

# Estimated 2005 Discard and Total Catch of Selected Groundfish Species

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## INTRODUCTION

This report summarizes estimates of 2005 discard and total fishing mortality for selected groundfish species. The report includes an inventory of fishing mortality from all sources, however, analysis conducted for this report focuses on commercial fisheries where NOAA Fisheries has conducted scientific observation of discards. Observations from limited-entry groundfish trawl fisheries, fixed-gear sablefish fisheries, and nearshore fixed-gear groundfish fisheries are used in conjunction with landings records and mortality information obtained from additional sources 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 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 vessels which only fish in the 0-3 mile state territorial zone also carry observers. 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 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.

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 uploaded 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 upon vessel delivery of fish. 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 uploaded to the PacFIN database.

The Groundfish Management Team (GMT) is an advisory body to the Pacific Fishery Management Council. The GMT monitors catch-related information from all sectors of the groundfish fishery, which is provided as needed for this analysis. 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 and first presented to the PFMC at their June 2005 meeting.

## **METHODS**

Discard estimates for each fleet begin 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 trawl logbook data, which provide fishing location and depth information, are not available for the fixed-gear fleets.

### Limited-Entry 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 are obtained from the Pacific Coast Fisheries Information Network (PacFIN) database. 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 2006, available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/rawl/datareportsep2006.cfm>.

First, WCGOP observer data is stratified by area, season, and depth. Trawl logbook data are then stratified in the same manner as the WCGOP observer data. Area strata are defined as north and south of the management line at 40° 10' N. latitude. The northern area is divided into six depth strata (0-50, 51-75, 76-100, 151-200, 201-300, >300 fathoms) and the southern area is divided into six depth strata (0-50, 51-75, 76-100, 151-225, 226-300, >300 fathoms). It should be noted that in 2005, depth-based spatial closures in the LE trawl fishery incorporated depths from 100 to 150 fathoms coast-wide for the entire year. In the northern area and for depths greater than 150 fathoms in the southern area, two seasons are defined by combining two-month cumulative trip limit periods representing winter (January-April and November-December; periods 1+2+6) and summer (May-October; periods 3+4+5). Due to the limited numbers of observations, data are aggregated to an annual level in the three southern depth strata less than 100 fathoms.

The catch of many groundfish species is characterized by a mix of retention and discard throughout most of the strata where they are encountered. For these species, the approach used in this analysis is to estimate discards as a function of retained catch of the individual species or species groups. 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. This 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 calculated for three sets of species: rebuilding species, which are under rebuilding plans and a critical component of bycatch in the context of groundfish fishery management, 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, for the purpose of analysis, 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 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 state and 2-month period.

Logbook data do not provide a complete synopsis of all trawl trips, as logbooks are not submitted for 100% of trips taken. Additionally, for analysis purposes, only logbook records which have a depth or latitude-longitude coordinates recorded are included in the stratum-specific expansions of observed discard. As a result, discard estimates must be expanded to reflect the difference in landed catch reported on fish tickets and that reported in logbooks. The expansion ratio for target species is equal to fish ticket pounds divided by logbook pounds for each state and two-month period. The expansion ratio for rebuilding and other bycatch species is equal to fish ticket pounds of the combined target species divided by logbook pounds for the combined target species. Landings and estimates of discard and total catch are reported in Table 4.

### Fixed-Gear Sablefish Fishery

Fleet-wide discard estimates for the fixed-gear fishery are derived from WCGOP observer data and fish ticket landings data. The observer data used in analysis of this fishery were collected mainly from observations of the LE primary fixed-gear season for sablefish. Fish ticket data are obtained from the Pacific Coast Fisheries Information Network (PacFIN) database. 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 2006, available at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/fixedgear/fixedgearreportsep2006.cfm> and the WCGOP Data Report and Summary Analyses of Non Sablefish-endorsed

Fixed Gear Permits published in October 2006, available at: [http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/fixedgear/fixedgearreport\\_oct2006.cfm](http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/fixedgear/fixedgearreport_oct2006.cfm). The observer program has focused on the primary LE sablefish fishery which takes place from April to the end of October and operates under a tier limit program. In contrast, few vessels (limited-entry or open access) in 2005 were observed under the alternative daily trip limit provisions. Thus, observations of the primary fishery are assumed to be representative of bycatch and discard associated with all fixed-gear sablefish fishing effort.

Stratification of the sablefish fishery is applied for area, gear type, and the area-specific depth zones dictated by fishery management. The sablefish fishery is divided into area strata north and south of the management line at 40° 10' N. latitude. Gear type is divided into longline or pot/trap strata. Because logbooks are not mandatory in this fishery, data associated with the depth of fishing for the entire fleet are not available. However, 2005 fishery management restrained fishing to depths greater than 100 fathoms in the area north of 40° 10' N. latitude and to depths greater than 150 fathoms in the area south of 40° 10' N. latitude. These two depth zones are therefore tied to area strata, but no further depth stratification of fishing effort is possible. Due to the limited number of observations of pot vessels in the southern area, data for the pot sector are combined on a coast-wide basis, for the appropriate depth range in each area.

Sablefish landings and discard estimates are calculated by gear type and area and are summarized in Table 5. 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 release 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 coast-wide fixed-gear sablefish landings are summarized in Table 6.

#### Nearshore Fixed-Gear Groundfish Fishery

Fleet-wide discard estimates in the nearshore (depths < 50 fathoms) 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 Pacific Coast Fisheries Information Network (PacFIN) database. The observer data used in this report were collected aboard open-access vessels in waters less than 50 fathoms. The WCGOP conducted pilot coverage of the nearshore open access fisheries in California and Oregon from August through October 2002. In 2003, California licensed their nearshore state fishery. In 2004, Oregon licensed their nearshore 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. Coverage of observed trips and catch is lower in these fisheries and therefore greater uncertainty in discard estimation should be noted.

The number of observed nearshore open access fixed-gear trips, sets, and associated landed catch in 2005 are summarized by WCGOP port group and gear type in Table 7. Port groups used by the WCGOP for the nearshore open access fixed-gear fisheries are reported in Appendix B. It should be noted that both gear types can be used during a single trip. Table 8 reports the total catch weight of nearshore species or species groups observed on fixed-gear sets in depths shallower than 50 fathoms, stratified by area and depth. The percentage of total species (or group) catch that was discarded is also shown for each stratum.

Table 9 summarizes the calculation of discard mortality for nearshore target species. Landed weights for each species/species group are expanded to total catch estimates, using the retention rate for all depths less than 50 fathoms. Total catch is then distributed among 3 depth intervals (0-10, 11-20, 21-50 fathoms), based on GMT estimates. Within each depth stratum, estimated discard and mortality estimates are calculated by applying observed discard ratios and GMT-assumed rates of discard mortality in sequence. The GMT's assumptions were based on consideration of nearshore rockfish biological attributes and available tagging and mortality studies. Depth-specific discard survival rates are based on GMT review of available data. Amounts of mortality from discard are then summed with estimated retained weights to produce stratum amounts of total mortality. Amounts of retained, discarded, and total catch are summarized over the entire 0-50 fathom depth range, along with estimates of the percentage of total catch that was discarded.

The calculation of discard amounts for rebuilding species is presented in Table 10. Stratum-specific retained amounts of combined target species are summed from Table 9. For purposes of estimating discard of rebuilding species, the target species group includes all nearshore rockfishes, cabezon, and kelp greenling in both areas, with the addition of California sheephead in the southern area. Target species tonnages are multiplied by discard ratios for each rebuilding species. Depth-specific discard survival rates, based on GMT review of available data, are used to calculate amounts of mortality attributable to discards.

#### Other Commercial Data

Fixed-gear landings of groundfish are summarized in Table 11. Limited-entry and open-access totals are provided by area, along with combined-fleet area and coast-wide totals. In Table 12, these landed catches are combined with discard mortality estimates from Tables 10 and 6, providing both area-specific and coast-wide summaries of fixed-gear 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 and motherships (with catcher boats) and a tribal fishery. Each of these fleets is observed by the At-Sea Hake Observer Program. Observer-based estimates of retained and discarded groundfish catch, obtained from NOAA Fisheries NW Regional Office, are presented in Table 13. 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. This permit allows participants to retard fish

degradation, through unloading codends directly into refrigerated tanks, while avoiding penalties for trip-limit overages at the time of landing. This may be described as a “maximum” retention fishery, with 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 13. PacFIN fish ticket records are used to document landings in this fishery.

### Fishing Mortality Summary

A summary of discarded and retained catches by all commercial fleets targeting groundfish is presented in Table 14. Because the tribal hake fishery is observed in the same manner as the commercial at-sea fishery, data from it are included in the “combined hake fisheries” summary. Table 15 summarizes fishing mortality from all sources. Sources not covered by previous tables include: the shoreside tribal hake fishery, recreational fisheries, research, and other commercial fishing where groundfish is not the target. Shoreside tribal amounts were summarized from fish ticket records submitted to PacFIN. The GMT Bycatch Scorecard was used as the source for recreational fishing mortalities for rebuilding species (Table 17). For California and Oregon, amounts of other species were extracted from the Recreational Fisheries Information Network (RecFIN), and include retained catch (A) plus discarded dead (B1). Washington catch estimates were obtained directly from the Washington Department of Fish and Wildlife. The GMT Bycatch Scorecard was also used as the source for research mortality for rebuilding species. Research amounts for other species reflect the catches of the Northwest Fisheries Science Center’s bottom trawl and hake surveys.

