

Estimated 2006 Discard and Total Catch of Selected Groundfish Species

Dr. James Hastie
Fishery Resource Analysis and Monitoring Division
Northwest Fisheries Science Center

Marlene Bellman
Pacific States Marine Fisheries Commission

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INTRODUCTION

This report summarizes estimates of 2006 discard and total fishing mortality for selected groundfish species. The report includes an inventory of fishing mortality from all sources, however, analyses conducted by the authors for this report focus on commercial fisheries where NOAA Fisheries has conducted scientific observation of discards. Observations from limited-entry (LE) groundfish trawl fisheries, fixed-gear sablefish fisheries, and nearshore fixed-gear groundfish fisheries are used in conjunction with landings and mortality information in developing mortality estimates for this report. Data sources for these analyses include onboard observer program data, landing receipt data (referred to as fish tickets), trawl logbook data, and information from the Pacific Fishery Management Council's (PFMC) Groundfish Management Team (GMT).

The West Coast Groundfish Observer Program (WCGOP) was established in 2001 by NOAA Fisheries (National Marine Fisheries Service, NMFS) (66 FR 20609). All commercial vessels that catch groundfish in the United States Exclusive Economic Zone (EEZ) from 3-200 miles offshore are required to carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require that California and Oregon commercial vessels which retain groundfish in the 0-3 mile state territorial zone also carry observers when requested. The WCGOP coverage plan, which details program goals, vessel selection, observer coverage, and basic data collection, is available at:

<http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observersamplingplan.pdf>.

Observation of the at-sea hake/whiting fishery had been conducted by the North Pacific Groundfish Observer Program since the 1970s. In 2001, the Northwest Fisheries Science Center assumed management of west coast hake fleet observations through the At-Sea Hake Observer Program (ASHOP). The ASHOP sampling manual and program information is available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observermanual/hakemanual2007.pdf>.

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

Landing receipts, known as fish tickets, are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are issued to fish-buyers by a state agency and must be returned to the agency for processing. Washington, Oregon, and California each have a slightly different format of fish ticket receipt. Each state also conducts species-composition sampling for numerous "market" categories reported on fish tickets. Market categories may include several species (e.g. minor shelf rockfish), or may represent individual species where verification of correct species identification is deemed desirable. The fish ticket and species-composition data are also submitted to the PacFIN database. Species-compositions from market categories were applied to the fish ticket data, so that landed weights are as species specific as possible.

The GMT is an advisory body to the PFMC comprised of representatives from federal, state, and tribal agencies involved in managing groundfish fisheries between the U.S. borders with Canada and Mexico. The GMT analyzes catch-related information from all sectors of the groundfish fishery, which is summarized and provided to the NWFSC, as needed. The assumptions regarding the survival of discards, as well as the modeling of nearshore groundfish fisheries used in this analysis are based on a model developed by the GMT [Final Environmental Impact Statement (FEIS) for the Proposed ABC/OY Specifications and Management Measures for the 2007-2008 Pacific Coast Groundfish Fishery / Amendment 16-4 to the Groundfish FMP]. In December 2007, the GMT provided a slightly revised suite of depth-specific discard survival assumptions for nearshore species, which are included in Tables 9 and 10.

Section 4.5.1.4 Modeling Nearshore Commercial Impacts
Proposed Acceptable

METHODS

The process of estimating discards for each fleet begins with summarizing WCGOP observer data according to strata. Based on the amount of available observer data and the distribution of observed and fleet fishing effort, observer data are stratified by depth, area, and/or season. Methods used to expand the observer data to the entire fishing fleet vary somewhat between fisheries since logbook data, which provide fishing location and depth information, are only available for the trawl fleet. The methods used to produce discard estimates for the LE groundfish bottom trawl fishery and the fixed-gear fisheries for sablefish and nearshore species are described below.

Limited-Entry Bottom Trawl Fishery

Fleet-wide discard estimates in the LE trawl fishery are derived from WCGOP observer data, fish ticket landings data, and trawl logbook data. Fish ticket and logbook data for commercial, trawl-endorsed LE vessels using bottom trawl gear are obtained from PacFIN. Several additional filters were applied in order to exclude the following records from the analysis: 1) research landings; 2) logbook tows lacking a recorded depth or latitude; 3) trips/tows where no groundfish was retained; 4) trips/tows where retained Pacific whiting was greater than 2 mt or comprised more than half of the total weight of retained groundfish; 5) trips/tows containing more than 100 lb of retained shrimp; and 6) tows/trips in which the landed weight of non-groundfish species was greater than that of groundfish species (see Appendix A. for a list of groundfish species).

The observer data used in this report are included in the WCGOP Data Report and Summary Analyses of Limited-Entry Trawl Permits published in September 2007, available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/trawl/datareportsep2007.cfm>. The same filters described above are also applied to the observer data, so that the data from all three sources (observer, fish ticket, logbook) reflect the same pool of fishing activity. Small amounts of observed catches for some shelf species (bocaccio, cowcod, canary rockfish, lingcod, widow rockfish, yelloweye rockfish) are deleted if tow depth was recorded as greater than 200 fathoms.

WCGOP observer data and trawl logbook data are then stratified by area, season, and depth. Records are separated into two areas, north and south of the groundfish management line at 40° 10' N. lat. Each area is divided into six depth strata (0-50, 51-75, 76-100, 151-200, 201-300, >300 fathoms). During 2006, the area between management lines representing 100 to 150 fathoms was closed to LE groundfish bottom trawling along the entire coast. Two-month cumulative trip limit periods are combined to form two seasonal strata: winter (January-April and November-December; periods 1+2+6) and summer (May-October; periods 3+4+5). In some cases, if the numbers of observations in particular strata were too limited, data were aggregated across depth or seasonal strata. In the southern area, data are combined for both seasons for depths less than 50 fathoms and for depths from 51 to 75 fathoms. In the southern area during the winter season, data are combined across depths between 151 and 300 fathoms.

For species that are commonly targeted by trawlers and for which significant percentages of catch are retained in most strata ("target" species), discard is estimated as a function of retained catch of the individual species or species group. For other species ("bycatch" species), where a large percentage of catch is discarded in many strata, discard is estimated as a function of the retained catch of a group of "target" species. The "target" species group includes all flatfish, sablefish, thornyheads, Pacific cod, skates, and spiny dogfish, in both the northern and southern areas, with the addition of slope rockfish in the southern area. The retained catch of these target species is used as a measure of trawl effort for expanding discard from observed trips to the entire fleet. Spiny dogfish and unspecified skates are included in the calculation of target tonnage, but are not treated as target species in expanding observed discard. The rationale for this is that while they are targeted in some areas, they are discarded at a very high rate in most strata. The number of tows and retained catch of target species within each stratum from the observer program and trawl logbooks are reported in Table 1.

Discard ratios are summarized in Tables 2a-2c for three sets of species: species that are under rebuilding plans, target species, and other "bycatch" species. Stratum discard ratios for rebuilding species are calculated by dividing a rebuilding species' discarded pounds by the aggregate poundage of target species retained in the stratum (Table 2a). Stratum discard ratios for target species are calculated by dividing each target species' (or group's) discarded pounds by its retained pounds (Table 2b). For other species that are treated as bycatch, discard ratios are calculated in the same manner as for rebuilding species (Table 2c). Overall ratios of bycatch (retained + discarded weight) for rebuilding species, relative to retained target species, are also presented in Table 3. A complete listing of groundfish species included in the Groundfish Fishery Management Plan is provided in Appendix A.

Stratum estimates of discard are calculated for each target species by multiplying the logbook retained species catch (metric tons) (Table 1) by the appropriate discard ratio (Table 2b). Stratum estimates of discard for individual rebuilding species and other bycatch species are calculated by multiplying the aggregate logbook target species catch (metric tons) in each stratum (Table 1) by the appropriate discard ratio (Table 2a and Table 2c). These amounts are then summed for each area stratum, state, and 2-month period.

Because logbooks are not submitted for 100% of trawl trips and some records are missing data elements used in this analysis, logbook data do not capture all groundfish trawl fishing effort. As

a result, discard estimates must be expanded to include landings that are not reported in logbooks. The expansion ratio for each target species is equal to its fish ticket pounds divided by its logbook pounds for each area, state, and two-month period. The expansion ratio for rebuilding and other bycatch species is equal to the fish ticket pounds of the combined target species divided by the logbook pounds of the combined target species. Coast-wide landings and estimates of discard and total catch of major west coast groundfish species are reported in Table 4 for the non-whiting, commercial limited-entry bottom trawl fishery. A 50% rate of mortality is applied for discarded sablefish and lingcod, as assumed by the GMT.

Fixed-Gear Sablefish Fishery

Fleet-wide discard estimates for the sablefish fixed-gear fishery are derived from WCGOP observer data and fish ticket landings data. Fish ticket data are obtained from the PacFIN database and selected for the commercial sector using fixed gear, with research catch removed. The observer program has focused on the primary LE sablefish-endorsed fixed-gear fishery which takes place from April to the end of October. However, both LE vessels without sablefish endorsement and open access (OA) vessels fishing fixed gear which target sablefish are also observed. Data used in the analysis were collected from observed LE sablefish-endorsed, LE non-sablefish endorsed, and OA California fixed-gear vessels targeting sablefish. The observer data used in this report are included in the WCGOP Data Report and Summary Analyses of Sablefish-Endorsed Fixed-Gear Permits published in September 2007, available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/fixedgear/fixedgearreportsep2007.cfm> and the WCGOP Data Report and Summary Analyses of Non Sablefish-endorsed Fixed Gear Permits published in September 2007, available at: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/fixedgear/fixedgearreport_nonsep2007.cfm. Observed sets were removed if depth or latitude information were missing and if no groundfish were retained or discarded.

The sablefish fixed-gear fishery data are stratified according to area, gear group, and the area-specific depth zones dictated by fishery management. Records are separated into two areas, north and south of the groundfish management line at 40° 10' N. lat. The southern stratum is limited to the area between 36° and 40° 10' N. lat., in accordance with PFMC management of this fishery. Data are summarized separately for longline and pot/trap gear groups. Because logbooks are not mandatory in this fishery, data associated with the depth of fishing for the entire fleet are not available. However, 2006 fishery management restricted fishing to depths greater than 100 fathoms in the area north of 40° 10' N. lat. and to depths greater than 150 fathoms in the area south of 40° 10' N. lat. These two depth zones are therefore tied to area strata, but no further depth stratification of fishing effort is possible.

In Table 5, sablefish landings and discard estimates are calculated and summarized by gear group and area for all (limited-entry and open access) fixed-gear sablefish landings north of 36° N. lat. Estimated discard for sablefish is calculated by multiplying the landed catch (from fish tickets) by the corresponding observed discard ratio. Since only a fraction of discarded sablefish die after being released, a discard mortality estimate is then calculated. The analysis employs a sablefish mortality rate of 20%, which is also used by the GMT. Estimated total sablefish

mortality in this fishery is then calculated by adding the estimated discard mortality to the total landed catch.

Discard ratios for rebuilding and other groundfish species in this fishery are calculated by dividing the stratum discard weight of each species by the retained catch weight of sablefish (Table 5). Estimated discard of rebuilding and other groundfish species associated with all coast-wide fixed-gear sablefish landings (limited-entry and open access) are summarized in Table 6a. Estimated discard for sablefish, rebuilding species, and other bycatch species are further separated in Table 6b for the limited-entry sector of fixed-gear sablefish landings and in Table 6c for the open access sector of fixed-gear sablefish landings.

In addition to the fixed-gear sablefish fishery, data from the fixed-gear slope fishery (limited-entry and open access) south of 36° N. lat. were also analyzed in this report. The estimated discard of groundfish target and bycatch species are presented in Table 7, based on observer and fleet landings data. Discard ratios for slope target species are calculated by dividing the discard weight of each species by its retained weight. Discard ratios for slope bycatch species are calculated by dividing the discard weight of each species by the combined weight of slope target species retained. Fleet estimates of discard are calculated by multiplying the fish ticket retained catch (metric tons) by the appropriate discard ratio. As in other fixed-gear fisheries, a 20% rate of mortality is applied to sablefish discard, as assumed by the GMT (Table 7).

Nearshore Fixed-Gear Groundfish Fishery

Fleet-wide discard estimates in the nearshore (depths < 50 fathoms) commercial fixed-gear fishery are derived from WCGOP observer data, fish ticket landings data, and other parameters developed through GMT modeling efforts. Fish ticket data are obtained from the PacFIN database for landings that include nearshore species by vessels using line (non-troll) or pot/trap gears. A list of nearshore species and associated species groups used in this analysis are found in Appendix B. The observer data used in this report were collected aboard vessels in waters less than 50 fathoms. The WCGOP conducted pilot coverage of the nearshore fisheries in California and Oregon from August through October 2002. In 2003, California licensed their nearshore state fishery. In 2004, Oregon licensed their near-shore state fishery, with additional licensing for black and blue rockfish. State regulations have extended the authority of the WCGOP to place observers on vessels participating in these state nearshore fisheries. Observer coverage (non-pilot) began in January 2003 for the California nearshore fishery and in May 2004 for the Oregon nearshore/rockfish fisheries. Observer coverage is lower in these fisheries and therefore discard estimates contain greater uncertainty.

