2002:

```
((MONTH = 6) & (DAY %in% 26:28)) |
((MONTH = 7) & (DAY %in% 10:12)) |
((MONTH = 7) & (DAY %in% 24:26))
```

# Trawl Logbook Data Retrieval and Processing

Logbook data are downloaded from a view in PacFIN that incorporates logbook data and permit information: `pacfin.lbk_codemb0310multiftiddelim`.

Data from 2002–10 are used in estimations of discard for the LE trawl fleet. Data from 2011–present are sometimes used for effort estimations when observer data are unavailable because a trip was monitored using an electronic system.

## Explicit WCGOP postprocessing of PacFIN logbook data output from query above

Select Puget Sound landings:
PSGRNDCODE ≠ 0

Select Non-Puget Sound (Ocean) landings:
PSGRNDCODE = 0

Select Midwater:
GRID = *MDT*

Select Non-Midwater:
GRID ≠ *MDT*

Select Limited Entry permitted:
PERMID_1 ≠ [blank]

Select Non-LE permitted (Open Access):
PERMID_1 = [blank]

*Note: LE Nonmidwater logbook data is further delineated into the state California halibut trawl fishery for each individual tow/haul as follows:*

*a) If tow target is California halibut (PACFIN_TARGET =* CHLB *or* CHL1*), or*
*b) Tow target PACFIN_TARGET = (*NSM *or* OFLT *or* SSOL *or* SSO1*) and DEPTH1 < 30 (fth) and SET_LAT < 40.16667.*

*The remaining LE non-midwater logbook data tows are considered part of the LE groundfish trawl fishery.*

Additional data processing steps are described in each report and product.

# List of Species

| | |
|---|---|
| Aurora rockfish | *Sebastes aurora* |
| Arrowtooth flounder | *Atheresthes stomias* |
| Aleutian skate | *Bathyraja aleutica* |
| Bank rockfish | *Sebastes rufus* |
| Blackgill rockfish | *Sebastes melanostomus* |
| Black rockfish | *Sebastes melanops* |
| Black skate | *Bathyraja trachura* |
| Blue/deacon rockfish | *Sebastes mystinus* |
| Bronzespotted rockfish | *Sebastes gilli* |
| Brown rockfish | *Sebastes auriculatus* |
| Buffalo sculpin | *Enophrys bison* |
| Big skate | *Raja binoculata* |
| Black and yellow rockfish | *Sebastes chrysomelas* |
| Cabezon | *Scorpaenichthys marmoratus* |
| California halibut | *Paralichthys californicus* |
| China rockfish | *Sebastes nebulosus* |
| Chinook (king) salmon | *Oncorhynchus tshawytscha* |
| Chum (dog) salmon | *Oncorhynchus keta* |
| Chilipepper rockfish | *Sebastes goodei* |
| Canary rockfish | *Sebastes pinniger* |
| Coho (silver) salmon | *Oncorhynchus kisutch* |
| Copper rockfish | *Sebastes caurinus* |
| California skate | *Raja inornata* |
| Curlfin sole | *Pleuronichthys decurrens* |
| Cowcod rockfish | *Sebastes levis* |
| Darkblotched rockfish | *Sebastes crameri* |
| Dungeness crab | *Cancer magister* |
| Dover sole | *Microstomus pacificus* |
| Deepsea sole | *Embassichthys bathybius* |
| Spiny dogfish shark | *Squalus suckleyi* |
| Diamond turbot | *Hypsopsetta guttulata* |
| Eulachon | *Thaleichthys pacificus* |
| Flag rockfish | *Sebastes rubrivinctus* |
| Freckled rockfish | *Sebastes lentiginosus* |
| Flathead sole | *Hippoglossoides elassodon* |
| Greenblotched rockfish | *Sebastes rosenblatti* |
| Grenadier, unid. | *Macrouridae* |
| California grenadier | *Nezumia stelgidolepis* |
| Popeye grenadier | *Coryphaenoides cinereus* |
| Shoulderspot grenadier | *Caelorinchus scaphopsis* |
| Smooth grenadier | *Nezumia liolepis* |
| Pacific grenadier | *Coryphaenoides acrolepis* |
| Greenspotted rockfish | *Sebastes chlorostictus* |
| Green sturgeon | *Acipenser medirostris* |
| Halfbanded rockfish | *Sebastes semicinctus* |
| Harlequin rockfish | *Sebastes variegatus* |
| Hornyhead turbot | *Pleuronichthys verticalis* |
| Kelp greenling | *Hexagrammos decagrammus* |
| Lingcod | *Ophiodon elongatus* |
| Longfin sanddab | *Citharichthys xanthostigma* |
| Longnose skate | *Raja rhina* |
| Longspine thornyhead (LST) | *Sebastolobus altivelis* |
| Leopard shark | *Triakis semifasciata* |
| Lanternfish, unid. | *Myctophidae* |
| Lightfish, unid. | *Phosichthyidae* |
| Bristlemouth, unid. | *Gonostomatidae* |
| Barracudina, unid. | *Paralepididae* |
| Mexican rockfish | *Sebastes macdonaldi* |
| Groundfish, unid. | — |
| Olive rockfish | *Sebastes serranoides* |
| Roundfish, unid. | — |
| Deepsea skate | *Bathyraja abyssicola* |
| Skate, unid. | *Rajidae* |
| Pacific cod | *Gadus macrocephalus* |