## **RESULTS**

In Table 16, total mortality estimates are presented with harvest specification quantities of 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, where OYs and ABCs are specified for northern and southern areas, amounts reflect coast-wide summation of the harvest specifications. Where applicable, adjoining columns indicate the percentage which each fishing mortality represents of the corresponding OY or ABC.

In three instances, estimated 2005 fishing mortality exceeded the specified OY. Canary rockfish mortality was roughly 2 mt (4%) higher than its rebuilding OY. Dover sole and petrale sole mortalities exceeded their OYs by larger amounts (31 mt and 4 mt, respectively), but much smaller percentages (0.4% and 0.1%, respectively). Because the petrale sole OY was equal to its ABC, fishing mortality also exceeded the ABC by 0.1%. In no other instance did fishing mortality exceed an ABC. With the exception of canary rockfish, fishing mortalities for other rebuilding species did not represent more than 70% of their rebuilding OYs, with an average of 43%.

## **CONCLUSIONS**

WCGOP observer data are used in conjunction with information from additional sources to estimate total levels of fishing mortality for major groundfish species. Estimated 2005 fishing mortalities for the species or species groups analyzed were less than their specified ABCs in all cases except that of petrale sole, where fishing mortality exceeded the 2,762 mt ABC (and OY) by 4 mt (0.1%). When comparing mortality estimates to management targets such as OY or ABC, it should be recognized that considerable uncertainty may be associated with discard estimates and assumptions from fisheries with partial or no at-sea observations.

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Table 1. --Number of 2005 limited-entry trawl tows and retained target species poundage in trawl logbook records and observed by the West Coast Groundfish Observer Program, by depth interval, area and season.

Depth intervals <sup>3</sup> (fathoms)	North of 40°10' N. Lat.				Depth intervals <sup>3</sup> (fathoms)	South of 40°10' N. Lat.			
	Number of tows		Retained mts of target species <sup>2</sup>			Number of tows		Retained mts of target species <sup>2</sup>	
	Winter <sup>1</sup>	Summer <sup>1</sup>	Winter <sup>1</sup>	Summer <sup>1</sup>		Winter <sup>1</sup>	Summer <sup>1</sup>	Winter <sup>1</sup>	Summer <sup>1</sup>
Observed fleet									
0-50	22	367	10.6	237.0	0-50	123		36.9	
51-75	117	670	63.9	663.3	51-75	85		38.7	
76-100	114	489	103.3	588.3	76-100	34		16.6	
151-200	183	0	341.9	0	151-225	57	34	66.5	50.1
201-300	387	303	882.9	374.5	226-300	70	47	153.3	73.2
>300	138	147	216.6	197.2	>300	73	82	128.3	134.6
All trawl logbooks									
0-50	137	1,900	59.6	1,059.8	0-50	1,351		84.2	
51-75	491	3,327	291.6	2,993.6	51-75	329		180.1	
76-100	246	2,184	224.1	2,348.5	76-100	260		181.1	
151-200	696	0	1,150.6	0	151-225	189	131	200.7	148.5
201-300	1,621	1,162	3,473.4	1,743.4	226-300	203	255	314.5	414.0
>300	541	543	888.9	684.0	>300	408	333	622.6	468.4
Observed percentage									
0-50	16%	19%	18%	22%	0-50	9% <sup>4</sup>		44%	
51-75	24%	20%	22%	22%	51-75	26%		22%	
76-100	46%	22%	46%	25%	76-100	13%		9%	
151-200	26%	na	30%	na	151-225	30%	26%	33%	34%
201-300	24%	26%	25%	21%	226-300	34%	18%	49%	18%
>300	26%	27%	24%	29%	>300	18%	25%	21%	29%

<sup>1</sup> 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 are combined for depth strata shallower than 100 fm in the area south of 40° 10' N. Lat..

<sup>2</sup> 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.

<sup>3</sup> Depths between 100 and 150 fm were closed coastwide throughout the year.

<sup>4</sup> Coverage of tows is substantially below that of tonnage, due to over 1,000 logbook tows with less than 100 lb of retained groundfish

Table 2a.--Discard ratios for major west coast bycatch and target species, by area, depth interval, and season, based on trawl tows observed during 2005 by the West Coast Groundfish Observer Program.

Species	Season <sup>1</sup>	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals <sup>3</sup> (fathoms)						Depth intervals <sup>3</sup> (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-225	226-300	>300
<b>Rebuilding species</b>													
(Ratio of species pounds discarded to total target species <sup>2</sup> pounds retained)													
Lingcod	Winter	0.00324	0.01054	0.02905	0.00718	0	0	0.02106	0.05370	0.00373	0.00015	0	0
	Summer	0.02136	0.05610	0.06484	0	0.00004	0				0.03190	0	0
Canary	Winter	0.00055	0.00071	0.00378	0.00003	0	0	0	0	0.00022	0	0	0
rockfish	Summer	0.00139	0.00283	0.00440	0	0.00002	0				0.00003	0	0
Widow	Winter	0	0.00002	0	0.00209	0	0	0	0.00018	0	0	0	0
rockfish	Summer	0.00000	0.00000	0.00011	0	0.00002	0				0.00083	0	0
Yelloweye	Winter	0	0.00000	0.00003	0.00007	0	0	0	0	0	0	0	0
rockfish	Summer	0.00013	0.00005	0.00010	0	0	0				0	0	0
Bocaccio <sup>4</sup>	Winter	na	na	na	na	na	na	0.00272	0.01675	0.07413	0.00021	0	0
	Summer	na	na	na	na	na	na				0.04613	0	0
Cowcod <sup>4</sup>	Winter	na	na	na	na	na	na	0.00000	0.00076	0.00558	0	0	0
	Summer	na	na	na	na	na	na				0.00045	0	0
Pacific ocean	Winter	0	0	0.00000	0.00519	0.00006	0	na	na	na	na	na	na
perch <sup>5</sup>	Summer	0	0.00001	0.00099	0	0.00065	0				na	na	na
Darkblotched	Winter	0	0.00006	0.00238	0.01020	0.00041	0.00011	0	0	0	0.00004	0	0
rockfish	Summer	0.00001	0.00059	0.00137	0	0.00100	0				0.00508	0	0

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons are combined for depth strata shallower than 100 fm in the area south of 40°10'.

<sup>2</sup> 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.

<sup>3</sup> Depths between 100 and 150 fm were closed coastwide throughout the year.

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

<sup>5</sup> 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 major west coast bycatch and target species, by area, depth interval, and season, based on trawl tows observed during 2005 by the West Coast Groundfish Observer Program.

Species	Season <sup>1</sup>	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals <sup>2</sup> (fathoms)						Depth intervals <sup>2</sup> (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-225	226-300	>300
<b>Target species</b>													
(Ratio of each species' discarded-to-retained pounds)													
Sablefish	Winter	14.067	0.806	3.472	0.691	0.242	0.229	0.000	0.474	0.323	0.137	0.189	0.337
	Summer	4.171	0.680	0.178		0.057	0.191				0.026	0.226	0.164
Shortspine thornyhead	Winter	0	0	0.065	0.370	0.190	0.260	0.000	0.000	0.000	0.121	0.241	0.307
	Summer	0	0.009	0.052		0.298	0.351				0.133	0.468	0.192
Longspine thornyhead	Winter	0	0	0	0.012	0.390	0.166	0.000	0.000	0.000	0.077	0.183	0.069
	Summer	0	0.005	1.912		1.147	0.154				0.006	0.263	0.077
Dover sole	Winter	6.327	0.112	0.077	0.192	0.026	0.085	0.000	0.000	0.000	0.739	0.055	0.023
	Summer	0.282	0.165	0.097		0.158	0.273				0.066	0.081	0.150
Petrale sole	Winter	0.307	0.030	0.080	0.002	0.023	0.014	0.006	0.010	0.014	0.003	0.000	0
	Summer	0.019	0.036	0.034		0.011	0				0.014	3.317	0
English sole	Winter	0.131	0.228	0.141	0.358	0.101	0.004	0.722	0.860	1.323	0.039	0.128	0
	Summer	0.447	0.384	0.235		0.066	0				0.178	0	0
Arrowtooth flounder	Winter	0.368	1.798	0.910	0.239	0.241	0.121	0.000	0.000	0.000	59.134	1.867	28.217
	Summer	0.795	1.005	1.004		0.151	0.246				0.424	0	0
Other flatfish	Winter	0.077	0.344	0.733	0.203	0.242	0.366	0.520	0.882	1.228	0.309	0.034	0.548
	Summer	0.711	1.369	1.821		0.085	0.323				0.209	0.405	3.931
Blackgill rockfish <sup>3</sup>	Winter	na	na	na	na	na	na	0.000	0.000	0.000	0.421	0.006	0.008
	Summer	na	na	na	na	na	na				0	0	0
Splitnose rockfish <sup>3</sup>	Winter	na	na	na	na	na	na	0.000	0.000	0.000	1.025	0.339	0
	Summer	na	na	na	na	na	na				2.275	6.228	1.929
Other slope rockfish	Winter	0	0	0	0.663	0.167	0.123	0.000	0.000	0.000	0.156	0.098	0.032
	Summer	0.004	1.245	0.535		0.070	0.018				0.013	0.043	0.200
Yellowtail rockfish <sup>4</sup>	Winter	0	0.243	2.247	11.083	0.682	0	na	na	na	na	na	na
	Summer	0.274	1.177	0.989		7.080	0				na	na	na
Chilipepper rockfish <sup>5</sup>	Winter	na	na	na	na	na	na	0.125	9.414	26.539	0.327	0	0
	Summer	na	na	na	na	na	na				0.021	0	0
Pacific cod	Winter	0.002	0.000	0.003	0.027	0	0	0.000	0.000	0.000	0	0	0
	Summer	0.007	0.009	0.005	0	0	0				0	0	0
Unspecified skate	Winter	0.122	0.193	0.055	0.043	0.128	0.716	0.705	0.161	0.332	0.051	0.034	12.151
	Summer	0.286	0.229	0.070	0	0.025	1.277				0.025	0	0

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons are combined for depth strata shallower than 100 fm in the area south of 40°10'. <sup>2</sup> Depths between 100 and 150 fm were closed coastwide throughout the year.