The number of observed nearshore fixed-gear trips, sets, vessels, and associated retained catch in 2006 are summarized by WCGOP port group and gear type in Table 8. The list of port groups used by the WCGOP for the nearshore fixed-gear fisheries is reported in Appendix C. Since both gear types can be used during a single trip, the number of trips is not additive across gears. Total catch and discard weights (lbs) of nearshore species or species groups observed on fixed-gear sets in depths shallower than 50 fathoms are summarized in Table 9, by area and depth (0-10, 11-50 fathoms). The percentage of total species (or group) catch that was discarded is also shown for each stratum. Data collected from gear sets between 11 and 50 fathoms were pooled

for purposes of calculating discard percentages, due to the limited number of observations between 21-50 fathoms.

Discard mortality for nearshore target species is summarized in Table 10a. Landed weights for each nearshore target species/species group are expanded to total catch estimates, using the observed retention rate for all depths less than 50 fathoms. Total catch is then distributed among the three depth intervals (0-10, 11-20, 21-50 fathoms), based on GMT estimates reported in Table 10a. Within each depth stratum, estimated gross discard is calculated by multiplying the observed discard ratio and the stratum catch. Discard mortality estimates are calculated by multiplying the GMT-assumed rates of discard mortality to the gross discard estimates. Depth-specific discard survival rates reflect GMT recommendations based on review of available tagging and mortality studies. Amounts of mortality from discard are then added to estimated retained weights, producing total mortality estimates for each stratum. Amounts of retained, discarded, and total catch are summed for the entire 0-50 fathom depth range, along with estimates of the percentage of total catch that was discarded.

The calculation of estimated discard for rebuilding species associated with nearshore target landings is presented in Table 10b. Retained amounts of combined target species (from Table 10a) and the number of observed sets are listed for each area and depth stratum. The target species include all nearshore rockfishes, cabezon, kelp greenling, and lingcod in both areas, with the addition of California sheephead in the southern area. Lingcod has been treated as a rebuilding/bycatch species in previous mortality analyses. Since the coast-wide biomass of lingcod is now above the target spawning biomass level and the species comprises 10-15% of the landed weight in the nearshore fisheries, it is treated as a target species. Combined target species weights are multiplied by discard ratios for each rebuilding species. The resulting amounts of gross discard are multiplied by depth-specific discard survival rates to calculate amounts of mortality attributable to discards. Discard estimates for minor shelf rockfish and yellowtail rockfish (in the northern area) are also included in Table 10b.

Landings and estimates of discard, total mortality, and discard percentage for nearshore target and bycatch species are summarized for the limited-entry and open-access fixed-gear fleets in Table 11. These estimates by fishery sector are calculated using the same methods described above for analysis of the entire fixed-gear fleet.

Other Commercial Data

Fixed-gear landings of groundfish in 2006 are summarized in Table 12. Limited-entry and open-access totals are provided by area, along with combined-fleet area and coast-wide totals. These landings include those from the fixed-gear sablefish fishery and nearshore fisheries noted above, as well as all other fixed-gear related groundfish landings. In Table 13, these landed catches are combined with discard mortality estimates from Table 6a (fixed-gear sablefish fishery north of 36° N. lat.), Table 7 (fixed-gear slope fishery south of 36° N. lat.), and Tables 10a and 10b (fixed-gear nearshore fisheries), thus providing both area-specific and coast-wide summaries of fixed-gear total catch.

The trawl fishery for Pacific hake/whiting is comprised of several fleets. The at-sea processing sector is comprised of three fleets: non-tribal catcher-processors, motherships (with catcher boats), and a tribal fishery. Data from each of these fleets are obtained from the At-Sea Hake Observer Program, which observes all of these fleets. The focus of observers in this program is to produce estimates of total catch in the fishery. They do not estimate or report amounts of discard separately. However, observers provide a visual estimate of the proportion of catch that is discarded. Along with the total catch estimates, these proportions form the basis of the retained and discarded catch amounts summarized in Table 14. There are also tribal and non-tribal fisheries which deliver to shoreside processors. The non-tribal shoreside fishery has been conducted under an Exempted Fishing Permit. In order to preserve fish quality, this permit allows participants to unload codends directly into refrigerated tanks, rather than sorting the catch on deck, while avoiding penalties for trip-limit overages at the time of landing. This is described as a “maximum” retention fishery, and generally has a low percentage of at-sea discards. However, a portion of these deliveries may be discarded upon landing, for quality reasons, or may be surrendered without payment if trip limits have been exceeded. Fish falling into either of these categories are summarized as discard for the shoreside fleet in Table 14. PacFIN fish ticket records are used to document landings in this fishery.

Fishing Mortality Summary

A coast-wide summary of discarded and total catches by all commercial fleets targeting groundfish is presented in Table 15. The combined hake fisheries category includes the at-sea and shoreside commercial fisheries and the tribal at-sea fishery. Table 16 summarizes total fishing mortality of major west coast groundfish species from all fishery sources. Shoreside tribal amounts were summarized from fish ticket records submitted to PacFIN. Recreational fishing mortalities for all species were provided by the Washington Department of Fish and Wildlife, the Oregon Department of Fish and Wildlife, and the California Department of Fish and Game. The GMT Bycatch Scorecard was used as the source for remaining amounts of mortality, including research, for rebuilding species (Table 16). Research amounts for other species reflect the catch of the Northwest Fisheries Science Center’s bottom trawl survey.

RESULTS

In Table 17, total fishing mortality estimates are presented with harvest specifications for Optimum Yield (OY) and Allowable Biological Catch (ABC). OYs represent the harvest targets of fishery managers. ABCs represent the thresholds for determining whether overfishing has occurred. For some species or species groups, such as the minor rockfish categories, OYs are specified for northern and southern areas. Where applicable, adjoining columns indicate the percentage which each fishing mortality represents of the corresponding OY or ABC.

In three instances, estimated 2006 fishing mortality exceeded the specified OY harvest target. Canary rockfish mortality was roughly 10 mt (21%) higher than its rebuilding OY. The fishing mortality of Dover sole exceeded its OY by 166 mt (2.2%), and the combined mortality of species included in the other nearshore rockfish category in the area south of 40° 10’ N. lat. exceeded the OY by 96 mt (16%). However, in no instance did fishing mortality exceed an ABC

in 2006. With the exception of canary rockfish, fishing mortalities for other rebuilding species did not represent more than 75% of their rebuilding OYs, with an average of 41.5%.

Area-specific ABCs were also specified in 2006 for several species that are managed as part of minor shelf or slope rockfish complexes and for which mortality is not estimated individually in this analysis. However, the ABCs for bank rockfish south of 40°10' N. lat., and bocaccio, redstripe, and sharpchin rockfishes north of 40°10' N. lat., were each higher than the total mortalities estimated for the entire complexes of which they are members. Additionally, black rockfish ABCs were specified for two areas north and south of 46° 16' N. lat., off northern Oregon. Since commercial fishing is not allowed in Washington state waters, the major source of mortality in the northern area is the Washington recreational fishery. Estimated mortality in that fishery was 268 mt, compared with an ABC of 540 mt. The remaining black rockfish mortality estimated in this report totals 627 mt, which is also less than the southern ABC of 736 mt.

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Appendix A.-- Common and scientific names of species included in the Groundfish Fishery Management Plan.

SHARKS

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

RATFISH

Ratfish, *Hydrolagus colliei*

MORIDS

Finescale codling, *Antimora microlepis*

GRENADIERS

Pacific rattail, *Coryphaenoides acrolepis*

ROUNDFISH

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

FLATFISH

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

Appendix A continued.-- Common and scientific names of species included in the Groundfish Fishery Management Plan.

ROCKFISH

(includes all genera and species of the family Scopaenidae, even if not listed, that occur in the Washington, Oregon, and California area)

Species that are managed with individual Optimum Yields for at least a portion of the Pacific Fishery Management Council area

Bocaccio, *S. paucispinis*
Canary rockfish, *Sebastes pinniger*
Chilipepper, *S. goodei*
Cowcod, *S. levis*
Darkblotched rockfish, *S. crameri*
Longspine thornyhead, *Sebastolobus altivelis*
Pacific ocean perch, *S. alutus*
Shortbelly rockfish, *S. jordani*
Shortspine thornyhead, *Sebastolobus alascanus*
Splitnose rockfish, *S. diploproa*
Widow rockfish, *S. entomelas*
Yelloweye rockfish, *S. ruberimus*
Yellowtail rockfish, *S. flavidus*

Minor Rockfish Species

North of 40°10' N. lat.

South of 40°10' N. lat.

Minor Nearshore Rockfish

Black, *Sebastes melanops*
Black-and-yellow, *S. chrysomelas*.
Blue, *S. mystinus*
Brown, *S. auriculatus*
Calico, *S. dalli*
China, *S. nebulosus*
Copper, *S. caurinus*
Gopher, *S. carnatus*
Grass, *S. rastrelliger*
Kelp, *S. atrovirens*
Olive, *S. serranoides*
Quillback, *S. maliger*
Treefish, *S. serriceps*

Black, *Sebastes melanops*
Black-and-yellow, *S. chrysomelas*
Blue, *S. mystinus*
Brown, *S. auriculatus*
Calico, *S. dalli*
California scorpionfish, *Scorpaena guttata*
China, *Sebastes nebulosus*
Copper, *S. caurinus*
Gopher, *S. carnatus*
Grass, *S. rastrelliger*
Kelp, *S. atrovirens*
Olive, *S. serranoides*
Quillback, *S. maliger*
Treefish, *S. serriceps*

Appendix A continued.-- Common and scientific names of species included in the Groundfish Fishery Management Plan.

North of 40°10' N. lat.

South of 40°10' N. lat.

Minor Shelf Rockfish

Bronzespotted, *S. gilli*
 Bocaccio, *S. paucispinis*
 Chameleon, *S. phillipsi*
 Chilipepper, *S. goodei*
 Cowcod, *S. levis*
 Dwarf-red, *S. rufianus*
 Flag, *S. rubrivinctus*
 Freckled, *S. lentiginosus*
 Greenblotched, *S. rosenblatti*
 Greenspotted, *S. chlorostictus*
 Greenstriped, *S. elongatus*
 Halfbanded, *S. semicinctus*
 Honeycomb, *S. umbrosus*
 Mexican, *S. macdonaldi*
 Pink, *S. eos*
 Pinkrose, *S. simulator*
 Pygmy, *S. wilsoni*
 Redstriped, *S. proriger*
 Rosethorn, *S. helvomaculatus*
 Rosy, *S. rosaceus*
 Silvergrey, *S. brevispinus*
 Speckled, *S. ovalis*
 Squarespot, *S. hopkinsi*
 Starry, *S. constellatus*
 Stripetail, *S. saxicola*
 Swordspine, *S. ensifer*
 Tiger, *S. nigorcinctus*
 Vermilion, *S. miniatus*
 Yelloweye, *S. ruberrimus*

Bronzespotted, *S. gilli*
 Chameleon, *S. phillipsi*
 Dwarf-red, *S. rufianus*
 Flag, *S. rubrivinctus*
 Freckled, *S. lentiginosus*
 Greenblotched, *S. rosenblatti*
 Greenspotted, *S. chlorostictus*
 Greenstriped, *S. elongatus*
 Halfbanded, *S. semicinctus*
 Honeycomb, *S. umbrosus*
 Mexican, *S. macdonaldi*
 Pink, *S. eos*
 Pinkrose, *S. simulator*
 Pygmy, *S. wilsoni*
 Redstriped, *S. proriger*
 Rosethorn, *S. helvomaculatus*
 Rosy, *S. rosaceus*
 Silvergrey, *S. brevispinus*
 Speckled, *S. ovalis*
 Squarespot, *S. hopkinsi*
 Starry, *S. constellatus*
 Stripetail, *S. saxicola*
 Swordspine, *S. ensifer*
 Tiger, *S. nigorcinctus*
 Vermilion, *S. miniatus*
 Yelloweye, *S. ruberrimus*
 Yellowtail, *S. flavidus*

Minor Slope Rockfish

Aurora, *S. aurora*
 Bank, *S. rufus*
 Blackgill, *S. melanostomus*
 Darkblotched, *S. crameri*
 Redbanded, *S. babcocki*
 Rougheye, *S. aleutianus*
 Sharpchin, *S. zacentrus*
 Shortraker, *S. borealis*
 Splitnose, *S. diploproa*
 Yellowmouth, *S. reedi*

Aurora, *S. aurora*
 Bank, *S. rufus*
 Blackgill, *S. melanostomus*
 Darkblotched, *S. crameri*
 Pacific ocean perch (POP), *S. alutus*
 Redbanded, *S. babcocki*
 Rougheye, *S. aleutianus*
 Sharpchin, *S. zacentrus*
 Shortraker, *S. borealis*
 Yellowmouth, *S. reedi*

Appendix B. -- Port groups used in West Coast Groundfish Observer Program sampling of nearshore commercial fixed-gear groundfish fisheries (less than 50 fathoms).