| | |
|---|---|
| Pacific sanddab | *Citharichthys sordidus* |
| Pacific flatnose | *Antimora microlepis* |
| Pygmy rockfish | *Sebastes wilsoni* |
| Pacific halibut | *Hippoglossus stenolepis* |
| Pink (humpback) salmon | *Oncorhynchus gorbuscha* |
| Pink rockfish | *Sebastes eos* |
| Pacific ocean perch | *Sebastes alutus* |
| Pinkrose rockfish | *Sebastes simulator* |
| Pink shrimp | *Pandalus jordani* |
| Petrale sole | *Eopsetta jordani* |
| Pacific hake | *Merluccius productus* |
| Quillback rockfish | *Sebastes maliger* |
| Spotted ratfish | *Hydrolagus colliei* |
| Rockfish, unid. | *Sebastes* spp. |
| Redbanded rockfish | *Sebastes babcocki* |
| Redstripe rockfish | *Sebastes proriger* |
| Rosy rockfish | *Sebastes rosaceus* |
| Red Irish lord sculpin | *Hemilepidotus hemilepidotus* |
| Rosethorn rockfish | *Sebastes helvomaculatus* |
| Sablefish | *Anoplopoma fimbria* |
| Pacific saury | *Cololabis saira* |
| Shortbelly rockfish | *Sebastes jordani* |
| Sculpin, unid. | *Cottidae* |
| Starry flounder | *Platichthys stellatus* |
| Sharpchin rockfish | *Sebastes zacentrus* |
| Slender sole | *Lyopsetta exilis* |
| Noneulachon smelt, unid. | *Osmeriformes* |
| Smelt, unid. | *Osmeridae* |
| Whitebait smelt | *Allosmerus elongatus* |
| Surf smelt | *Hypomesus pretiosus* |
| Deepsea smelt, unid. | *Bathylagidae* |
| Splitnose rockfish | *Sebastes diploproa* |
| Sockeye (red) salmon | *Oncorhynchus nerka* |
| Speckled rockfish | *Sebastes ovalis* |
| Sandpaper skate | *Bathyraja kincaidii* |
| Squarespot rockfish | *Sebastes hopkinsi* |
| Shortraker rockfish | *Sebastes borealis* |
| Speckled sanddab | *Citharichthys stigmaeus* |
| Starry skate | *Raja stellulata* |
| Sand sole | *Psettichthys melanostictus* |
| Shortspine thornyhead (SST) | *Sebastolobus alascanus* |
| Soupfin shark | *Galeorhinus galeus* |
| Starry rockfish | *Sebastes constellatus* |
| Stripetail rockfish | *Sebastes saxicola* |
| Tiger rockfish | *Sebastes nigrocinctus* |
| SST/LST | *Sebastolobus* spp. |
| Sanddab, unid. | *Citharichthys* |
| Shortraker/rougheye/ blackspotted rockfish | *Sebastes borealis/aleutianus* |
| Greenling, unid. | *Hexagrammidae* |
| Spotted rockfish, unid. | *Sebastomus* spp. |
| Salmon, unid. | *Oncorhynchus* |
| Vermilion rockfish | *Sebastes miniatus* |
| Widow rockfish | *Sebastes entomelas* |
| Yelloweye rockfish | *Sebastes ruberrimus* |
| Yellowmouth rockfish | *Sebastes reedi* |
| Yellowtail rockfish | *Sebastes flavidus* |
| Brown Irish lord sculpin | *Hemilepidotus spinosus* |
| Calico rockfish | *Sebastes dalli* |
| Gopher rockfish | *Sebastes carnatus* |
| Grass rockfish | *Sebastes rastrelliger* |
| Honeycomb rockfish | *Sebastes umbrosus* |
| Kelp rockfish | *Sebastes atrovirens* |
| Puget Sound rockfish | *Sebastes emphaeus* |
| California scorpionfish | *Scorpaena guttata* |
| California sheephead | *Semicossyphus pulcher* |
| Swordspine rockfish | *Sebastes ensifer* |
| Treefish rockfish | *Sebastes serriceps* |

| | |
|---|---|
| Pacific sandlance | *Ammodytes hexapterus* |
| Round herring | *Etrumeus teres* |
| Ridgeback prawn | *Sicyonia ingentis* |
| Shark and skate, unid. | — |
| Blacksmelt, unid. | *Bathylagus* spp. |
| Duckbill barracudina | *Magnisudis atlantica* |
| Slender barracudina | *Lestidiops ringens* |
| White barracudina | *Arctozenus risso* |
| Sea cucumber | *Holothuroidea* |
| Coonstripe prawn | *Pandalus hypsinotus* |
| Spotted prawn | *Pandalus platyceros* |
| Bocaccio rockfish | *Sebastes paucispinis* |
| Butter sole | *Isopsetta isolepis* |
| English sole | *Parophrys vetulus* |
| Giant grenadier | *Albatrossia pectoralis* |
| Greenstriped rockfish | *Sebastes elongatus* |
| Shelf rockfish, unid. | *Scorpaenidae* |
| Slope rockfish, unid. | *Scorpaenidae* |
| Nearshore rockfish, unid. | *Scorpaenidae* |
| Flatfish, unid. | *Pleuronectiformes* |
| Rougheye/blackspotted rockfish | *Sebastes melanostictus and S. aleutianus* |
| Rex sole | *Glyptocephalus zachirus* |
| Rock sole | *Pleuronectes bilineatus* |
| Silvergray rockfish | *Sebastes brevispinis* |
| Non-Humboldt squid, unid. | *Teuthida* |
| Squid, unid. | *Teuthida* |

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### NOAA Technical Memorandum NMFS-NWFSC-

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