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

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

<sup>5</sup> 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 major west coast bycatch and target species, by area, depth interval, and season, based on trawl tows observed during 2005 by the West Coast Groundfish Observer Program.

Species	Season <sup>1</sup>	North of 40°10' N. Lat.						South of 40°10' N. Lat.						
		Depth intervals <sup>3</sup> (fathoms)						Depth intervals <sup>3</sup> (fathoms)						
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-225	226-300	>300	
<b>Other species</b>														
(Ratio of species pounds discarded to total target species <sup>2</sup> pounds retained)														
Shortbelly rockfish	Winter	0	0	0	0	0	0	0.00000	0.00137	0.00191	0.00074	0	0	
	Summer	0	0	0.00000		0	0				0.00139	0	0	
Chilipepper <sup>4</sup> rockfish	Winter	na	na	na	na	na	na	0.00026	0.16524	0.40124	0.00109	0	0	
	Summer	na	na	na	na	na	na				0.00210	0	0	
Other shelf rockfish	Winter	0	0.00180	0.03252	0.00106	0.00015	0.00003	0.00119	0.01172	0.01416	0.00165	0.00000	0	
	Summer	0.00036	0.00732	0.01738		0.00093	0				0.00194	0	0	
Black rockfish	Winter	0	0	0	0	0	0	0.00000	0.00000	0.00000	0	0	0	
	Summer	0.00056	0	0		0	0				0	0	0	
Other near-shore rockfish	Winter	0	0	0	0	0	0	0.00000	0.00000	0.00105	0	0	0	
	Summer	0.00004	0.00001	0		0	0				0	0	0	
Pacific hake	Winter	0.00006	0.00073	0.00245	0.10975	0.04118	0.02014	0.23229	0.16169	0.18522	0.19601	0.08916	0.00697	
	Summer	0.07532	0.03403	0.00466		0.04872	0.01172				0.06644	0.03827	0.00322	
Spiny dogfish	Winter	0.00682	0.03007	0.18280	0.05617	0.00732	0.00153	0.02184	0.02768	0.01460	0.01495	0.00140	0.00017	
	Summer	0.09742	0.12030	0.12603		0.01357	0.00009				0.58108	0.01618	0	
Big skate	Winter	0.00155	0.01455	0.01041	0.00006	0.00094	0.00009	0.01405	0.01028	0.00939	0	0	0.00009	
	Summer	0.03955	0.01421	0.00203		0.00188	0.00062				0	0	0	
Longnose skate	Winter	0.00200	0.03501	0.04004	0.01752	0.01455	0.00366	0.02975	0.18286	0.22085	0.18437	0.04004	0.01611	
	Summer	0.06336	0.04241	0.03500		0.02391	0.00373				0.03500	0.08426	0.01360	
Other groundfish	Winter	0.03928	0.06875	0.15695	0.04657	0.04744	0.09879	0.17082	0.25428	0.28769	0.13943	0.03923	0.06144	
	Summer	0.08283	0.07337	0.08951		0.11187	0.15681				0.05743	0.03608	0.07875	
Dungeness crab	Winter	0.05781	0.09436	0.01357	0.00037	0.00001	0.00005	0.08277	0.03939	0.02259	0.00033	0	0	
	Summer	0.07236	0.02548	0.01591		0.00030	0.00001				0.00021	0	0	
Tanner crab	Winter	0	0	0	0.00019	0.00557	0.04261	0.00000	0.00013	0.00000	0.00618	0.01688	0.08577	
	Summer	0	0.00002	0.00000		0.01358	0.07649				0.00007	0.00176	0.07518	

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons are combined for depth strata shallower than 100 fm in the area south of 40°10'.

<sup>2</sup> 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. <sup>3</sup> Depths between 100 and 150 fm were closed coastwide throughout the year.

<sup>4</sup> 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 trawl tows observed during 2005 by the West Coast Groundfish Observer Program.

Species	Season <sup>1</sup>	North of 40°10' N. Lat.						South of 40°10' N. Lat.					
		Depth intervals <sup>3</sup> (fathoms)						Depth intervals <sup>3</sup> (fathoms)					
		0-50	51-75	76-100	151-200	201-300	>300	0-50	51-75	76-100	151-225	226-300	>300
<b>Rebuilding species</b>													
(Ratio of species pounds retained+discarded to total target species <sup>2</sup> pounds retained)													
Lingcod	Winter	0.00661	0.02248	0.03384	0.01058	0	0	0.02222	0.06539	0.00894	0.00671	0	0
	Summer	0.02741	0.06525	0.06968		0.00015	0				0.04061	0	0
Canary rockfish	Winter	0.00055	0.00166	0.00459	0.00003	0	0	0.00016	0.00119	0.00022	0	0	0
	Summer	0.00237	0.00361	0.00556		0.00002	0				0.00006	0	0
Widow rockfish	Winter	0	0.00004	0.00001	0.00218	0	0	0.00000	0.00018	0	0	0	0
	Summer	0.00001	0.00000	0.00012		0.00004	0				0.00083	0	0
Yelloweye rockfish	Winter	0	0.00000	0.00003	0.00007	0	0	0.00000	0.00000	0	0	0	0
	Summer	0.00014	0.00012	0.00012		0	0				0	0	0
Bocaccio <sup>4</sup>	Winter	na	na	na	na	na	na	0.00272	0.01675	0.07413	0.00021	0	0
	Summer	na	na	na	na	na	na				0.04626	0	0
Cowcod <sup>4</sup>	Winter	na	na	na	na	na	na	0.00000	0.00076	0.00558	0	0	0
	Summer	na	na	na	na	na	na				0.00045	0	0
Pacific ocean perch <sup>5</sup>	Winter	0	0.00000	0.00020	0.01511	0.00425	0.00106	na	na	na	na	na	na
	Summer	0.00001	0.00026	0.00398		0.01303	0.00091				na	na	na
Darkblotched rockfish	Winter	0	0.00006	0.00343	0.02303	0.00454	0.00911	0	0.00001	0	0.00233	0.00477	0.000891
	Summer	0.00071	0.00088	0.00478		0.01625	0.00281				0.02305	0.003	0.008071

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5. Seasons are combined for depth strata shallower than 100 fm in the area south of 40°10'.

<sup>2</sup> 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. <sup>3</sup> Depths between 100 and 150 fm were closed coastwide throughout the year.

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

<sup>5</sup> 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-whiting<sup>1</sup>, commercial groundfish trawls targeting groundfish during 2005.

	Landed catch (mt)			Estimated discard (mt)			Estimated total catch (mt)		
	North of 40°10'	South of 40°10'	Total	North of 40°10'	South of 40°10'	Total	North of 40°10'	South of 40°10'	Total
Sablefish mortality <sup>2</sup>	1,834	456	2,291	213	49	262	2,047	505	2,553
Shortspine thornyhead	348	146	494	93	40	133	441	186	627
Longspine thornyhead	280	351	631	63	29	92	343	380	723
Dover sole	5,493	1,177	6,671	545	111	656	6,039	1,288	7,327
Petrale sole	2,303	372	2,675	51	4	55	2,354	376	2,730
English sole	780	67	847	249	53	302	1,029	120	1,149
Arrowtooth flounder	2,050	2	2,052	1,394	4	1,397	3,443	6	3,450
Other Flatfish	854	228	1,081	589	142	731	1,443	370	1,813
Blackgill rockfish <sup>3</sup>	na	51	51	na	2	2	na	53	53
Splitnose rockfish <sup>3</sup>	na	86	86	na	144	144	na	230	230
Other slope rockfish	85	59	144	22	5	27	107	64	171
Yellowtail rockfish <sup>4</sup>	27	na	27	29	na	29	56	na	56
Chilipepper rockfish <sup>5</sup>	na	24	24	na	52	52	na	76	76
Other shelf rockfish	11	5	16	75	6	81	86	11	97
Black rockfish	0	0	0	1	0	1	1	0	1
Other nearshore rockfish	0	0	0	0	0	0	0	0	1
Pacific hake/whiting	4	0	4	613	210	822	617	210	826
Pacific cod	722	0	722	4	0	4	726	0	726
Spiny dogfish	126	0	126	943	125	1,067	1,069	125	1,194
Unspecified skate	840	18	858	134	4	138	975	21	996
Big skate	0	0	0	105	6	111	105	6	111
Longnose skate	0	0	0	426	211	637	427	211	637
Big+longnose+Unsp. skate	840	18	858	666	220	886	1,506	238	1,744
Shortbelly rockfish	0	0	0	0	1	1	0	1	1
Other groundfish	72	36	108	1,231	294	1,524	1,303	329	1,632
Dungeness crab				233	21	254	233	21	254
Tanner crab				141	111	252	141	111	252
Lingcod mortality <sup>2</sup>	63	10	73	182	10	192	244	20	264
Canary rockfish	3.7	0.7	4.4	21.5	0.1	21.6	25.2	0.7	26.0
Widow rockfish	0.2	2.7	3.0	3.2	0.2	3.3	3.4	2.9	6.3
Yelloweye rockfish	0.2	0.0	0.2	0.6	0.0	0.6	0.8	0.0	0.8
Bocaccio <sup>5</sup>	na	1.6	1.6	na	27.7	27.7	na	29.3	29.3
Cowcod <sup>5</sup>	na	0.0	0.0	na	1.4	1.4	na	1.4	1.4
Pacific ocean perch <sup>6</sup>	56.9	na	56.9	10.8	na	10.8	67.7	na	67.7
Darkblotched rockfish	66.9	9.8	76.7	22.8	0.9	23.7	89.7	10.7	100.4