State	Port Group	Port	
OR	Astoria	Astoria/Warrenton	
		Pacific City	
		Garibaldi (Tillamook)	
	Southern Oregon	Newport	
		Bandon	
		Charleston (Coos Bay)	
		Florence	
		Winchester Bay	
		Brookings	
		Gold Beach	
Port Orford			
CA	Crescent City / Eureka	Crescent City	
		Eureka	
		Fields Landing	
	Fort Bragg	Albion	
		Point Arena	
		Bodega Bay	
	San Francisco / Monterey	Fort Bragg	
		Oakland	
		Richmond	
		San Francisco	
		San Francisco Area	
		Santa Cruz	
		Monterey	
	Moss Landing		
	Princeton (Half Moon Bay)		
	Morro Bay / Los Angeles	Morro Bay / Los Angeles	Avila
			Morro Bay
			San Luis Obispo Area
			San Simeon
Ventura			
Oxnard			
Santa Barbara			
Dana Point Harbor			
Los Angeles Area			
Los Angeles			
Newport Beach			
Oceanside			
San Diego			

Appendix C. – Nearshore species and species groups selected for characterization of the nearshore commercial fixed-gear groundfish fisheries by area.

PacFIN Species Identification		Nearshore Target Category North of 40° 10' N. Lat.		Nearshore Target Category South of 40° 10' N. Lat.	
	PacFIN Common Name				
BLCK	BLACK ROCKFISH	Black Rockfish	North	Black Rockfish	South
BLK1	NOM. BLACK ROCKFISH	Black Rockfish	North	Black Rockfish	South
BLU1	NOM. BLUE ROCKFISH	Blue Rockfish	North	Deeper Nearshore Species	South
BLUR	BLUE ROCKFISH	Blue Rockfish	North	Deeper Nearshore Species	South
BRW1	NOM. BROWN ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
BRWN	BROWN ROCKFISH BLACK-AND-YELLOW	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
BYEL	ROCKFISH NOM. BLACK-AND-YELLOW	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
BYL1	ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
CBZ1	NOM. CABEZON	Cabezon	North	Cabezon	South
CBZN	CABEZON	Cabezon	North	Cabezon	South
CHN1	NOM. CHINA ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
CHNA	CHINA ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
CLC1	NOM. CALICO ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
CLCO	CALICO ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
COP1	NOM. COPPER ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
COPP	COPPER ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
GPH1	NOM. GOPHER ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
GPHR	GOPHER ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
GRAS	GRASS ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
GRS1	NOM. GRASS ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
KGL1	NOM. KELP GREENLING	Kelp Greenling	North	Kelp Greenling	South
KLPG	KELP GREENLING	Kelp Greenling	North	Kelp Greenling	South
KLP1	NOM. KELP ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
KLPR	KELP ROCKFISH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
LCD1	NOM. LINGCOD	Lingcod	North	Lingcod	South
LCOD	LINGCOD	Lingcod	North	Lingcod	South
NSHR	NORTHERN NEARSHORE ROCKFISH NOR. UNSP. NEARSHORE	Other Nearshore Rockfish	North		
NUSR	ROCKFISH	Other Nearshore Rockfish	North		
OLV1	NOM. OLIVE ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
OLVE	OLIVE ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
QLB1	NOM. QUILLBACK ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
QLBK	QUILLBACK ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
RCK2	UNSP. BOLINA RCKFSH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
RCK7	UNSP. GOPHER RCKFSH	Other Nearshore Rockfish	North	Shallow Nearshore Species	South
RCK9	BLACK+BLUE ROCKFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
SCOR	CALIFORNIA SCORPIONFISH			Shallow Nearshore Species	South
SCR1	NOM. CALIF. SCORPIONFISH NOM. CALIFORNIA			Shallow Nearshore Species	South
SHP1	SHEEPHEAD			California Sheephead	South
SHPD	CALIFORNIA SHEEPHEAD SOUTHERN NEARSHORE			California Sheephead	South
SSHR	ROCKFISH			Deeper Nearshore Species	South
SSRD	Deep So. Nearshore RF			Deeper Nearshore Species	South
SSRS	Shallow So. Nearshore RF SOU. UNSP. NEARSHORE			Shallow Nearshore Species	South
SUSR	ROCKFISH			Deeper Nearshore Species	South
TRE1	NOM. TREEFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
TREE	TREEFISH	Other Nearshore Rockfish	North	Deeper Nearshore Species	South
UDNR	UNSP. DEEP NEARSHORE RF UNSP. NEARSHORE			Deeper Nearshore Species	South
USHR	ROCKFISH			Deeper Nearshore Species	South

Table 1. --Number of 2006 limited-entry, non-whiting¹ trawl tows and retained target species weights in trawl logbook records and in observations by the West Coast Groundfish Observer Program, by depth interval, area and season.

Depth intervals ⁴ (fathoms)	North of 40°10' N. Lat.				South of 40°10' N. Lat.			
	Number of tows		Retained mts of target species ²		Number of tows		Retained mts of target species ²	
	Winter ³	Summer ³	Winter ³	Summer ³	Winter ³	Summer ³	Winter ³	Summer ³
Observed fleet								
0-50	32	432	8	258	109		21	
51-75	96	623	41	448	86		33	
76-100	na	241	na	284	na	43	na	18
151-200	162	na	277	na	37	44	44	38
201-300	290	244	604	463		70		92
>300	96	177	151	258	22	99	38	160
All trawl logbooks								
0-50	108	2,864	31	1,763	382		102	
51-75	432	3,567	195	2,719	241		113	
76-100	na	1,034	na	1,171	na	116	na	111
151-200	916	na	1,333	na		107		91
201-300	1,388	1,438	2,940	2,101	279	225	313	301
>300	564	875	843	1,225	216	368	357	577
Observed percentage								
0-50	30%	15%	26%	15%	29%		21%	
51-75	22%	17%	21%	16%	36%		30%	
76-100	na	23%	na	24%	na	37%	na	16%
151-200	18%	na	21%	na		41%		42%
201-300	21%	17%	21%	22%	13%	31%	14%	31%
>300	17%	20%	18%	21%	10%	27%	11%	28%

¹ Trips with less than 2 mt of retained whiting.

² Target species include retained amounts of all flatfish, sablefish, thornyheads, Pacific cod, skates, and spiny dogfish in both areas, as well as slope rockfish in the southern area.

³ Winter season includes bi-monthly periods 1, 2, 6 (January-April; November-December); the Summer season includes bi-monthly periods 3, 4, 5 (May-October). Seasons or depth strata are combined in the area south of 40° 10' N. Lat. for purposes of sample size.

⁴ Depths between 100 and 150 fm were closed coastwide throughout the year.

Table 2a.--Discard ratios for west coast **rebuilding groundfish species**, by area, depth interval, and season, based on non-whiting trawl tows observed during 2006 by the West Coast Groundfish Observer Program.

Species	Season ¹	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals ³ (fathoms)						Depth intervals ³ (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-200	201-300	>300
Rebuilding species													
(Ratio of each species' discarded pounds to the total pounds of retained target species ²)													
Canary rockfish	Winter	0.00060	0.00604	na	0.00001	0	0	0.00020	0.00597	na	0	0	0
	Summer	0.00279	0.00351	0.00240	na	0	0			0.00182	0.00029	0	0
Widow rockfish	Winter	0	0.00004	na	0.00006	0	0	0	0.00259	na	0	0	0
	Summer	0.00000	0.00000	0.00002	na	0	0			0.00033	0	0	0
Yelloweye rockfish	Winter	0	0	na	0	0	0	0	0	na	0	0	0
	Summer	0.00026	0.00010	0.00010	na	0	0			0	0	0	0
Bocaccio ⁴	Winter	na	na	na	na	na	na	0.02468	0.01740	na	0	0	0
	Summer	na	na	na	na	na	na			0.07504	0.02600	0	0
Cowcod ⁴	Winter	na	na	na	na	na	na	0.00002	0.00312	na	0	0	0
	Summer	na	na	na	na	na	na			0.00174	0.00238	0	0
Pacific ocean perch ⁵	Winter	0.00006	0	na	0.00297	0.00078	0.00002	na	na	na	na	na	na
	Summer	0	0.00000	0.00073	na	0.00011	0.00002			na	na	na	na
Darkblotched rockfish	Winter	0	0.00002	na	0.03668	0.00965	0	0.00002	0.00001	na	0.00010	0	0
	Summer	0.00001	0.00085	0.00122	na	0.00215	0.00002			0.00001	0.00141	0.00005	0.00001

¹ Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons or depth strata are combined in the area south of 40° 10' N. Lat. for purposes of sample size.

² Target species include retained amounts of all flatfish, sablefish, thornyheads, Pacific cod, skates, and spiny dogfish in both areas, as well as slope rockfish in the southern area.

³ Depths between 100 and 150 fm were closed coastwide throughout the year.

⁴ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁵ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

Table 2b.--Discard ratios for west coast **target groundfish species**, by area, depth interval, and season, based on non-whiting trawl tows observed during 2006 by the West Coast Groundfish Observer Program.

Species	Season ¹	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals ² (fathoms)						Depth intervals ² (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-200	201-300	>300
Target species													
(Ratio of each species' discarded-to-retained pounds)													
Sablefish	Winter	27.737	5.594	na	0.491	0.173	0.169	1.673	0.600	na	0.049		0.136
	Summer	0.783	0.564	0.318	na	0.086	0.078			0.086	0.267	0.004	0.016
Shortspine thornyhead	Winter	0	0	na	0.791	0.285	0.251	0	0	na	0.948		0.331
	Summer	0	0.007	0.425	na	0.224	0.152			0	0.270	0.066	0.065
Longspine thornyhead	Winter	0	0	na	0.178	0.824	0.241	0	0	na	0.069		0.072
	Summer	0	0	0	na	0.422	0.108			0	0.151	0.086	0.032
Dover sole	Winter	0.105	0.136	na	0.074	0.075	0.141	2.431	4.609	na	0.268		0.085
	Summer	1.016	0.218	0.298	na	0.048	0.631			19.663	0.190	0.030	0.236
Petrale sole	Winter	0.021	0.082	na	0.008	0.007	0.189	0.064	0.074	na	0.004		0.016
	Summer	0.088	0.069	0.087	na	0.050	0.079			0.021	0.209	0.003	0.150
English sole	Winter	0.347	0.178	na	0.003	0.005	0.078	0.902	1.372	na	0.225		0
	Summer	0.694	0.360	0.195	na	0.030	0			2.911	1.288	0.211	0.469
Arrowtooth flounder	Winter	1,500.93	10.629	na	0.276	0.159	0.090	0	0	na	2.225		0
	Summer	0.805	0.692	0.479	na	0.086	0.153			0	0.223	15.259	0.374
Other flatfish	Winter	0.259	0.494	na	0.236	0.103	1.178	0.332	1.051	na	0.202		0.370
	Summer	0.713	1.585	1.217	na	0.059	0.435			0.835	2.213	0.080	4.508
Blackgill rockfish ³	Winter	na	na	na	na	na	na	0	0	na	1.662		0
	Summer	na	na	na	na	na	na			0	0.020	0.227	0
Splitnose rockfish ³	Winter	na	na	na	na	na	na	0.203	0	na	0.468		0
	Summer	na	na	na	na	na	na			0	0.930	1.206	0.331
Other slope rockfish	Winter	0	0		2.658	0.888	0.141	0	0	na	1.913		0.008
	Summer	0.775	0.310	0.951	na	0.440	0.210			0.660	0.353	0.017	0.001
Yellowtail rockfish ⁴	Winter	0	0	na	0			na	na	na	na		na
	Summer	0.024	0.305	0.044	na	30.422	0	na	na	na	na		na
Pacific cod	Winter	0.007	0.069	na	0	0.023	0	0	0	na	0		0
	Summer	0.002	0.021	0.006	na	0	0	0	0	0	0		0
Unspecified skate	Winter	0.007	0	na	0.021	0.007	0.031	1.042	0	na	0		0
	Summer	0.091	0.066	0.009	na	0.004	0.003			0	0	0	0

¹ Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons or depth strata are combined in the area south of 40° 10' N. Lat. for purposes of sample size. ² Depths between 100 and 150 fm were closed coastwide throughout the year.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁵ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

Table 2c.--Discard ratios for other west coast non-rebuilding **bycatch groundfish species**, by area, depth interval, and season, based on non-whiting trawl tows observed during 2006 by the West Coast Groundfish Observer Program.