<sup>1</sup> includes only landings with less than 2 mt of Pacific hake/whiting.

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

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

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

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

<sup>6</sup> 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 fixed-gear sablefish landings north of 36° N. Lat. during 2005.

	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	
<b>Sablefish</b>					
Observed sets used for discard ratios in each depth range <sup>1</sup>					
number of sets	35	457	618	490	
observed sablefish catch (mt)	30	286	516	326	
Total landings (mt)	<b>311</b>	<b>262</b>	<b>1,774</b>	<b>723</b>	<b>3,069</b>
Area percent, by gear	54%	46%	71%	29%	
Coast-wide percent, by gear/area	10%	9%	58%	24%	
Observed sablefish discard ratio <sup>4</sup>	9.7%	17.4%	12.8%	16.3%	13.7%
Total estimated discard	30	46	228	118	421
Estimated discard mortality <sup>2</sup> (mt)	6	9	46	24	84
Estimated total mortality	<b>317</b>	<b>271</b>	<b>1,819</b>	<b>746</b>	<b>3,153</b>
<b>Rebuilding species discard ratios <sup>3</sup></b>					
Lingcod	0.000337	0.000295	0.005211	0.001545	
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	0	0	
Cowcod rockfish	0	0	0	0	
Pacific ocean perch	0	0	0.000158	0	
Darkblotched rockfish	0.000085	0.000175	0.000209	0.000152	
<b>Other species discard ratios <sup>3</sup></b>					
Pacific whiting/hake	0	0.000096	0.000291	0.000084	
Shortspine thornyhead	0.000283	0.000081	0.000546	0.000070	
Longspine thornyhead	0.000127	0.000014	0	0.000012	
Dover sole	0.003206	0.000615	0.001195	0.000580	
Arrowtooth flounder	0	0.002723	0.045180	0.002455	
Petrale sole	0	0	0.000024	0	
English sole	0	0	0	0	
Other flatfish	0	0.000009	0.000007	0.000008	
Yellowtail rockfish	0	0	0.000230	0	
Chilipepper rockfish	0	0	0	0	
Other shelf rockfish	0.000035	0.000086	0.007931	0.000106	
Blackgill rockfish	0.001335	0	0	0	
Splitnose rockfish	0	0	0	0	
Other slope rockfish	0.000139	0.000198	0.009848	0.000172	
Pacific cod	0	0.000011	0.001275	0.000010	
Spiny dogfish	0.067127	0.000245	0.072411	0.000352	
Longnose skate	0.035468	0	0.024401	0	
Big skate	0.000209	0	0.025584	0	
Unspecified skate	0.000758	0	0.010592	0	
Other groundfish	0.003264	0.001821	0.003490	0.001586	
Dungeness crab	0.000000	0.001009	0.000007	0.001305	
Tanner crab	0.000212	0.009572	0.000050	0.008335	

<sup>1</sup> Due to the limited number of pot-gear observations south of Cape Mendocino, data for the pot sector have been pooled on a coast-wide basis for the appropriate depth strata. The total number of pot sets observed coastwide was 490, of which 33 were between 100 and 150 fm.

<sup>2</sup> As assumed by the PFMC's Groundfish Management Team, the rate of mortality for discarded sablefish in the fixed-gear fishery is assumed to be 20%.

<sup>3</sup> 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 2005 from trips targeting sablefish.

<sup>4</sup> Sablefish discard ratio = 100 \* discard lb / retained lb.

Table 6.--Estimated discard of groundfish species associated with coast-wide, fixed-gear sablefish landings during 2005.

	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	
<b>Estimated discard of rebuilding species (mt)</b>							
Lingcod	0.1	0.1	<b>0.2</b>	9.2	1.1	<b>10.4</b>	<b>10.5</b>
Canary rockfish	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
Widow rockfish	0.0	0.0	<b>0.0</b>	0.8	0.0	<b>0.8</b>	<b>0.8</b>
Yelloweye rockfish	0.0	0.0	<b>0.0</b>	0.8	0.0	<b>0.8</b>	<b>0.8</b>
Bocaccio rockfish <sup>1</sup>	0.0	0.0	<b>0.0</b>	na	na	na	<b>0.0</b>
Cowcod rockfish <sup>1</sup>	0.0	0.0	<b>0.0</b>	na	na	na	<b>0.0</b>
Pacific ocean perch <sup>2</sup>	na	na	na	0.3	0.0	<b>0.3</b>	<b>0.3</b>
Darkblotched rockfish	0.0	0.0	<b>0.1</b>	0.4	0.1	<b>0.5</b>	<b>0.6</b>
<b>Estimated discard of other species (mt)</b>							
Pacific whiting/hake	0.0	0.0	<b>0.0</b>	0.5	0.1	<b>0.6</b>	<b>0.6</b>
Shortspine thornyhead	0.1	0.0	<b>0.1</b>	1.0	0.1	<b>1.0</b>	<b>1.1</b>
Longspine thornyhead	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.1</b>
Dover sole	1.0	0.2	<b>1.2</b>	2.1	0.4	<b>2.5</b>	<b>3.7</b>
Arrowtooth flounder	0.0	0.7	<b>0.7</b>	80.1	1.8	<b>81.9</b>	<b>82.6</b>
Petrale sole	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
English sole	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
Other flatfish	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
Yellowtail rockfish <sup>3</sup>	na	na	na	0.4	0.0	<b>0.4</b>	<b>0.4</b>
Chilipepper rockfish <sup>1</sup>	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
Other shelf rockfish	0.0	0.0	<b>0.0</b>	14.1	0.1	<b>14.1</b>	<b>14.2</b>
Blackgill rockfish <sup>4</sup>	0.4	0.0	<b>0.4</b>	na	na	na	<b>0.4</b>
Splitnose rockfish <sup>4</sup>	0.0	0.0	<b>0.0</b>	na	na	na	<b>0.0</b>
Other slope rockfish	0.0	0.1	<b>0.1</b>	17.5	0.1	<b>17.6</b>	<b>17.7</b>
Pacific cod	0.0	0.0	<b>0.0</b>	2.3	0.0	<b>2.3</b>	<b>2.3</b>
Spiny dogfish	20.9	0.1	<b>20.9</b>	128.4	0.3	<b>128.7</b>	<b>149.6</b>
Longnose skate	11.0	0.0	<b>11.0</b>	43.3	0.0	<b>43.3</b>	<b>54.3</b>
Big skate	0.1	0.0	<b>0.1</b>	45.4	0.0	<b>45.4</b>	<b>45.4</b>
Unspecified skate	0.2	0.0	<b>0.2</b>	18.8	0.0	<b>18.8</b>	<b>19.0</b>
Other groundfish	1.0	0.5	<b>1.5</b>	6.2	1.1	<b>7.3</b>	<b>8.8</b>
Dungeness crab	0.0	0.3	<b>0.3</b>	0.0	0.9	<b>1.0</b>	<b>1.2</b>
Tanner crab	0.1	2.5	<b>2.6</b>	0.1	6.0	<b>6.1</b>	<b>8.7</b>

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

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

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

<sup>4</sup> 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.--Number of open-access, fixed-gear trips and sets, with associated landed tonnage, observed in depths less than 50 fm during 2005 by the West Coast Groundfish Observer Program (WCGOP), by port group and gear.

WCGOP Port Group	Hook and Line			Pot		
	Number of trips	Number of sets	Retained weight (mt)	Number of trips	Number of sets	Retained weight (mt)
Astoria	28	32	1.9			
S Oregon	100	125	9.8			
Crescent City	61	78	10.1			
Fort Bragg	14	20	0.6	1	1	*
Monterey	41	47	2.1	2	2	*
Morro Bay	23	33	0.7			
Santa Barbara						
Los Angeles	15	16	1.0	20	26	*
ALL PORTS	282	351	26.1	23	29	1.7

Note: Since both gear groups were used on some trips, the total number of observed trips is less than the sum of the numbers shown for each gear group in this table.

\* Data not reported because of confidentiality issues.

Table 8.--Catch weights and discard percentages for target and rebuilding species, by area and depth, from nearshore, open-access, fixed-gear sets observed in depths less than 50 fm during 2005 by the West Coast Groundfish Observer Program.

Area Species	0 - 10 fm		11 - 20 fm		21 - 50 fm		Less than 50 fm	
	Total lbs	Discard % <sup>1</sup>	Total lbs	Discard % <sup>1</sup>	Total lbs	Discard % <sup>1</sup>	Total lbs	Discard % <sup>1</sup>
<b>South of 40°10' N. Lat.</b>								
Target species								
Shallow nearshore species <sup>2</sup>	1,102	18%	336	32%	56	100%	1,494	24%
Deeper nearshore species <sup>3</sup>	702	16%	1,211	20%	141	100%	2,054	24%
Black rockfish	231	8%	315	5%			546	7%
Cabazon	1,230	49%	101	100%	6	100%	1,337	54%
Kelp Greenling	132	53%	25	100%			157	61%
California Sheephead	1,929	28%	4,103	39%			6,032	36%
Rebuilding species								
Bocaccio Rockfish					36	0%	36	0%
Canary Rockfish	12	100%	28	100%	56	100%	96	100%
Widow Rockfish			2	0%			2	0%
Yelloweye Rockfish			10	100%	12	100%	22	100%
Lingcod	1,082	34%	1,249	48%	33	84%	2,364	42%
<b>North of 40°10' N. Lat.</b>								
Target species								
Black Rockfish	15,946	2%	11,888	4%	464	5%	28,298	3%
Blue Rockfish	2,624	14%	3,704	18%	140	4%	6,468	16%
Other minor nearshore rockfish	275	4%	1,094	5%	539	0%	1,908	3%
Cabazon	1,087	11%	3,781	5%	166	0%	5,034	6%
Kelp Greenling	776	35%	1,906	22%	12	37%	2,694	26%
Rebuilding species								
Canary Rockfish	64	100%	210	100%	104	100%	378	100%
Widow Rockfish			45	21%	6	0%	51	18%
Yelloweye Rockfish			73	100%	143	100%	216	100%
Lingcod	2,964	53%	5,880	45%	785	8%	9,629	44%

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

<sup>2</sup> Includes black and yellow rockfish, kelp rockfish, grass rockfish, gopher rockfish, china rockfish, California scorpionfish.

<sup>3</sup> Includes blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, treefish.

Table 9.--Estimated fixed-gear discard mortality for nearshore target species, derived using discard observations from the West Coast Groundfish Observer Program, 2005 landed catches, and the Groundfish Management Team nearshore model.

Area Species	0 - 50 fm			0 - 10 fm							11 - 20 fm						
				stratum % of 0-50 fm catch	est. stratum catch mt	estimated stratum discard mt	mortality rate & weight of discards		retained + discard mortality mt	stratum % of 0-50 fm catch	est. stratum catch mt	estimated stratum discard mt	mortality rate & weight of discards		retained + discard mortality mt		
	landed mt	retention rate	catch mt	mt	%	mt	%	mt	mt	mt	%	mt	%	mt	mt		
South of 40°10' N. Lat.																	
Shallow nearshore species	34	76%	45	81%	36	18%	7	15%	1.0	31	18%	8	32%	3	45%	1.1	7
Black Rockfish	4	93%	4	47%	2	8%	0	10%	0.0	2	50%	2	5%	0	40%	0.0	2
Deeper nearshore species	44	76%	58	43%	25	16%	4	10%	0.4	21	53%	31	20%	6	40%	2.5	27
Cabazon	28	46%	59	97%	58	49%	28	7%	2.0	31	2%	1	100%	1	7%	0.1	0
Kelp Greenling	1	39%	4	98%	4	53%	2	7%	0.1	2	1%	0	100%	0	7%	0.0	0
California Sheephead	39	65%	61	81%	50	29%	14	15%	2.1	38	18%	11	39%	4	45%	1.9	8
All nearshore groundfish	151	65%	231	75%	175	24%	41	14%	5.7	139	23%	53	19%	10	55%	5.6	49
North of 40°10' N. Lat.																	
Black Rockfish	167	97%	172	47%	81	2%	2	10%	0.2	80	50%	87	4%	3	40%	1.4	84
Blue Rockfish	18	84%	22	26%	6	14%	1	10%	0.1	5	69%	15	18%	3	40%	1.1	13
Other minor nearshore rockfish	17	100%	17	55%	9	4%	0	20%	0.1	9	35%	6	5%	0	50%	0.1	6
Cabazon	32	94%	34	36%	12	11%	1	7%	0.1	11	60%	21	5%	1	7%	0.1	20
Kelp Greenling	21	74%	29	37%	11	35%	4	7%	0.3	7	59%	17	22%	4	7%	0.3	14
All nearshore groundfish	255.11	94%	271	44%	119	7%	8	9%	0.7	112	53%	145	8%	11	26%	2.9	137

Area Species	21 - 50 fm							0 - 50 fm				
	stratum % of 0-50 fm catch	est. stratum catch mt	estimated stratum discard		mortality rate & weight of discards		retained + discard mortality mt	mortality from:			discard as a percentage of total mortality	
			mt	%	mt	%		mt	retained catch mt	discarded catch mt		total mt
South of 40°10' N. Lat.												
Shallow nearshore species	1%	0	100%	0.5	100%	0.5	0	34	2.6	36.6	7.0%	
Black Rockfish	2%	0	0%	0.0	100%	0.0	0	4	0.1	3.9	1.5%	
Deeper nearshore species	4%	2	100%	2.3	100%	2.3	2	44	5.2	49.6	10.5%	
Cabazon	0%	0	100%	0.2	7%	0.0	0	28	2.1	29.6	7.1%	
Kelp Greenling	1%	0	0%	0.0	7%	0.0	0	1	0.1	1.6	8.7%	
California Sheephead	1%	1	0%	0.0	100%	0.0	1	39	4.0	43.4	9.2%	
All nearshore groundfish	1%	3	96%	3.0	95%	2.8	3	151	14.1	164.8	8.6%	
North of 40°10' N. Lat.												
Black Rockfish	2%	4	5%	0.2	100%	0.2	4	167	1.7	168.4	1.0%	
Blue Rockfish	5%	1	4%	0.0	100%	0.0	1	18	1.2	19.5	6.2%	
Other minor nearshore rockfish	10%	2	0%	0.0	100%	0.0	2	17	0.2	17.0	1.3%	
Cabazon	4%	2	0%	0.0	7%	0.0	2	32	0.2	32.4	0.5%	
Kelp Greenling	3%	1	37%	0.3	7%	0.0	1	21	0.5	21.8	2.5%	
All nearshore groundfish	3%	9	6%	0.6	46%	0.3	9	255	3.9	259.0	1.5%	

Note: The model uses discard and retention percentages reported by the West Coast Groundfish Observer Program from data collected during 2005.

Table 10.--Estimated mortality of rebuilding species from fixed-gear fishing in depths shallower than 50 fm, based on Groundfish Management Team nearshore bycatch model.

	Depth intervals (fm)			Catch and discard weights (mt)			
	0 - 10	11-20	21 - 50	Depth intervals (fm)			
				0 - 10	11-20	21 - 50	0 - 50
<b>South of 40°10' N. Lat.</b>							
Number of observed sets	87	49	9				
Landed nearshore mt	133	43	0.1				
Rebuilding species	<i>Bycatch rates</i> <sup>1</sup>						
Canary	0.38%	0.86%	0.86%	0.50	0.37	0.00	0.87
disc. mort. (%:mt)	10%	55%	100%	0.05	0.20	0.00	<b>0.25</b>
Bocaccio							
catch (%:mt)	0.00%	0.17%	0.17%	0.00	0.07	0.00	0.07
landed (%:mt)	0%	0%	100%	0.00	0.00	0.00	0.00
discard (%:mt)	100%	100%	0%	0.00	0.07	0.00	0.07
disc. mort. (%:mt)	10%	55%	100%	0.00	0.04	0.00	0.04
total mortality				0.00	0.04	0.00	<b>0.04</b>
Widow							
catch (%:mt)	0.00%	0.04%	0.04%	0.00	0.02	0.00	0.02
landed (%:mt)	58%	44%	55%	0.00	0.01	0.00	0.01
discard (%:mt)	42%	56%	45%	0.00	0.01	0.00	0.01
disc. mort. (%:mt)	100%	100%	100%	0.00	0.01	0.00	0.01
total mortality				0.00	0.02	0.00	<b>0.02</b>
Yelloweye	0.00%	0.26%	0.26%	0.00	0.00	0.00	0.00
disc. mort. (%:mt)	50%	90%	100%	0.00	0.00	0.00	<b>0.00</b>
Lingcod							
catch (%:mt)	35.35%	26.08%	26.08%	47.19	11.19	0.03	58.40
landed (%:mt)	66%	52%	16%	31.14	5.82	0.00	36.97
discard (%:mt)	34%	48%	84%	16.04	5.37	0.03	21.44
disc. mort. (%:mt)	7%	7%	7%	1.12	0.38	0.00	1.50
total mortality				32.27	6.19	0.01	<b>38.47</b>
<b>North of 40°10' N. Lat.</b>							
Number of observed sets	103	120	12				
Fleet landed target mt	111	134	9				
Rebuilding species	<i>Bycatch rates</i> <sup>1</sup>						
Canary rockfish	0.39%	1.85%	1.85%	0.43	2.47	0.16	3.06
disc. mort. (%:mt)	10%	55%	100%	0.04	1.36	0.16	<b>1.56</b>
Yelloweye	0.00%	1.21%	1.21%	0.00	1.62	0.10	1.73
disc. mort. (%:mt)	50%	90%	100%	0.00	1.46	0.10	<b>1.57</b>
Widow rockfish							
catch (%:mt)	0.00%	0.31%	0.31%	0.00	0.41	0.03	0.44
landed (%:mt)	0%	79%	100%	0.00	0.33	0.03	0.35
discard (%:mt)	100%	21%	0%	0.00	0.09	0.00	0.09
disc. mort. (%:mt)	100%	100%	100%	0.00	0.09	0.00	0.09
total mortality				0.00	0.41	0.03	<b>0.44</b>
Lingcod							
catch (%:mt)	17.78%	40.45%	40.45%	19.76	54.10	3.49	77.36
landed (%:mt)	47%	55%	92%	9.29	29.76	3.21	42.26
discard (%:mt)	53%	45%	8%	10.47	24.35	0.28	35.10
disc. mort. (%:mt)	7%	7%	7%	0.73	1.70	0.02	2.46
total mortality				10.02	31.46	3.23	<b>44.72</b>