Species	Season ¹	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals ² (fathoms)						Depth intervals ² (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-200	201-300	>300
Other species													
(Ratio of each species' discarded pounds to the total pounds of retained target species ²)													
Shortbelly rockfish	Winter	0	0	na	0	0	0	0.00005	0.00281	na	0	0	0
	Summer	0	0.00001	0	na	0	0			0.00172	0.00013	0.00000	0.00004
Chilipepper rockfish ⁵	Winter	na	na	na	na	na	na	0.00057	0.37508	na	0.00004	0	0
	Summer	na	na	na	na	na	na			0.34989	0.00967	0	0
Other shelf rockfish	Winter	0.00004	0.00060	na	0.00129	0.00044	0.00002	0.00052	0.06848	na	0.00781	0	0
	Summer	0.00024	0.00462	0.01235	na	0.00018	0.00002			0.01362	0.02011	0.00127	0.00000
Black rockfish	Winter	0.00764	0	na	0	0	0	0	0.00026	na	0	0	0
	Summer	0.00109	0.00000	0	na	0	0			0	0	0	0
Other near-shore rockfish	Winter	0	0	na	0	0	0	0	0	na	0	0	0
	Summer	0.00102	0.00001	0.00000	na	0	0			0	0	0	0
Pacific hake	Winter	0.00052	0.00540	na	0.07823	0.07410	0.01851	0.33404	0.26015	na	0.16371	0.00820	0
	Summer	0.09952	0.04145	0.00922	na	0.03083	0.01103			0.11185	0.04173	0.06806	0.00199
Lingcod	Winter	0.00251	0.01636	na	0.00924	0	0	0.00094	0.00661	na	0.00226	0	0
	Summer	0.02433	0.07840	0.02693	na	0.00001	0			0.00046	0.00003	0	0
Spiny dogfish	Winter	0.03448	0.04934	na	0.08938	0.02484	0.00070	0.05217	0.05827	na	0.12740	0	0
	Summer	0.03026	0.05797	0.05743	na	0.00161	0.00009			0.00855	0.05316	0.00551	0.00014
Big skate	Winter	0.03144	0.06666	na	0.00217	0.00241	0	0.04292	0.00408	na	0	0	0
	Summer	0.05564	0.01077	0.00023	na	0.00035	0.00012			0.00268	0	0	0
Longnose skate	Winter	0.01945	0.12650	na	0.03375	0.02537	0.01074	0.03546	0.12019	na	0.12830	0.00449	0
	Summer	0.02135	0.05244	0.03514	na	0.01674	0.00536			0.13833	0.06214	0.07200	0.01189
Other groundfish	Winter	0.44408	0.13918	na	0.01688	0.01095	0.06608	0.15823	0.14652	na	0.02423	0.03506	0
	Summer	0.03951	0.04389	0.04140	na	0.02386	0.11331			0.09606	0.09211	0.02474	0.07496
Dungeness crab	Winter	0.03573	0.06833	na	0.00007	0.00003	0	0.69303	0.11143	na	0	0	0
	Summer	0.10465	0.04682	0.01240	na	0.00027	0			0.21957	0.00653	0	0
Tanner crab	Winter	0	0	na	0.00032	0.01322	0.09980	0	0	na	0.05260	0.07207	0
	Summer	0	0.00000	0	na	0.01241	0.07540			0	0.00210	0.01691	0.10671
Green sturgeon	Winter	0	0	na	0	0	0	0.00117	0	na	0	0	0
	Summer	0	0	0	na	0	0			0	0	0	0

¹ Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons or depth strata are combined in the area south of 40° 10' N. Lat. for purposes of sample size.

² Target species include retained amounts of all flatfish, sablefish, thornyheads, Pacific cod, skates, and spiny dogfish in both areas, as well as slope rockfish in the southern area.

³ Depths between 100 and 150 fm were closed coastwide throughout the year.

⁴ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

Table 3.--Bycatch ratios for west coast rebuilding species, by area, depth interval, and season, based on non-whiting trawl tows observed during 2006 by the West Coast Groundfish Observer Program.

Species	Season ¹	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals ³ (fathoms)						Depth intervals ³ (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-225	226-300	>300
Rebuilding species													
(Ratio of each species' retained+discarded pounds to the total pounds of retained target species ²)													
Canary rockfish	Winter	0.00121	0.00848	na	0.00001	0	0	0.00024	0.00830	na	0	0	0
	Summer	0.00291	0.00430	0.00272	na	0	0			0.00182	0.00039	0	0
Widow rockfish	Winter	0	0.00004	na	0.00012	0	0	0	0.00436	na	0	0	0
	Summer	0.00000	0.00005	0.00043	na	0	0			0.00237	0	0	0
Yelloweye rockfish	Winter	0	0	na	0	0	0	0	0	na	0	0	0
	Summer	0.00026	0.00024	0.00018	na	0.00000	0			0.00000	0	0	0
Bocaccio ⁴	Winter	na	na	na	na	na	na	0.02468	0.01740	na	0	0	0
	Summer	na	na	na	na	na	na			0.07632	0.03035	0	0
Cowcod ⁴	Winter	na	na	na	na	na	na	0.00002	0.00312	na	0	0	0
	Summer	na	na	na	na	na	na			0.00174	0.00238	0	0
Pacific ocean perch ⁵	Winter	0.00006	0.00001	na	0.01822	0.00444	0.00110	na	na	na	na	na	na
	Summer	0.00001	0.00001	0.00078	na	0.00613	0.00042			na	na	na	na
Darkblotched rockfish	Winter	0	0.00002	na	0.05198	0.01901	0.00829	0.00002	0.00001	na	0.05501	0	0
	Summer	0.00001	0.00085	0.00180	na	0.00686	0.00252			0.00001	0.01248	0.00308	0.00511

¹ Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons or depth strata are combined in the area south of 40° 10' N. Lat. for purposes of sample size.

² Target species include retained amounts of all flatfish, sablefish, thornyheads, Pacific cod, skates, and spiny dogfish in both areas, as well as slope rockfish in the southern area. ³ Depths between 100 and 150 fm were closed coastwide throughout the year.

⁴ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁵ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

Table 4.--Landings, estimated discard mortality, and total catch (mt) of major west coast groundfish species from non-whiting¹, commercial limited-entry groundfish trawls targeting groundfish during 2006.

	North of 40°10' N. Lat.			South of 40°10' N. Lat.			Coast-wide		
	Landed	Discard	Total	Landed	Discard	Total	Landed	Discard	Total
Sablefish		366			23			389	
mortality ²	2,060	183	2,243	400	11	411	2,460	194	2,654
Shortspine thornyhead	406	95	502	121	26	147	528	121	649
Longspine thornyhead	442	78	520	288	14	301	730	91	821
Dover sole	4,926	905	5,831	802	842	1,644	5,728	1,748	7,476
Petrале sole	2,209	95	2,304	368	17	386	2,578	113	2,690
English sole	816	335	1,151	56	85	141	871	420	1,291
Arrowtooth flounder	1,713	1,097	2,809	1	7	8	1,714	1,104	2,818
Other Flatfish	949	680	1,628	146	81	227	1,095	760	1,855
Blackgill rockfish ³	na	na	na	39	26	66	39	26	66
Splitnose rockfish ³	na	na	na	96	64	159	96	64	159
Other slope rockfish	78	109	187	57	65	122	135	174	309
Yellowtail rockfish ⁴	23	8	32	na	na	na	23	8	32
Chilipepper rockfish ⁵	na	na	na	17	99	116	17	99	116
Other shelf rockfish	14	32	46	5	17	22	19	49	68
Black rockfish	2	2	4	0	0	0	2	2	5
Other nearshore rockfish	1	2	3	0	0	0	1	2	3
Pacific hake/whiting	1	750	751	0	191	191	1	941	942
Lingcod		315			1			316	
mortality ²	104	157	261	10	1	11	115	158	272
Pacific cod	339	6	344	0	0	0	339	6	344
Spiny dogfish	78	506	584	7	75	82	85	581	666
Unspecified skate	1,009	45	1,054	13	2	14	1,021	47	1,068
Big skate	0	158	158	0	6	6	0	165	165
Longnose skate	0	435	435	0	134	134	0	569	569
Big+longnose+Unsp. skate	1,009	639	1,647	13	141	154	1,021	780	1,801
Shortbelly rockfish	0	0	0	0	1	1	0	1	1
Other groundfish	68	600	668	26	148	174	94	748	842
Green sturgeon	0	0	0	0	0.1	0.1	0	0.1	0.1
Dungeness crab	0	354	354	0	130	130	0	483	483
Tanner crab	0	253	253	0	134	134	0	387	387
Canary rockfish	2	19	21	1	1	3	3	20	24
Widow rockfish	2	0	3	4	0	4	6	1	6
Yelloweye rockfish	0	1	1	0	0	0	0	1	1
Bocaccio ⁵	na	na	na	1	18	19	1	18	19
Cowcod ⁵	na	na	na	0	1	1	0	1	1
Pacific ocean perch ⁶	64	8	72	na	na	na	64	8	72
Darkblotched rockfish	75	90	165	13	0	13	88	91	178

¹ Includes only landings containing less than 2 mt of Pacific hake/whiting.

² As assumed by the PFMC's Groundfish Management Team, the rate of mortality for discarded sablefish and lingcod in the trawl fishery is 50%.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁵ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁶ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

Table 5.--Estimated discard and total catch of sablefish and discard ratios for other species associated with all (limited entry & open access) fixed-gear sablefish landings north of 36° N. Lat. during 2006.

	36° to 40°10' N. Lat. (seaward boundary of) the RCA at 150 fm)		North of 40°10' N. Lat. (seaward boundary of) the RCA at 100 fm)		North of 36° N. Lat. Total
	Longline	Pot	Longline	Pot	
Sablefish					
Observed sets used for discard ratios in each depth range					
number of sets	31	50	424	262	
observed sablefish catch (mt)	9	79	318	172	
Total landings (mt)	232	205	1,675	747	2,859
Area percent, by gear	53%	47%	69%	31%	
Coast-wide percent, by gear/area	8%	7%	59%	26%	
Observed sablefish discard ratio ¹	9.7%	17.4%	12.8%	16.3%	13.8%
Total estimated discard	23	36	215	122	395
Estimated discard mortality ² (mt)	5	7	43	24	79
Estimated total mortality	237	213	1,718	771	2,938
Rebuilding species discard ratios ³					
Canary rockfish	0	0.000009	0	0.000008	
Widow rockfish	0	0	0.000458	0	
Yelloweye rockfish	0	0	0.000448	0.000011	
Bocaccio rockfish	0	0	na	na	
Cowcod rockfish	0	0	na	na	
Pacific ocean perch	na	na	0.000158	0	
Darkblotched rockfish	0.000085	0.000175	0.000209	0.000152	
Other species discard ratios ³					
Pacific whiting/hake	0	0	0.000066	0.000005	
Shortspine thornyhead	0.01814	0	0.000917	0.000006	
Longspine thornyhead	0.00355	0	0	0	
Dover sole	0.00585	0.00023	0.000183	0.000192	
Arrowtooth flounder	0	0.00017	0.044053	0.000738	
Petrale sole	0.00006	0.00005	0.000006	0	
English sole	0	0	0	0	
Other flatfish	0.00003	0	0.001054	0	
Yellowtail rockfish	na	na	0.000194	0	
Chilipepper rockfish	0	0	na	na	
Other shelf rockfish	0	0.00011	0.001860	0.000042	
Blackgill rockfish	0	0.00016	na	na	
Splitnose rockfish	0	0.00015	na	na	
Other slope rockfish	0.00004	0.00003	0.001523	0.000012	
Lingcod	0.00034	0.00029	0.005211	0.001545	
Pacific cod	0	0	0.000030	0	
Spiny dogfish	0.00946	0.00005	0.219636	0.001154	
Longnose skate	0.02576	0	0.074903	0	
Big skate	0	0	0.002614	0	
Unspecified skate	0	0	0.003656	0	
Other groundfish	0.14409	0.00009	0.001618	0.000686	
Dungeness crab	0	0	0.000006	0.019478	
Tanner crab	0.00434	0.00005	0.000018	0.000191	
Pacific Halibut	0	0	0.459067	0.036631	
Green sturgeon	0	0	0	0	
Other non-groundfish	0.05238	0.00002	0.032922	0.000614	

¹ Sablefish discard ratio = 100 * discard lb / retained lb.

² As assumed by the PFMC's Groundfish Management Team, the rate of mortality used for discarded sablefish in the fixed-gear fishery is 20%.

³ Discard ratios are calculated by dividing the total discarded weight of each species by the retained catch weight of sablefish, and are derived from data collected by the West Coast Groundfish Observer Program during 2006 from trips targeting sablefish.