<sup>1</sup> Bycatch rates for rebuilding species = (retained + discard lb) / retained target species lb

Table 11.--Limited-entry and open-access, fixed-gear groundfish landings (mt) in 2005, by area and fleet.

	North of 40°10'		35° to 40°10'		South of 35°		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'	35° to 40°10'	South of 35°	South of 40°10'	Coast-wide
Sablefish	1,976	520	194	379	73	14	2,243	913	2,496	573	87	660	3,156
Shortspine thornyhead	7	0	11	0	127	0	145	1	8	11	127	138	146
Longspine thornyhead	0	0	7	0	10	0	17	0	0	7	10	17	17
Dover sole	2	0	0	0	0	0	2	0	2	0	0	0	3
Petrale sole	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
Arrowtooth flounder	4	1	0	0	0	0	4	1	5	0	0	0	5
Other Flatfish	0	0	0	1	0	0	0	1	0	1	1	2	2
Blackgill rockfish <sup>1</sup>	na	na	5	6	18	6	23	13	na	12	24	36	36
Splitnose rockfish <sup>1</sup>	na	na	1	0	0	0	1	0	na	1	0	1	1
Other slope rockfish	50	10	2	5	1	1	53	16	60	7	2	9	69
Yellowtail rockfish <sup>2</sup>	1	2	na	na	na	na	1	2	3	na	na	na	3
Chilipepper rockfish <sup>3</sup>	0	0	3	0	0	0	3	0	0	3	0	3	3
Other shelf rockfish	7	5	1	10	7	7	15	22	12	11	14	24	36
Black rockfish	14	152	0	3	0	0	15	156	167	4	0	4	170
Other nearshore rockfish	3	32	0	49	1	6	4	86	34	49	6	56	90
Cabazon	2	30	0	25	0	2	2	58	32	25	2	28	60
Kelp greenling	2	20	0	1	0	0	2	21	21	1	0	1	23
Pacific cod	2	1	0	0	0	0	2	1	3	0	0	0	3
Spiny dogfish	230	3	0	0	0	0	230	3	233	0	0	0	233
Longnose+big+Unsp. skate	14	6	0	0	2	0	16	6	20	0	3	3	23
Other groundfish	4	50	27	66	1	3	31	119	54	94	4	97	151
Lingcod	13	45	1	24	1	1	15	69	58	24	2	26	84
Canary rockfish	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1
Widow rockfish	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.3	0.3
Yelloweye rockfish	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.5
Bocaccio <sup>3</sup>	na	na	0.5	0.6	1.2	2.0	1.6	2.6	na	1.1	3.2	4.2	4.2
Cowcod <sup>3</sup>	na	na	0.0	0.0	0.0	0.0	0.0	0.0	na	0.0	0.0	0.0	0.0
Pacific ocean perch <sup>4</sup>	0.4	0.3	na	na	na	na	0.4	0.3	0.7	na	na	na	0.8
Darkblotched rockfish	1.9	1.9	0.1	0.3	0.0	0.0	2.0	2.2	3.8	0.4	0.0	0.4	4.2

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

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

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

<sup>4</sup> 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 12.--Landings and estimated discards (mt) of groundfish from all fixed-gear trips targeting groundfish in 2005, 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		346			76			421	
mortality	2,496	69	2,565	660	15	675	3,156	84	3,240
Shortspine thornyhead	8	1	9	138	0	138	146	1	147
Longspine thornyhead	0	0	0	17	0	17	17	0	17
Dover sole	2	3	5	0	1	1	3	4	6
Petrale sole	0	0	0	0	0	0	0	0	0
English sole		0	0	0	0	0	0	0	0
Arrowtooth flounder	5	82	87	0	1	1	5	83	87
Other Flatfish	0	0	0	2	0	2	2	0	2
Blackgill rockfish <sup>1</sup>	na	na	na	36	0	36	36	0	36
Splitnose rockfish <sup>1</sup>	na	na	na	1	0	1	1	0	1
Other slope rockfish	60	18	78	9	0	9	69	18	87
Yellowtail rockfish <sup>2</sup>	3	0	3	na	na	na	3	0	3
Chilipepper rockfish <sup>3</sup>	na	na	na	3	0	3	3	0	3
Other shelf rockfish	12	14	26	24	0	24	36	14	51
Black rockfish	167	2	168	4	0	4	170	2	172
Other nearshore rockfish	34	1	36	56	8	63	90	9	99
Cabezon	32	0	32	28	2	30	60	2	62
Kelp greenling	21	1	22	1	0	2	23	1	23
Pacific cod	3	2	5	0	0	0	3	2	5
Spiny dogfish	233	129	362	0	21	21	233	150	383
Longnose+big+Unsp. skate	20	107	127	3	11	14	23	119	141
Other groundfish	54	7	61	97	1	99	151	9	160
Dungeness crab		1	1		0	0	0	1	1
Tanner crab		6	6		3	3	0	9	9
Lingcod		55.1			38.7			93.8	
mortality	57.7	4.5	62.3	26.3	1.5	27.9	84.1	6.1	90.1
Canary rockfish	0.0	1.6	1.6	0.1	0.3	0.3	0.1	1.8	1.9
Widow rockfish	0.1	0.9	1.0	0.3	0.0	0.3	0.3	0.9	1.3
Yelloweye rockfish	0.5	2.4	2.9	0.0	0.0	0.0	0.5	2.4	2.9
Bocaccio <sup>3</sup>	na	na	na	4.2	0.0	4.3	4.2	0.0	4.3
Cowcod <sup>3</sup>	na	na	na	0.0	0.0	0.0	0.0	0.0	0.0
Pacific ocean perch <sup>4</sup>	0.7	0.3	1.0	na	na	na	0.7	0.3	1.0
Darkblotched rockfish	3.8	0.5	4.3	0.4	0.1	0.5	4.2	0.6	4.8

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

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

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

<sup>4</sup> 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.--Estimated retained and discarded catch (mt) of major west coast groundfish species in the 2005 at-sea and shoreside fisheries for Pacific hake/whiting, by sector.

	Catcher-processor			Mothership			Tribal			All At-sea			Shoreside <sup>1</sup>		
	retained	discard	total	retained	discard	total	retained	discard	total	retained	discard	total	retained	discard	total
Pacific hake	78,415	475	78,890	48,451	80	48,531	23,582	0	23,582	150,448	555	151,003	96,184	1,390	97,574
Sablefish	9	4	13	1	1	2	0	0	0	10	5	15	22	0	22
Shortspine thornyhead	6	0	6	0	0	1	0	0	0	7	1	7	0	0	0
Longspine thornyhead	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
Petrale sole	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
Arrowtooth flounder	1	0	1	0	0	0	0	2	2	1	3	4	1	0	1
Other Flatfish	2	0	2	1	1	1	0	0	0	2	1	3	0	0	0
Other slope rockfish	34	5	40	9	3	12	0	0	0	43	8	51	4	0	4
Yellowtail rockfish	3	44	47	21	4	25	39	0	39	64	48	112	95	78	173
Other shelf rockfish	0	0	1	4	1	6	0	0	0	5	1	6	27	0	27
Pacific cod	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Spiny dogfish	3	39	42	16	11	28	7	278	285	26	328	355	96	0	96
Longnose+big+Unsp. skate	0	0	0	0	1	1	0	0	0	0	1	1	1	0	1
Other groundfish	0	0	0	0	0	0	349	67	416	349	68	417	188	0	188
Dungeness crab	0	0	0	0	0	0	0	0	0	0	0	0			0
Tanner crab	0	0	0	0	0	0	0	0	0	0	0	0			0
Lingcod	0.3	0.1	0.4	0.6	1.4	2.0	0.3	0.6	1.0	1.3	2.2	3.4	5.9	0.0	5.9
Canary rockfish	0.1	0.2	0.3	0.5	0.2	0.7	0.4	0.0	0.4	1.0	0.5	1.4	2.2	0.0	2.2
Widow rockfish	8.9	34.3	43.1	16.1	19.4	35.5	1.4	0.0	1.4	26.3	53.7	80.0	64.3	12.5	76.8
Yelloweye rockfish	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	0.0	0.0
POP	0.6	0.2	0.8	0.8	0.0	0.9	0.1	0.0	0.1	1.5	0.2	1.7	0.5	0.0	0.5
Darkblotched	2.7	3.2	5.9	4.3	0.8	5.1	0.0	0.0	0.0	7.0	4.1	11.1	5.1	0.4	5.5

<sup>1</sup> 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 14.--Coast-wide 2005 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.