Table 6a.--Estimated discard of groundfish species associated with **all** (limited entry & open access) fixed-gear sablefish landings north of 36° N. Lat. during 2006.

	36° to 40°10' N. Lat. (seaward boundary of) the RCA at 150 fm)			North of 40°10' N. Lat. (seaward boundary of) the RCA at 100 fm)			North of 36° N. Lat. Total
	Longline	Pot	All gears	Longline	Pot	All gears	
Estimated discard of rebuilding species (mt)							
Canary rockfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Widow rockfish	0.0	0.0	0.0	0.8	0.0	0.8	0.8
Yelloweye rockfish	0.0	0.0	0.0	0.7	0.0	0.8	0.8
Bocaccio rockfish ¹	0.0	0.0	0.0	na	na	na	0.0
Cowcod rockfish ¹	0.0	0.0	0.0	na	na	na	0.0
Pacific ocean perch ²	na	na	na	0.3	0.0	0.3	0.3
Darkblotched rockfish	0.0	0.0	0.1	0.3	0.1	0.5	0.5
Estimated discard of other species (mt)							
Pacific whiting/hake	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Shortspine thornyhead	4.2	0.0	4.2	1.5	0.0	1.5	5.8
Longspine thornyhead	0.8	0.0	0.8	0.0	0.0	0.0	0.8
Dover sole	1.4	0.0	1.4	0.3	0.1	0.5	1.9
Arrowtooth flounder	0.0	0.0	0.0	73.8	0.6	74.3	74.4
Petrale sole	0.0	0.0	0.0	0.0	0.0	0.0	0.0
English sole	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other flatfish	0.0	0.0	0.0	1.8	0.0	1.8	1.8
Yellowtail rockfish ³	na	na	na	0.3	0.0	0.3	0.3
Chilipepper rockfish ¹	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other shelf rockfish	0.0	0.0	0.0	3.1	0.0	3.1	3.2
Blackgill rockfish ⁴	0.0	0.0	0.0	na	na	na	0.0
Splitnose rockfish ⁴	0.0	0.0	0.0	na	na	na	0.0
Other slope rockfish	0.0	0.0	0.0	2.6	0.0	2.6	2.6
Lingcod	0.1	0.1	0.1	8.7	1.2	9.9	10.0
Pacific cod	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Spiny dogfish	2.2	0.0	2.2	367.8	0.9	368.7	370.9
Longnose skate	6.0	0.0	6.0	125.4	0.0	125.4	131.4
Big skate	0.0	0.0	0.0	4.4	0.0	4.4	4.4
Unspecified skate	0.0	0.0	0.0	6.1	0.0	6.1	6.1
Other groundfish	33.5	0.0	33.5	2.7	0.5	3.2	36.7
Dungeness crab	0.0	0.0	0.0	0.0	14.5	14.6	14.6
Tanner crab	1.0	0.0	1.0	0.0	0.1	0.2	1.2
Pacific Halibut	0.0	0.0	0.0	768.8	27.3	796.2	796.2
mortality (25%)	0.0	0.0	0.0	192.2	6.8	199.0	199.0
Green sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other non-groundfish	12.2	0.0	12.2	55.1	0.5	55.6	67.8

¹ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

² Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

³ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

Table 6b.--Estimated discard of groundfish species associated with **limited-entry**, fixed-gear sablefish landings north of 36° N. Lat. during 2006.

	36° to 40°10' N. Lat. (seaward boundary of) the RCA at 150 fm)			North of 40°10' N. Lat. (seaward boundary of) the RCA at 100 fm)			North of 36° N. Lat.
	Longline	Pot	All gears	Longline	Pot	All gears	Total
Sablefish							
Observed sets used for discard ratios in each depth range							
number of sets	31	50	81	424	262	686	
observed sablefish catch (mt)	9	79	87	318	172	490	
			0			0	
Total landings (mt)	164	50	214	1,391	564	1,956	2,170
Area percent, by gear	77%	23%	100%	71%	29%	100%	
N. of 36° percent, by gear/area	8%	2%	10%	64%	26%	90%	
Observed sablefish discard ratio ¹	9.7%	17.4%	27%	12.8%	16.3%	29%	13.6%
Total estimated discard (mt)	16	9	25	179	92	271	295
Estimated discard mortality ² (mt)	3	2	5	36	18	54	59
Estimated total mortality	168	51	219	1,427	583	2,010	2,229
Estimated discard of rebuilding species (mt)							
Canary rockfish	0	0.0	0.0	0	0.0	0.0	0.0
Widow rockfish	0	0	0	0.6	0	0.6	0.6
Yelloweye rockfish	0	0	0	0.6	0.0	0.6	0.6
Bocaccio rockfish ³	0	0	0	na	na	na	0
Cowcod rockfish ³	0	0	0	na	na	na	0
Pacific ocean perch ⁴	na	na	na	0.2	0	0.2	0.2
Darkblotched rockfish	0.0	0.0	0.0	0.3	0.1	0.4	0.4
Estimated discard of other species (mt)							
Pacific whiting/hake	0	0	0	0.1	0.0	0.1	0.1
Shortspine thornyhead	3.0	0	3.0	1.3	0.0	1.3	4.3
Longspine thornyhead	0.6	0	0.6	0	0	0	0.6
Dover sole	1.0	0.0	1.0	0.3	0.1	0.4	1.3
Arrowtooth flounder	0	0.0	0.0	61.3	0.4	61.7	61.7
Petrale sole	0.0	0.0	0.0	0.0	0	0.0	0.0
English sole	0	0	0	0	0	0	0
Other flatfish	0.0	0	0.0	1.5	0	1.5	1.5
Yellowtail rockfish ⁵	na	na	na	0.3	0	0.3	0.3
Chilipepper rockfish ³	0	0	0	0	0	0	0
Other shelf rockfish	0	0.0	0.0	2.6	0.0	2.6	2.6
Blackgill rockfish ⁶	0	0.0	0.0	na	na	na	0.0
Splitnose rockfish ⁶	0	0.0	0.0	na	na	na	0.0
Other slope rockfish	0.0	0.0	0.0	2.1	0.0	2.1	2.1
Lingcod	0.1	0.0	0.1	7.3	0.9	8.1	8.2
Pacific cod	0	0	0	0.0	0	0.0	0.0
Spiny dogfish	1.6	0.0	1.6	305.6	0.7	306.2	307.8
Longnose skate	4.2	0	4.2	104.2	0	104.2	108.4
Big skate	0	0	0	3.6	0	3.6	3.6
Unspecified skate	0	0	0	5.1	0	5.1	5.1
Other groundfish	23.7	0.0	23.7	2.3	0.4	2.6	26.3
Dungeness crab	0	0	0	0.0	11.0	11.0	11.0
Tanner crab	0.7	0.0	0.7	0.0	0.1	0.1	0.8
Pacific Halibut	0	0	0	638.7	20.7	659.4	659.4
mortality (25%)	0.0	0.0	0.0	159.7	5.2	164.8	164.8
Green sturgeon	0	0	0	0	0	0	0
Other non-groundfish	8.6	0.0	8.6	45.8	0.3	46.1	54.8

¹ Sablefish discard ratio = 100 * discard lb / retained lb. ² 20% mortality rate provided by the PFMC's Groundfish Management Team

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

⁵ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁶ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

Table 6c.--Estimated discard of groundfish species associated with **open-access**, fixed-gear sablefish landings north of 36° N. Lat. during 2006.

	36° to 40°10' N. Lat. (seaward boundary of) the RCA at 150 fm)			North of 40°10' N. Lat. (seaward boundary of) the RCA at 100 fm)			North of 36° N. Lat.
	Longline	Pot	All gears	Longline	Pot	All gears	Total
Sablefish							
Observed sets used for discard ratios in each depth range							
number of sets	31	50	81	424	262	686	
observed sablefish catch (mt)	9	79	87	318	172	490	
			0			0	
Total landings (mt)	68	156	224	284	182	466	689
Area percent, by gear	30%	70%	100%	61%	39%	100%	
N. of 36° percent, by gear/area	10%	23%	32%	41%	26%	68%	
Observed sablefish discard ratio ¹	9.7%	17%	27%	12.8%	16.3%	29%	14.5%
Total estimated discard (mt)	7	27	34	36	30	66	100
Estimated discard mortality ² (mt)	1	5	7	7	6	13	20
Estimated total mortality	69	161	230	291	188	479	709
Estimated discard of rebuilding species (mt)							
Canary rockfish	0	0.0	0.0	0.0	0	0.0	0.0
Widow rockfish	0	0	0	0	0	0	0
Yelloweye rockfish	0	0	0	0.1	0	0.1	0.1
Bocaccio rockfish ³	0	0	0	na	na	na	0
Cowcod rockfish ³	0	0	0	na	na	na	0
Pacific ocean perch ⁴	na	na	na	0	0	0	0
Darkblotched rockfish	0.0	0.0	0.0	0.1	0	0.1	0.1
Estimated discard of other species (mt)							
Pacific whiting/hake	0	0	0	0.0	0	0.0	0.0
Shortspine thornyhead	1.2	0	1.2	0.3	0	0.3	1.5
Longspine thornyhead	0.2	0	0.2	0	0	0	0.2
Dover sole	0.4	0.0	0.4	0.1	0	0.1	0.5
Arrowtooth flounder	0	0.0	0.0	12.5	0	12.6	12.7
Petrale sole	0.0	0.0	0.0	0	0	0	0.0
English sole	0	0	0	0	0	0	0
Other flatfish	0.0	0	0.0	0	0	0	0.3
Yellowtail rockfish ⁵	na	na	na	0	0	0	0
Chilipepper rockfish ³	0	0	0	0	0	0	0
Other shelf rockfish	0	0.0	0.0	0.5	0	0.5	0.6
Blackgill rockfish ⁶	0	0.0	0.0	na	na	na	0.0
Splitnose rockfish ⁶	0	0.0	0.0	na	na	na	0.0
Other slope rockfish	0.0	0.0	0.0	0.4	0	0.4	0.4
Lingcod	0.0	0.0	0.1	1.5	0	1.8	1.8
Pacific cod	0	0	0	0	0	0	0
Spiny dogfish	0.6	0.0	0.6	62.3	0	62.5	63.1
Longnose skate	1.7	0	1.7	21	0	21	23.0
Big skate	0	0	0	1	0	1	1
Unspecified skate	0	0	0	1	0	1	1
Other groundfish	9.8	0.0	9.8	0.5	0	0.6	10.4
Dungeness crab	0	0	0	0.0	4	3.5	3.5
Tanner crab	0.3	0.0	0.3	0.0	0	0.0	0.3
Pacific Halibut	0	0	0	130.2	7	136.8	136.8
mortality (25%)	0.0	0.0	0.0	32.5	1.7	34.2	34.2
Green sturgeon	0	0	0	0	0	0	0
Other non-groundfish	3.6	0.0	3.6	9.3	0	9.4	13.0

¹ Sablefish discard ratio = 100 * discard lb / retained lb. ² 20% mortality rate provided by the PFMC's Groundfish Management Team

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

⁵ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁶ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

Table 7.--Estimated discard of groundfish species associated with **all** (limited entry & open access) fixed-gear slope fishery landings south of 36° N. Lat. during 2006.

	Observed			Fleet total based on landed catch			
	Retained lb	Discard lb	Discard lb / Retained lb	Landings mts	Discard mts	Total mts	Discard % of catch
Slope Target species							
Sablefish		600			12.0		
mortality ¹	8,938	120	1.3%	178.8	2.4	181.2	1.3%
Shortspine thornyhead	29,473	3,547	12.0%	130.4	15.7	146.1	10.7%
Longspine thornyhead	3,758	1,084	28.8%	9.8	2.8	12.6	22.4%
Blackgill rockfish	6,186	171	2.8%	43.3	1.2	44.5	2.7%
Other slope rockfish	374	9	2.4%	4.4	0.1	4.5	2.3%
Dover sole	101	282	280.3%	0.3	1.0	1.3	73.7%
Total	48,830	5,692	11.7%	367.0	35.2	580.9	9.6%
Slope Bycatch species							
			Discard lb / Target species retained lb				
Spiny dogfish	0	108	0.2%	0.0	0.8	0.8	97.0%
Unsp.+ longnose skate	0	4,563	9.3%	1.9	34.3	36.2	94.7%
Bocaccio	0	0	0.0%	2.1	0	2.1	0.0%
Cowcod	0	0	0.0%	0	0	0	na
Other groundfish	293	748	1.5%	2.3	5.6	7.9	70.9%

¹ As assumed by the PFMC's Groundfish Management Team, the rate of mortality used for discarded sablefish in the fixed-gear fishery is 20%.

Table 8.--Number of fixed-gear trips and sets by port group and gear, with associated retained weight, observed in nearshore depths less than 50 fathoms during 2006 by the West Coast Groundfish Observer Program (WCGOP).

WCGOP Port Group	Hook and Line				Pot			
	Number of vessels	Number of trips	Number of sets	Retained weight (mt)	Number of vessels	Number of trips	Number of sets	Retained weight (mt)
Astoria	12	52	61	3.5	1	10	20	*
S Oregon	43	185	298	16.9				
Crescent City / Eureka	13	34	39	6.2				
Fort Bragg	5	8	21	0.3	1	3	3	*
San Francisco / Monterey	5	15	19	1.1				
Morro Bay - Los Angeles	16	42	65	1.6	3	3	10	0.3
ALL PORTS	94	336	503	29.6	5	16	33	1.6

Note: Since both gear types can be used on the same trip, the total number of observed trips may be less than the sum of the numbers shown for each gear group. Similarly, the overall number of vessels observed may be less than the sum of the numbers reported for each port group.

* Data not reported because of confidentiality issues.

Table 9.--Total catch weight, discard weight, and discard percentage for target and rebuilding species, by area and depth, from fixed-gear sets observed in nearshore depths less than 50 fm during 2006 by the West Coast Groundfish Observer Program.

Area	Species	0 - 10 fm			11 - 50 fm			0 - 50 fm		
		Total lbs	Discard lbs	Discard % ¹	Total lbs	Discard lbs	Discard % ¹	Total lbs	Discard lbs	Discard % ¹
South of 40°10' N. Lat.										
Target species										
	Shallow nearshore species ²	1,088	122	11.2%	375	121	32.3%	1,464	243	16.6%
	Black rockfish	119	40	33.7%	154	71	46.1%	273	111	40.7%
	Deeper nearshore species ³	1,721	213	12.3%	1,969	208	10.6%	3,690	421	11.4%
	Cabazon	1,386	426	30.7%	281	84	29.8%	1,666	509	30.6%
	Kelp Greenling	156	104	66.6%	172	163	94.8%	328	267	81.4%
	Lingcod	727	503	69.2%	617	408	66.2%	1,344	911	67.8%
	California Sheephead	768	363	47.2%				768	363	47.2%
Rebuilding species										
	Bocaccio Rockfish	0	0		16	0	0.0%	16	0	0.0%
	Canary Rockfish	9	9	100.0%	154	154	100.0%	163	163	100.0%
Other species										
	Minor Shelf rockfish	168	0.8	0.5%	579	0.7	0.1%	748	1.5	0.2%
North of 40°10' N. Lat.										
Target species										
	Black rockfish	18,576	703	3.8%	16,607	1,010	6.1%	35,183	1,713	4.9%
	Blue rockfish	1,911	528	27.6%	4,764	1,164	24.4%	6,674	1,692	25.4%
	Other minor nearshore rockfish	1,219	52	4.2%	2,546	77	3.0%	3,765	129	3.4%
	Cabazon	2,171	297	13.7%	5,216	543	10.4%	7,387	839	11.4%
	Kelp Greenling	2,585	184	7.1%	2,333	444	19.0%	4,918	628	12.8%
	Lingcod	4,301	1,963	45.7%	6,116	2,204	36.0%	10,417	4,167	40.0%
Rebuilding species										
	Canary rockfish	132	132	100.0%	424	424	100.0%	556	556	100.0%
	Widow rockfish				30	17	58.6%	30	17	58.6%
	Yelloweye rockfish	59	59	100.0%	283	281	99.4%	342	340	99.5%
Other species										
	Yellowtail rockfish	71	21	29.3%	306	67	22.0%	378	88	23.4%
	Minor Shelf rockfish	300	16	5.2%	804	13	1.7%	1,104	29	2.6%

¹ The discard percentage is calculated as the discard poundage divided by the total catch weight for each species or group.

² Includes black-and-yellow rockfish, kelp rockfish, grass rockfish, gopher rockfish, china rockfish, California scorpionfish.

³ Includes blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, treefish.

Table 10a.--Estimated fixed-gear discard mortality for nearshore target species, derived using discard observations from the West Coast Groundfish Observer Program, 2006 landed catches, and the Groundfish Management Team nearshore model.

Area Species	All depths			0 - 10 fm							11 - 20 fm						
				% of total catch ¹	stratum catch mt	gross discard		discard mortality		stratum mortality mt	% of total catch ¹	stratum catch mt	gross discard		discard mortality		stratum mortality mt
	retention rate	catch mt	%			mt	% ¹	mt	%				mt	% ¹	mt		
South of 40°10' N. Lat.																	
Shallow nearshore species	45	85%	53	81%	43	11%	5	10%	0.5	38	18%	9	32%	3	45%	1.3	8
Black rockfish	3	60%	5	47%	2	34%	1	10%	0.1	2	50%	2	46%	1	40%	0.4	2
Deeper nearshore species	38	89%	43	43%	19	12%	2	10%	0.2	17	53%	23	11%	2	40%	1.0	21
Cabazon	26	69%	37	97%	36	31%	11	7%	0.8	26	2%	1	30%	0	7%	0.0	1
Kelp greenling	1	33%	4	98%	4	67%	3	7%	0.2	2	1%	0	95%	0	7%	0.0	0
Lingcod	17	32%	54	54%	29	69%	20	7%	1.4	10	41%	22	66%	15	7%	1.0	9
California sheephead	38	53%	73	81%	59	47%	28	7%	2.0	33	18%	13	47%	6	7%	0.4	7
All nearshore groundfish	169	63%	269	72%	192	36%	70	7%	5.1	127	26%	71	39%	28	15%	4.2	47
North of 40°10' N. Lat.																	
Black rockfish	150	95%	158	47%	75	4%	3	10%	0.3	72	50%	80	6%	5	40%	1.9	77
Blue rockfish	16	75%	22	26%	6	28%	2	10%	0.2	4	69%	15	24%	4	60%	2.2	14
Other minor nearshore rockfish	16	96%	16	55%	9	4%	0	10%	0.0	9	35%	6	3%	0	40%	0.1	6
Cabazon	25	88%	28	36%	10	14%	1	7%	0.1	9	60%	17	10%	2	7%	0.1	15
Kelp greenling	15	85%	17	37%	6	7%	0	7%	0.0	6	59%	10	19%	2	7%	0.1	8
Lingcod	35	60%	58	41%	24	46%	11	7%	0.8	14	50%	29	36%	10	7%	0.7	19
All nearshore groundfish	222	74%	300	43%	130	14%	18	8%	1.4	114	52%	157	15%	23	23%	5.2	139

Area Species	21 - 50 fm							0 - 50 fm			
	% of total catch ¹	stratum catch mt	gross discard		discard mortality		stratum mortality mt	mortality from:			mortality from discard as a percentage of total mortality
			%	mt	% ¹	mt		landed mt	discard mt	total mt	
South of 40°10' N. Lat.											
Shallow nearshore species	1%	1	32%	0.2	100%	0.2	1	45	2.0	46.6	4.3%
Black rockfish	2%	0	46%	0.0	90%	0.0	0	3	0.5	3.3	16.6%
Deeper nearshore species	4%	2	11%	0.2	90%	0.2	2	38	1.4	39.7	3.4%
Cabazon	0%	0	30%	0.0	7%	0.0	0	26	0.8	26.4	3.0%
Kelp greenling	1%	0	95%	0.0	7%	0.0	0	1	0.2	1.6	12.5%
Lingcod	5%	2	66%	1.6	7%	0.1	1	17	2.6	20.0	12.8%
California sheephead	1%	1	47%	0.3	7%	0.0	0	38	2.4	40.9	5.9%
All nearshore groundfish	2%	6	43%	2.5	21%	0.5	4	169	9.9	178.5	5.5%
North of 40°10' N. Lat.											
Black rockfish	2%	4	6%	0.2	90%	0.2	4	150	2.4	152.7	1.6%
Blue rockfish	5%	1	24%	0.3	100%	0.3	1	16	2.7	19.1	13.9%
Other minor nearshore rockfish	10%	2	3%	0.0	100%	0.0	2	16	0.2	15.7	1.0%
Cabazon	4%	1	10%	0.1	7%	0.0	1	25	0.2	24.9	0.9%
Kelp greenling	3%	1	19%	0.1	7%	0.0	0	15	0.2	14.9	1.2%
Lingcod	9%	5	36%	1.8	7%	0.1	3	35	1.6	36.5	4.5%
All nearshore groundfish	4%	13	20%	2.6	26%	0.7	11	222	7.3	228.9	3.2%

Note: Due to the limited number of observations between 21 and 50 fm, a single discard percentage was calculated for each species using all observations between 11 and 50 fm, and that value was used for both the 11-20 fm and 21-50 fm strata in this table..

¹ Distribution of species catch across depths and mortality rates for discarded fish provided by the PFMC Groundfish Management Team.

Table 10b.--Estimated bycatch mortality of rebuilding species associated with fixed-gear landed catch of nearshore target species.

	0 fm - 10 fm	11 fm - 20 fm	21 fm - 50 fm	Estimated Bycatch (mt)			
				0 - 10 fm	11 - 20 fm	21 - 50 fm	0 - 50 fm
South of 40°10' N. Lat.							
Number of observed sets	69	46	3				
Landed nearshore mt	122	43	3.3				
Rebuilding species	<i>Bycatch Rates</i>						
Canary rockfish	0.21%	6.14%	6.14%	0.26	2.64	0.20	3.10
disc. mort. (% by depth: mt)	10%	55%	100%	0.03	1.45	0.20	1.68
Bocaccio							
landed (depth %: mt)	0%	93%	7%	0.00	1.13	0.09	1.21
discard (% of target: mt)	0%	0%	0%	0.00	0.00	0.00	0.00
disc. mort. (% by depth: mt)	10%	70%	100%	0.00	0.00	0.00	0.00
total mortality				0.00	1.13	0.09	1.21
Minor Shelf rockfish							
landed (depth %: mt)	31%	64%	5%	4.24	8.59	0.65	13.49
discard (% of target: mt)	0.02%	0.03%	0.03%	0.02	0.01	0.00	0.04
disc. mort. (% by depth: mt)	10%	55%	100%	0.00	0.01	0.00	0.01
total mortality				4.25	8.60	0.65	13.50
North of 40°10' N. Lat.							
Number of observed sets	218	189	11				
Landed nearshore mt	112	105	11				
Rebuilding species	<i>Bycatch Rates</i>						
Canary rockfish	0.49%	1.32%	1.32%	0.55	1.76	0.14	2.45
disc. mort. (% by depth: mt)	10%	55%	100%	0.05	0.97	0.14	1.16
Yelloweye rockfish	0.22%	0.88%	0.88%	0.25	1.18	0.09	1.52
disc. mort. (% by depth: mt)	10%	50%	100%	0.02	0.59	0.09	0.71
Widow rockfish							
landed (depth %: mt)	0%	90%	10%	0.00	0.03	0.00	0.03
discard (% of target: mt)	0.00%	0.05%	0.05%	0.00	0.07	0.01	0.08
disc. mort. (% by depth: mt)	50%	90%	100%	0.00	0.06	0.01	0.07
total mortality				0.00	0.09	0.01	0.10
Yellowtail rockfish							
landed (depth %: mt)	20%	73%	7%	0.31	1.16	0.12	2
discard (% of target: mt)	0%	0%	0%	0.09	0.28	0.02	0.39
disc. mort. (% by depth: mt)	10%	30%	75%	0.01	0.08	0.02	0.11
total mortality				0.32	1.24	0.13	1.70
Minor Shelf rockfish							
landed (depth %: mt)	29%	64%	7%	1.52	3.31	0.34	5
discard (% of target: mt)	0%	0%	0%	0.06	0.06	0.00	0.12
disc. mort. (% by depth: mt)	10%	55%	100%	0.01	0.03	0.00	0.04
total mortality				1.52	3.34	0.34	5.20

Note: Due to the limited number of observations between 21 and 50 fm, a single discard percentage was calculated for each species using all observations between 11 and 50 fm, and that value was used for both the 11-20 fm and 21-50 fm strata in this table..

Table 11.--Landings and estimated discard mortality for target and incidentally caught species in near-shore, fixed-gear fisheries for groundfish in 2006, by fleet and area, derived using discard observations from the West Coast Groundfish Observer Program, 2006 landed catches, and the Groundfish Management Team near-shore model.