Target species	Non-hake trawl fishery			Combined hake fisheries <sup>1</sup>			Combined fixed-gear fisheries			All commercial <sup>2</sup>		
	retained mt	discarded mt	discarded % of total	retained mt	discarded mt	discarded % of total	retained mt	discarded mt	discarded % of total	retained mt	discarded mt	discarded % of total
<b>Target species</b>												
Sablefish mortality	2,291	262	10%	32	5	14%	3,156	84	3%	5,479	352	6%
Shortspine thornyhead	494	133	21%	7	1	7%	146	1	1%	646	135	17%
Longspine thornyhead	631	92	13%	0	0	0%	17	0	0%	648	92	12%
Dover sole	6,671	656	9%	0	0	11%	3	4	58%	6,674	660	9%
Petrale sole	2,675	55	2%	0	0	0%	0	0	11%	2,676	55	2%
English sole	847	302	26%	0	0	50%		0		847	302	26%
Arrowtooth flounder	2,052	1,397	41%	2	3	58%	5	83	95%	2,059	1,483	42%
Other Flatfish	1,081	731	40%	0	0	0%	2	0	1%	1,083	731	40%
Blackgill rockfish <sup>3</sup>	51	2	4%	0	0	0%	36	0	1%	87	3	3%
Splitnose rockfish <sup>3</sup>	86	144	63%	0	0	0%	1	0	0%	87	144	62%
Other slope rockfish	144	27	16%	47	8	15%	69	18	20%	260	53	17%
Yellowtail rockfish <sup>4</sup>	27	29	51%	159	126	44%	3	0	12%	189	155	45%
Chilipepper rockfish <sup>5</sup>	24	52	68%	0	0	0%	3	0	0%	27	52	65%
Other shelf rockfish	16	81	83%	32	2	5%	36	14	28%	85	97	53%
Black rockfish	0	1	54%	0	0	0%	170	2	1%	171	2	1%
Other nearshore rockfish	0	0	54%	0	0	0%	90	9	9%	90	9	10%
Cabezon	0	0	0%	0	0	0%	60	2	4%	60	2	4%
Kelp greenling	0	0	0%	0	0	0%	23	1	3%	23	1	3%
Pacific hake	4	822	100%	246,632	1,945	1%				246,635	2,767	1%
Pacific cod	722	4	1%	1	0	3%	3	2	47%	725	7	1%
Spiny dogfish	126	1,067	89%	122	328	73%	233	150	39%	482	1,545	76%
Longnose+big+Unsp. skate	858	886	51%	1	1	42%	23	119	84%	882	1,005	53%
Other groundfish	108	1,524	93%	537	68	11%	151	9	6%	795	1,601	67%
<b>Rebuilding species (as of 2005)</b>												
Lingcod mortality	73	192	73%	7	2	23%	84	6.1	7%	164	200	55%
Canary rockfish	4.4	21.6	83%	3.2	0.5	12%	0.1	1.8	94%	7.7	23.8	75%
Widow rockfish	3.0	3.3	53%	90.6	66.2	42%	0.3	0.9	73%	93.9	70.5	43%
Yelloweye rockfish	0.2	0.6	73%	0.0	0.0	0%	0.5	2.4	82%	0.8	3.0	80%
Bocaccio <sup>5</sup>	1.6	27.7	94%	0.0	0.0	0%	4.2	0.0	1%	5.8	27.7	83%
Cowcod <sup>5</sup>	0.0	1.4	99%	0.0	0.0	0%	0.0	0.0	0%	0.0	1.4	97%
Pacific ocean perch <sup>6</sup>	56.9	10.8	16%	2.0	0.2	10%	0.8	0.3	27%	59.6	11.3	16%
Darkblotched rockfish	76.7	23.7	24%	12.1	4.5	27%	4.2	0.6	12%	93.0	28.7	24%

<sup>1</sup> Includes the commercial shoreside and at-sea fisheries, as well as the tribal at-sea hake fishery

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

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

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

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

<sup>5</sup> 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 15.--Estimated total mortality (mt) of major west coast groundfish species during 2005, by sector.

	Shoreside commercial fisheries				All at-sea hake fisheries	Shore-side WA Tribal	Total recreational fishing mortality			Research	Remaining GMT Scorecard <sup>3</sup> Values	Estimated total fishing mortality
	Estimated non-hake trawl <sup>1</sup>	Estimated hake trawl	Estimated non-trawl <sup>2</sup>	Total shoreside mortality			CA	OR	WA			
<b>Target species</b>												
Sablefish	2,553	22	3,242	5,817	15	700	0	1	0	10		6,543
Shortspine thornyhead	627	0	147	774	7	11	0	0	0	4		796
Longspine thornyhead	723	0	17	740	0	0	0	0	0	10		750
Dover sole	7,327	0	6	7,333	0	145	0	0	0	28		7,507
Petrale sole	2,732	0	0	2,733	0	30	0	0	0	4		2,766
English sole	1,151	0	0	1,151	0	66	0	0	0	4		1,222
Arrowtooth flounder	3,450	1	87	3,539	4	158	0	0	0	5		3,706
Other Flatfish	1,872	0	2	1,874	3	47	25	0	2	13		1,965
Blackgill rockfish <sup>4</sup>	53	0	36	89	0	0	0	0	0	0		90
Splitnose rockfish <sup>4</sup>	230	0	1	231	0	0	0	0	0	7		237
Other slope rockfish	171	4	87	262	51	28	0	0	0	4		345
Yellowtail rockfish <sup>5</sup>	56	173	10	239	112	539	9	13	20	3		935
Chilipepper rockfish <sup>6</sup>	76	0	3	79	0	0	4	0	0	14		97
Other shelf rockfish	98	27	52	176	6	10	281	6	1	19		501
Black rockfish	1	0	174	175	0	0	180	311	271	0		937
Other nearshore rockfish	1	0	99	100	0	0	441	41	7	0		590
Cabezon	0	0	62	62	0	0	47	17	7	0		133
Kelp greenling	0	0	23	23	0	0	5	4	2	0		35
Pacific hake/whiting	826	97,574	0	98,400	151,003	11,767	0	0	0	42		261,212
Pacific cod	726	1	5	732	0	124	0	0	8	0		864
Spiny dogfish	1,194	96	383	1,672	355	6	3	0	0	9		2,044
Longnose+big+Unsp. skate	1,745	1	141	1,887	1	23	0	0	0	8		1,920
Other groundfish	1,633	188	160	1,981	417	20	0	0	0	8		2,425
Dungeness crab	254	0	1	255	0							255
Tanner crab	252	0	9	261	0							261
<b>Rebuilding species (as of 2005)</b>												
Lingcod	266.3	5.9	91.2	363.4	3.4	29.9	299.3	131.7	58.6	4.0	0.0	890.4
Canary rockfish	26.0	2.2	1.9	30.1	1.4	4.3	2.0	4.9	1.9	2.3	1.8	48.7
Widow rockfish	6.3	76.8	2.1	85.2	80.0	28.6	1.6	1.6		1.6	0.4	198.9
Yelloweye rockfish	0.8	0.0	2.9	3.8	0.0	0.8	0.9	4.1	5.2	0.6	0.3	15.7
Bocaccio <sup>6</sup>	29.3	0.0	4.5	33.8	0.0	0.0	38.1	0.0	0.1	1.7	1.3	75.1
Cowcod <sup>6</sup>	1.4	0.0	0.0	1.5	0.0	0.0	0.4	0.0	0.0	0.1	0.0	2.0
Pacific ocean perch <sup>7</sup>	67.7	0.5	1.0	69.2	1.7	3.5	0.0	0.0	0.0	1.8	0.0	76.2
Darkblotched rockfish	100.4	5.5	4.8	110.6	11.1	0.1	0.0	0.0	0.0	2.1	0.0	123.9

<sup>1</sup> Includes minor landings by trawlers not targeting groundfish

<sup>2</sup> Includes minor landings made with troll gear

<sup>3</sup> The Pacific Fishery Management Council's Groundfish Management Team Bycatch Scorecard (Table 17) contains estimates of mortality for species that are managed under rebuilding plans.