Area Species	Open access: 0 - 50 fm				Limited entry: 0 - 50 fm			
	mortality from:			mortality from discard as a percentage of total mortality	mortality from:			mortality from discard as a percentage of total mortality
	landed mt	discard mt	total mt		landed mt	discard mt	total mt	
South of 40°10' N. Lat.								
Shallow nearshore species	44	2.0	46.4	4.3%	0.3	0.0	0.3	4.3%
Black rockfish	3	0.5	3.2	16.6%	0.0	0.0	0.0	16.6%
Deeper nearshore species	37	1.3	38.2	3.4%	1.5	0.1	1.5	3.4%
Cabezon	25	0.8	26.2	3.0%	0.1	0.0	0.1	3.0%
Kelp greenling	1	0.2	1.6	12.5%	0.0	0.0	0.0	12.5%
Lingcod	17	2.5	19.1	12.8%	0.7	0.1	0.8	12.8%
California sheephead	38	2.4	40.7	5.9%	0.2	0.0	0.2	5.9%
All nearshore groundfish	166	9.7	175.5	5.5%	2.8	0.2	3.0	6.5%
Canary rockfish	0	1.7	1.7	100.0%	0	0.0	0.0	100.0%
Bocaccio	1	0	0.8	0.0%	0.4	0	0.4	0.0%
Minor shelf rockfish	10	0.0	10.4	0.1%	3.1	0.0	3.1	0.0%
North of 40°10' N. Lat.								
Black rockfish	137	2.2	139.1	1.6%	13.4	0.2	13.6	1.6%
Blue rockfish	16	2.6	18.3	13.9%	0.7	0.1	0.8	13.9%
Other minor nearshore rockfish	14	0.1	14.6	1.0%	1.1	0.0	1.1	1.0%
Cabezon	23	0.2	23.0	0.9%	1.8	0.0	1.8	0.9%
Kelp greenling	14	0.2	13.7	1.2%	1.2	0.0	1.2	1.2%
Lingcod	32	1.5	33.0	4.5%	3.4	0.2	3.5	4.5%
All nearshore groundfish	203	6.7	210.2	3.2%	18.2	0.5	18.7	2.8%
Canary rockfish	0	1.1	1.1	100.0%	0	0.1	0.1	100.0%
Yelloweye rockfish	0	0.6	0.6	100.0%	0	0.1	0.1	100.0%
Widow rockfish	0	0.1	0.1	76.1%	0.0	0.0	0.0	32.4%
Yellowtail rockfish	2	0.1	1.7	6.0%	0.0	0.0	0.0	30.1%
Minor shelf rockfish	5	0.0	4.8	0.8%	0.4	0.0	0.4	0.9%

Table 12.--Limited-entry and open-access, fixed-gear groundfish landings (mt) in 2006, by area and fleet.

	North of 40°10' N. Lat.		36° to 40°10' N. Lat.		South of 36° N. Lat.		Coast-wide		All fixed gear				
	Limited entry	Open access	Limited entry	Open access	Limited entry	Open access	Limited entry	Open access	North of 40°10' N.L.	36° to 40°10' N.L.	South of 36° N.L.	South of 40°10' N.L.	Coast-wide
Sablefish	1,956	466	214	224	63	116	2,233	805	2,421	438	179	617	3,038
Shortspine thornyhead	9.4	0.1	16.4	0.3	129.1	1.3	154.9	1.7	9.5	16.7	130.4	147.2	157
Longspine thornyhead	0.0	0.0	7.7	0.1	9.8	0.0	17.5	0.1	0.0	7.8	9.8	17.6	18
Dover sole	1.1	0.1	0	0.2	0.2	0.2	1.3	0.4	1.2	0.2	0.3	0.5	2
Petrale sole	3.8	0.1	0.1	0.0	0.0	0.0	3.9	0.1	3.9	0.1	0.0	0.2	4
English sole	0.0	0	0	0	0	0	0.0	0	0.0	0	0	0.0	0
Arrowtooth flounder	3.4	1.0	0	0	0	0	3.4	1.0	4.4	0	0	0.0	4
Other Flatfish	0	0.0	0.0	0.4	0.1	1.9	0.1	2.3	0.0	0.4	2.0	2.4	2
Blackgill rockfish ¹	na	na	10.8	1.7	27.1	16.2	37.9	17.9	na	12.5	43.3	55.8	56
Splitnose rockfish ¹	na	na	0.0	0.0	0.0	0.0	0.0	0.1	na	0.0	0.1	0.1	0
Other slope rockfish	52.0	3.5	2.5	2.5	0.9	3.5	55.4	9.5	55.5	5.1	4.4	9.5	65
Yellowtail rockfish ²	0.6	2.1	na	na	na	na	0.6	2.1	2.7	na	na	na	3
Chilipepper rockfish ³	na	na	4.3	1.0	0.5	0.2	4.8	1.3	na	5.3	0.8	6.1	6
Other shelf rockfish	8.9	5.7	2.7	11.6	6.7	13.7	18.3	30.9	14.6	14.2	20.3	34.6	49
Black rockfish	13.4	136.9	0	2.6	0.0	0.1	13.4	139.6	150.3	2.6	0.1	2.7	153
Other nearshore rockfish	1.7	29.6	0.3	24.8	1.1	32.0	3.1	86.3	31.3	25.1	33.0	58.1	89
Lingcod	16.3	47.4	0.8	11.5	0.6	9.1	17.7	67.9	63.7	12.3	9.7	22.0	86
Cabezon	1.8	22.8	0	8.4	0.1	17.1	1.9	48.3	24.6	8.4	17.2	25.6	50
Kelp greenling	1.2	13.5	0	0.6	0.0	0.8	1.2	14.9	14.7	0.6	0.8	1.4	16
Pacific cod	0.3	0.1	0	0	0	0	0.3	0.1	0.4	0	0	0.0	0
Spiny dogfish	131.0	59.8	0	0.2	0	0.0	131.0	60.0	190.8	0.2	0.0	0.2	191
Longnose+big+Unsp. skate	14.7	4.8	0.1	0.2	1.4	0.5	16.1	5.4	19.5	0.2	1.9	2.1	22
Other groundfish	0	0.0	20.2	13.4	0.9	1.4	21.0	14.9	0.0	33.6	2.3	35.9	36
Canary rockfish	0.2	0.0	0	0	0	0	0.2	0.0	0.2	0	0	0.0	0.2
Widow rockfish	0.0	0.0	0.3	0.3	0.1	0.1	0.3	0.5	0.0	0.6	0.2	0.8	0.8
Yelloweye rockfish	0.1	0	0	0	0	0	0.1	0	0.1	0	0	0.0	0.1
Bocaccio ³	na	na	0.4	1.3	0.8	1.4	1.2	2.6	na	1.6	2.1	3.8	3.8
Cowcod ³	na	na	0	0	0	0	0	0.0	na	0	0	0.0	0.0
Pacific ocean perch ⁴	0.2	0.1	na	na	na	na	0.2	0.1	0.3	na	na	na	0.3
Darkblotched rockfish	3.6	2.8	0.0	0.1	0	0.1	3.6	3.0	6.4	0.1	0.1	0.2	6.6

¹ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

² Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

Table 13.--Landings and estimated discards (mt) of groundfish from all fixed-gear trips targeting groundfish in 2006, by area.

	North of 40°10' N. Lat.			South of 40°10' N. Lat.			Coast-wide		
	Landed	Discard	Total	Landed	Discard	Total	Landed	Discard	Total
Sablefish		336			70			454	
mortality	2,421	67	2,489	617	14	631	3,038	81	3,119
Shortspine thornyhead	9	2	11	147	20	167	157	21	178
Longspine thornyhead	0	0	0	18	4	21	18	4	21
Dover sole	1	0	2	1	2	3	2	3	5
Petrale sole	4	0	4	0	0	0	4	0	4
English sole	0	0	0	0	0	0	0	0	0
Arrowtooth flounder	4	74	79	0	0	0	4	74	79
Other Flatfish	0	2	2	2	0	2	2	2	4
Blackgill rockfish ¹	na	na	na	56	1	57	56	1	57
Splitnose rockfish ¹	na	na	na	0	0	0	0	0	0
Other slope rockfish	55	3	58	9	0	10	65	3	68
Yellowtail rockfish ²	3	0	3	na	na	na	3	0	3
Chilipepper rockfish ³	na	na	na	6	0		6	0	0
Other shelf rockfish	15	3	18	35	0	35	49	3	52
Black rockfish	150	2	153	3	1	3	153	3	156
Other nearshore rockfish	31	3	34	58	3	61	89	6	96
Lingcod									
mortality	64	12	75	22	3	25	86	14	100
Cabazon	25	0	25	26	1	26	50	1	51
Kelp greenling	15	0	15	1	0	2	16	0	17
Pacific cod	0	0	0	0	0	0	0	0	0
Spiny dogfish	191	369	560	0	3	3	191	372	563
Longnose+big+Unsp. skate	19	136	155	2	40	42	22	176	198
Other groundfish	0	3	3	36	39	75	36	42	78
Dungeness crab		15			0			15	
Tanner crab		0			1			1	
Pacific Halibut		796			0			796	
mortality		199			0			199	
Canary rockfish	0.2	1.2	1.4	0.0	1.7	1.7	0.2	2.9	3.1
Widow rockfish	0.0	0.8	0.9	0.8	0.0	0.8	0.8	0.8	1.7
Yelloweye rockfish	0.1	1.5	1.6	0.0	0.0	0.0	0.1	1.5	1.6
Bocaccio ³	na	na	na	3.8	0.0	3.8	3.8	0.0	3.8
Cowcod ³	na	na	na	0.0	0.0	0.0	0.0	0.0	0.0
Pacific ocean perch ⁴	0.3	0.3	0.5	na	na	na	0.3	0.3	0.5
Darkblotched rockfish	6.4	0.5	6.8	0.2	0.1	0.3	6.6	0.5	7.1

¹ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

² Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

Table 14.--Estimated retained and discarded catch (mt) of major west coast groundfish species in the 2006 at-sea and shoreside fisheries for Pacific hake/whiting, by sector.

	Catcher-processor			Mothership			Tribal			All At-sea			Shoreside ¹		
	retained	discard	total	retained	discard	total	retained	discard	total	retained	discard	total	retained	discard	total
Pacific Hake	77,272	1,574	78,846	55,003	351	55,355	5,564	8	5,573	137,840	1,934	139,774	88,587	8,491	97,078
Sablefish	1.4	0.5	1.9	0.1	0.4	0.5	0	0	0	1	1	2	9.9	1.1	11.0
Shortspine thornyhead	0.2	0.3	0.5	0.0	0.0	0.0	0	0	0	0.2	0.3	0.5	0.0	0.1	0.1
Longspine thornyhead	0	0.0	0.0	0.0	0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Dover sole	0.0	0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Petrale sole	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
English sole	0.0	0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Arrowtooth flounder	0.1	0.0	0.1	0.5	0.4	1.0	0.0	1.7	1.7	1	2	3	2.0	0.3	2.3
Other flatfish	0.2	0.1	0.3	0.0	0.0	0.1	0	0	0	0.2	0.1	0.3	0.1	0.0	0.1
Other slope rockfish	2.7	4.4	7.1	0.4	0.7	1.1	0	0	0	3	5	8	2.6	0.2	2.8
Yellowtail	0.6	2.9	3.5	23.9	36.0	59.9	42.5	3.0	45.5	67	42	109	147.8	5.9	153.7
Other shelf rockfish	1.4	1.2	2.6	0.4	1.2	1.6	0.0	0	0.0	2	2	4	8.8	0.4	9.2
Other nearshore rockfish	0	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.1	0.0	0.1
Shortbelly	0.1	0.2	0.3	0.4	10.8	11.2	0	0	0	1	11	12	0.0	0.1	0.1
Lingcod	0.1	0.1	0.2	1.2	1.7	2.9	0.0	0.1	0.1	1	2	3	4.6	0.8	5.4
Pacific cod	0	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.1	0.8	0.0	0.9
Spiny dogfish	1.6	4.5	6.1	4.2	13.0	17.2	0	35.3	35.3	6	53	59	26.4	6.8	33.2
Skate	0.1	0.1	0.2	0.1	0.5	0.5	0	0.0	0.0	0.1	1	1	0.9	0.8	1.7
Other groundfish	0.0	0.1	0.1	0.1	0.8	0.8	0	0	0	0.1	1	1	0.9	0.8	1.7
Dungeness	0	0	0	0	0.0	0.0	0	0	0	0	0.0	0.0	0	0.0	0.0
Green sturgeon	0	0	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0.0	0	0.0
Canary	0.0	0.1	0.1	0.3	0.6	0.9	0.1	0.0	0.1	0.4	0.7	1.1	1.6	0.0	1.6
Widow	30.0	38.0	68.0	20.4	52.3	72.7	2.6	0.1	2.6	53.0	90.3	143.3	41.2	6.7	47.9
Yelloweye	0.0	0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.1
Bocaccio	0	0.0	0.0	0.1	0.0	0.1	0.2	0.0	0.2	0.2	0.1	0.3	0.0	0.0	0.0
Pacific ocean perch	0.3	0.4	0.8	0.8	1.1	1.9	0.5	0	0.5	1.6	1.5	3.1	0.1	0.0	0.1
Darkblotched	3.3	3.5	6.8	0.9	3.4	4.3	0	0	0	4.2	6.9	11.1	2.0	0.0	2.1

¹ Includes all trawl landings with more than 2 mt of Pacific hake/whiting. This fishery is a "maximized"-retention fishery; discard amounts reflect fish that, at the time of landing, were either discarded due to quality or forfeited if they were in excess of trawl trip limits.

Table 15.--Coast-wide 2006 commercial fishery rates of discard for major west coast groundfish species, based on fleet-wide landings and estimated amounts of discard from directed groundfish fisheries.

	Non-hake trawl fishery			Combined hake fisheries ¹			Combined fixed-gear fisheries			All commercial ²		
	total mt	discarded mt	discarded % of total	total mt	discarded mt	discarded % of total	total mt	discarded mt	discarded % of total	total mt	discarded mt	discarded % of total
Non-rebuilding species												
Sablefish mortality	2,654.3	194.4	7%	13.4	2.0	15%	3,119.3	81.4	3%	5,787	278	5%
Shortspine thornyhead	648.7	121.2	19%	0.6	0.4	66%	178.1	21.5	12%	827	143	17%
Longspine thornyhead	821.3	91.2	11%	0.0	0.0	94%	21.2	3.6	17%	843	95	11%
Dover sole	7,475.5	1,747.6	23%	0.1	0.0	29%	4.6	2.8	62%	7,480	1,750	23%
Petrale sole	2,690.1	112.5	4%	0.0	0.0	6%	4.1	0.0	1%	2,694	113	4%
English sole	1,291.4	419.9	33%	0.0	0.0	39%	0.0	0	0%	1,291	420	33%
Arrowtooth flounder	2,817.6	1,103.6	39%	5.0	2.4	48%	78.8	74.4	94%	2,901	1,180	41%
Other Flatfish	1,854.9	760.2	41%	0.5	0.2	41%	4.1	1.8	43%	1,859	762	41%
Blackgill rockfish ³	65.7	26.3	40%	0	0	na	57.0	1.2	2%	123	28	22%
Splitnose rockfish ³	159.5	63.8	40%	0	0	na	0.1	0.0	26%	160	64	40%
Other slope rockfish N	187.2	109.3	58%	11.0	5.3	48%	58.0	2.6	4%	256	117	46%
Other slope rockfish S	122.1	65.2	53%	0	0	na	9.6	0.1	1%	132	65	50%
Yellowtail rockfish ⁴	31.8	8.3	26%	262.7	47.8	18%	3.1	0.4	14%	298	57	19%
Chilipepper rockfish ⁵	115.6	98.9	85%	0	0	na	0.0	0	na	116	99	85%
Other shelf rockfish N	45.8	32.0	70%	13.4	2.8	21%	17.8	3.2	18%	77	38	49%
Other shelf rockfish S	22.0	17.0	77%	0	0	na	34.6	0.0	0%	57	17	30%
Black rockfish	4.5	2.3	50%	0	0	na	156.0	3.0	2%	161	5	3%
Other nearshore rockfish N	2.7	1.9	71%	0.1	0.0	20%	34.1	2.8	8%	37	5	13%
Other nearshore rockfish S	0	0	na	0	0	na	61.5	3.4	5%	61	3	5%
Shortbelly rockfish	0	0	na	11.6	11.0	95%	0	0	na	12	11	95%
Lingcod mortality	272.4	157.8	58%	8.6	2.7	32%	99.9	14.2	14%	381	175	46%
Cabazon	0	0	na	0	0	na	51.2	1.0	2%	51	1	2%
Kelp greenling	0	0	na	0	0	na	16.5	0.4	2%	17	0	2%
Pacific hake	942.4	941	100%	236,852	10,425	4%	0	0	na	237,794	11,367	5%
Pacific cod	344.5	5.8	2%	0.9	0.0	5%	0.5	0.1	11%	346	6	2%
Spiny dogfish	666.1	581.1	87%	91.7	59.5	65%	562.8	371.7	66%	1,321	1,012	77%
Longnose+big+Unsp. skate	780.3	780.3	100%	2.4	1.4	58%	197.8	176.2	89%	980	958	98%
Other groundfish	842.3	748.2	89%	2.7	1.7	65%	78.2	42.3	54%	923	792	46%
Green sturgeon	0.1	0.1	100%	0.0	0	0%	na	0	na	0	0	78%
Dungeness crab	483.5	483.5	100%	0.0	0	na	na	14.6	na	483	498	103%
Tanner crab	386.6	386.6	100%	0.0	0.0	100%	na	1.2	na	387	388	100%
Pacific halibut		151.0			0			199.0			350	
Rebuilding species												
Canary rockfish	23.7	20.3	86%	2.7	0.7	25%	2.9	2.7	93%	29.3	23.7	81%
Widow rockfish	6.5	0.5	8%	191.2	97.0	51%	1.6	0.8	48%	199.3	98.3	49%
Yelloweye rockfish	1.4	0.9	65%	0.1	0.0	46%	1.5	1.4	93%	3.0	2.3	79%
Bocaccio ⁵	18.8	18.1	96%	0.3	0.1	28%	3.8	0.0	0%	22.9	18.2	79%
Cowcod ⁵	0.9	0.9	100%	0	0	na	0	0	na	0.9	0.9	100%
Pacific ocean perch ⁶	71.7	7.7	11%	3.3	1.5	47%	0.5	0.3	49%	75.5	9.5	13%
Darkblotched rockfish	178.5	90.5	51%	13.2	6.9	52%	7.1	0.5	7%	198.8	97.9	49%

¹ Includes commercial shoreside and at-sea directed groundfish fisheries, as well as the tribal at-sea hake fishery.

⁶ Amounts in this row are for the area north of 40°10' N. Lat.

² Includes all directed groundfish trawl fisheries, and the tribal at-sea hake fishery.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁵ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

Table 16.--Estimated total mortality (mt) of major west coast groundfish species during 2006, by sector.

	Shoreside commercial fisheries				All at-sea hake fisheries	Shore-side WA Tribal	Total recreational fishing mortality			Research	Remaining GMT Scorecard ³ Values	Estimated total fishing mortality
	Estimated non-hake trawl ¹	Estimated hake trawl	Estimated non-trawl ²	Total shoreside mortality			CA	OR	WA			
Non-rebuilding species												
Sablefish mortality	2,654	11.0	3,119	5,785	2	669	0.0	2.1	0	11		6,470
Shortspine thornyhead	649	0.1	178	827	0.5	21	0.0	0	0	4		853
Longspine thornyhead	821	0	21	843	0.0		0	0	0	11.6		854
Dover sole	7,476	0.0	5	7,480	0.0	221	0	0.0	0	28.8		7,730
Petrale sole	2,690	0.0	4	2,694	0	26	0.5	0.0	0	2.3		2,723
English sole	1,291	0.0	0.0	1,291	0.0	42	0.0	0.0	0	2.5		1,336
Arrowtooth flounder	2,818	2.3	79	2,899	2.8	197	0	0.0	0	6.1		3,105
Other Flatfish	1,855	0.1	4	1,859	0.3	60	27.6	3.3	0.2	11.8		1,962
Blackgill rockfish ³	66	na	57	123	na	na	0	na	na	0.4		123
Splitnose rockfish ³	159	na	0	160	na	na	0	na	na	2.1		162
Other slope rockfish N	187	2.8	58	248	8.2	25	0	0.0	0	2.5		283
Other slope rockfish S	122	na	10	132	na	na	0.0	na	na	1.3		133
Yellowtail rockfish ⁴	32	153.7	3	189	109	172	0.4	8.7	13.9	1.2		493
Chilipepper rockfish ⁵	116	na	0	116	na	na	1.6	na	na	8.3		126
Other shelf rockfish N	46	9.2	18	73	4	10	5.8	6.3	0.6	4.6		104
Other shelf rockfish S	22	na	35	57	na	na	275	na	na	3.1		334
Black rockfish	5	0	156	161		0.0	186	281	268	0		896
Other nearshore rockfish N	3	0.1	34	37	0.0	1.1	18.3	31.5	7.9	0.0		96
Other nearshore rockfish S	0	na	61	61	na	na	649	na	na	0.0		711
Lingcod mortality	272	5.4	100	378	3.2	45	348	127	47	5.3		952
Cabazon	0	0	51	51	0	0	31.6	18.7	4.3	0		106
Kelp greenling	0	0	17	17	0	0	8.2	21.7	1.6	0.0		48
Pacific hake	942	97,078	0	98,021	139,774	29,896	0.1	0.1	0	16.0		267,707
Pacific cod	344	0.9	0.5	346	0.1	36	0	0.0	3.5	0.2		385
Spiny dogfish	666	33.2	563	1,262	59	77	3.9	0.0	0	5.8		1,407
Longnose+big+Unsp. skate	780	1.7	198	980	0.8	39	1.1	0	1.6	7.3		1,029
Other groundfish	842	1.7	78	922	1.0	0.9	88.6	0.0	0.2	2.6		1,015
Rebuilding species												
Canary rockfish	23.7	1.6	2.9	28.2	1.1	2.9	12.3	2.9	1.1	7.2	1.3	57.0
Widow rockfish	6.5	47.9	0.8	55.2	143.3	9.9	3.3	1.1	0	0.2	0.9	213.8
Yelloweye rockfish	1.4	0.1	1.5	2.9	0.0	0.5	4.1	2.5	1.7	0.1	0.4	12.2
Bocaccio ⁵	18.8	na	0.0	18.8	na	na	42.0	na	na	0.2	0.3	61.3
Cowcod ⁵	0.9	na	0	0.9	na	na	0.2	na	na	0.0	0.0	1.1
Pacific ocean perch ⁶	71.7	0.1	0.3	72.1	3.1	3.9	0	0	0	1.2	0.0	80.3
Darkblotched rockfish	178.5	2.1	0.5	181.1	11.1	0.1	0	0	0	0.9	0.0	193.3

¹ Includes minor landings by trawlers not targeting groundfish ² Includes minor landings made with troll gear ³ The Pacific Fishery Management Council's Groundfish Management Team Bycatch Scorecard (Table 17) contains estimates of mortality from non-groundfish fisheries for species that are managed under rebuilding plans.

⁴ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

⁵ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

⁶ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁷ Amounts in this row are for the area north of 40°10' N. Lat.

Table 17.--Estimated total fishing mortality (mt) of major west coast groundfish species during 2006 and corresponding management reference points (harvest specifications).

	Estimated total fishing mortality (mt)	Management reference points (harvest specifications)			
		Optimum Yield (total catch) (mt)	Mortality % of Optimum Yield	Allowable Biological Catch (mt)	Mortality % of ABC
Target species					
Sablefish	6,470	7,634	85%	8,175	79%
Shortspine thornyhead	853	1,018	84%	1,077	79%
Longspine thornyhead	854	2,461	35%	2,461	35%
Dover sole	7,730	7,564	102.2%	8,589	90%
Petrale sole	2,723	2,762	99%	2,762	99%
English sole	1,336	3,100	43%	3,100	43%
Arrowtooth flounder	3,105	5,800	54%	5,800	54%
Other Flatfish	1,962	4,090	48%	6,781	29%
Blackgill rockfish ¹	123			343	36%
Splitnose rockfish ¹	162	461	35%	615	26%
Other slope rockfish North	283	1,160	24%		
Other slope rockfish South	133				
Other slope S. + blackgill	256	639	40%		
Yellowtail rockfish ²	493	3,681	13%	3,681	13%
Chilipepper rockfish ³	126	2,000	6%	2,700	5%
Other shelf rockfish N	104	968	11%		
Other shelf rockfish S	334	714	47%		
Black rockfish	896	1,276	70%	1,276	70%
Other nearshore rockfish N	96	122	78%		
Other nearshore rockfish S	711	615	116%		
Lingcod	952	2,413	39%	2,716	35%
Cabezon (California only)	106	69	153%	108	98%
Kelp greenling	48				
Pacific hake/whiting	267,707	269,069	99%	518,294	52%
Pacific cod	385	1,600	24%	3,200	12%
Spiny dogfish	1,407				
Longnose+big+Unsp. skate	1,029				
Other groundfish	1,015				
Other groundfish OY group ⁵	3,452	7,300	47%	14,600	24%
Rebuilding species (as of 2005)					
Canary rockfish	57.0	47.1	121%	270	21%
Widow rockfish	213.8	289	74%	3,059	7%
Yelloweye rockfish	12.2	27	45%	55	22%
Bocaccio ³	61.3	308	20%	549	11%
Cowcod ³	1.1	4.2	26%	24	5%
Pacific ocean perch ⁴	80.3	447	18%	934	9%
Darkblotched rockfish	193.3	294	66%	294	66%

¹ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Slope Rockfish category.

² Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Shelf Rockfish category.

³ Amounts in this row are for the area south of 40°10' N. Lat. Northern catch is included in the Other Shelf Rockfish category.

⁴ Amounts in this row are for the area north of 40°10' N. Lat. Southern catch is included in the Other Slope Rockfish category.

⁵ Category includes cabezon, kelp greenling, spiny dogfish, longnose and big skate, and other groundfish.