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

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

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

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

Table 16.--Estimated total fishing mortality (mt) of major west coast groundfish species during 2005 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
<b>Target species</b>					
Sablefish	6,543	7,761	84%	8,368	78%
Shortspine thornyhead	796	999	80%	1,055	75%
Longspine thornyhead	750	2,461	30%	2,461	30%
Dover sole	7,507	7,476	100.4%	8,522	88%
Petrале sole	2,766	2,762	100.1%	2,762	100.1%
English sole	1,222	3,100	39%	3,100	39%
Arrowtooth flounder	3,706	5,800	64%	5,800	64%
Other Flatfish	1,965	4,090	48%	6,781	29%
Blackgill rockfish <sup>1</sup>	90			343	26%
Splitnose rockfish <sup>1</sup>	237	461	52%	615	39%
Other slope rockfish	345				
Other slope + blackgill	435	1,799	24%		
Yellowtail rockfish <sup>2</sup>	935	3,896	24%	3,896	24%
Chilipepper rockfish <sup>3</sup>	97	2,700	4%	2,700	4%
Other shelf rockfish	501	1,612	31%		
Black rockfish	937	1,293	72%	1,293	72%
Other nearshore rockfish	590	737	80%		
Cabezon (California only)	80	69	116%	103	78%
Kelp greenling	35				
Pacific hake/whiting	261,212	269,069	97%	269,545	97%
Pacific cod	864	1,600	54%	3,200	27%
Spiny dogfish	2,044				
Longnose+big+Unsp. skate	1,920				
Other groundfish	2,425				
Other groundfish OY group <sup>5</sup>	6,424	7,300	88%	14,600	44%
<b>Rebuilding species (as of 2005)</b>					
Lingcod	890.4	2,413	37%	2,922	30%
Canary rockfish	48.7	46.8	104%	270	18%
Widow rockfish	198.9	285	70%	3,218	6%
Yelloweye rockfish	15.7	26	60%	54	29%
Bocaccio <sup>3</sup>	75.1	307	24%	566	13%
Cowcod <sup>3</sup>	2.0	4.2	47%	24	8%
Pacific ocean perch <sup>4</sup>	76.2	447	17%	966	8%
Darkblotched rockfish	123.9	269	46%	269	46%

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

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

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

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

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

Table 17.--2005 Groundfish Management Team bycatch scorecard for rebuilding species.

**Estimated Total Mortality Impacts Updated with 2005 OY levels - April 2006 Council Meeting**

Fishery	Bocaccio a/	Canary	Cowcod	Dkbl	POP	Widow	Yelloweye
Limited Entry Trawl- Non-whiting	46.6	9.5	2.7	135.9	61.0	1.0	0.4
Limited Entry Trawl- Whiting							
At-sea whiting motherships							0.0
At-sea whiting cat-proc		3.3		16.4	2.1	155.8	0.0
Shoreside whiting							0.0
Tribal whiting		0.6		0.0	0.0	1.9	0.0
<b>Tribal</b>							
Midwater Trawl		1.8		0.0	0.0	40.0	0.0
Bottom Trawl		0.8		0.0	3.2	0.0	0.0
Troll		0.5		0.0	0.0		0.0
Fixed gear		0.3		0.0	0.0	0.0	2.3
Limited Entry Fixed Gear	13.4	1.2	0.1	1.3	0.4	0.5	2.9
Open Access: Directed Groundfish	10.6	3.0	0.1	0.2	0.1	0.1	3.0
Open Access: Incidental Groundfish							
CA Halibut	0.1	0.1		0.0	0.0		
CA Gillnet b/	0.5			0.0	0.0	0.0	
CA Sheephead b/				0.0	0.0	0.0	0.0
CPS- wetfish b/	0.3						
CPS- squid c/							
Dungeness crab b/	0.0		0.0	0.0	0.0		
HMS b/		0.0	0.0	0.0			
Pacific Halibut b/	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pink shrimp	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.0	0.3	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)							
<b>Recreational Groundfish d/</b>							
WA		6.8					9.3
OR						1.6	
CA	37.3	2.0	0.4			1.6	0.9
<b>Research: Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.</b>							
	1.7	2.3	0.1	2.1	1.8	1.1	0.6
<b>Non-EFP Total</b>	110.9	33.9	3.4	156.0	68.6	204.0	19.8
<b>EFPs e/</b>							
<b>EFP Subtotal</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>TOTAL</b>	110.9	33.9	3.4	156.0	68.6	204.0	19.8
<b>2005 OY</b>	307	47.0	4.2	269	447	285	26
<b>Difference</b>	196.1	13.1	0.8	113.1	378.4	81.1	6.2
<b>Percent of OY</b>	36.1%	72.1%	81.0%	58.0%	15.3%	71.6%	76.0%
Key		= either not applicable; trace amount (<0.01 mt); or not reported in available data sources.					

a/ South of 40°10' N. lat.

b/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

c/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

d/ Values for yelloweye in California represent specified harvest guidelines.

e/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

**CHANGES INCORPORATED:**

Updated with 2006 Oys

Deleted Lingcod column (declared rebuilt)

Yelloweye recreational HG for OR/WA:

In Nov 2005, a projected impact higher than the HG was replaced in the scorecard. Best est. was 4.0 mt in OR and 5.1 mt in WA + a 0.3 mt buffer.

The 2006 recreational HG returned to 6.7 mt

LE Trawl Non-whiting impacts were adjusted based on model refinement from catches occurring at the end of 2005 and beginning of 2006

LE Trawl Whiting impacts represent GMT proposed bycatch limits for canary and widow, and projected impacts resulting from the 2006 whiting bycatch model

## 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*

## ROCKFISH

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

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

Bocaccio, *Sebastes paucispinis*  
Canary rockfish, *Sebastes pinniger*  
Chilipepper, *Sebastes goodei*  
Cowcod, *Sebastes levis*  
Darkblotched rockfish, *Sebastes crameri*  
Longspine thornyhead, *Sebastolobus altivelis*  
Pacific ocean perch, *Sebastes alutus*  
Shortbelly rockfish, *Sebastes jordani*  
Shortspine thornyhead, *Sebastolobus alascanus*  
Splitnose rockfish, *Sebastes diploproa*  
Widow rockfish, *Sebastes entomelas*  
Yelloweye rockfish, *Sebastes ruberimus*  
Yellowtail rockfish, *Sebastes 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, *Sebastes chrysomelas*.  
blue, *Sebastes mystinus*  
brown, *Sebastes auriculatus*  
calico, *Sebastes dalli*  
China, *Sebastes nebulosus*  
copper, *Sebastes caurinus*  
gopher, *Sebastes carnatus*  
grass, *Sebastes rastrelliger*  
kelp, *Sebastes atrovirens*  
olive, *Sebastes serranoides*  
quillback, *Sebastes maliger*  
treefish, *Sebastes serriceps*

black, *Sebastes melanops*  
black and yellow, *Sebastes chrysomelas*  
blue, *Sebastes mystinus*  
brown, *Sebastes auriculatus*  
calico, *Sebastes dalli*  
California scorpionfish, *Scorpaena guttata*  
China, *Sebastes nebulosus*  
copper, *Sebastes caurinus*  
gopher, *Sebastes carnatus*  
grass, *Sebastes rastrelliger*  
kelp, *Sebastes atrovirens*  
olive, *Sebastes serranoides*  
quillback, *Sebastes maliger*  
treefish, *Sebastes serriceps*

North of 40°10' N. lat.

Minor Shelf Rockfish

bronzespotted, *Sebastes gilli*  
bocaccio, *Sebastes paucispinis*  
chameleon, *Sebastes phillipsi*  
chilipepper, *Sebastes goodei*  
cowcod, *Sebastes levis*  
dwarf-red, *Sebastes rufianus*  
flag, *Sebastes rubrivinctus*  
freckled, *Sebastes lentiginosus*  
greenblotched, *Sebastes rosenblatti*  
greenspotted, *Sebastes chlorostictus*  
greenstriped, *Sebastes elongatus*  
halfbanded, *Sebastes semicinctus*  
honeycomb, *Sebastes umbrosus*  
Mexican, *Sebastes macdonaldi*  
pink, *Sebastes eos*  
pinkrose, *Sebastes simulator*  
pygmy, *Sebastes wilsoni*  
redstriped, *Sebastes proriger*  
rosethorn, *Sebastes helvomaculatus*  
rosy, *Sebastes rosaceus*  
silvergrey, *Sebastes brevispinus*  
speckled, *Sebastes ovalis*  
squarespot, *Sebastes hopkinsi*  
starry, *Sebastes constellatus*  
stripetail, *Sebastes saxicola*  
swordspine, *Sebastes ensifer*  
tiger, *Sebastes nigorcinctus*  
vermilion, *Sebastes miniatus*  
yelloweye, *Sebastes ruberrimus*

Minor Slope Rockfish

aurora, *Sebastes aurora*  
bank, *Sebastes rufus*  
blackgill, *Sebastes melanostomus*  
darkblotched, *Sebastes crameri*  
redbanded, *Sebastes babcocki*  
rougheye, *Sebastes aleutianus*  
sharpchin, *Sebastes zacentrus*  
shortraker, *Sebastes borealis*  
splitnose, *Sebastes diploproa*  
yellowmouth, *Sebastes reedi*

South of 40°10' N. lat.

bronzespotted, *Sebastes gilli*  
chameleon, *Sebastes phillipsi*  
dwarf-red, *Sebastes rufianus*  
flag, *Sebastes rubrivinctus*  
freckled, *Sebastes lentiginosus*  
greenblotched, *Sebastes rosenblatti*  
greenspotted, *Sebastes chlorostictus*  
greenstriped, *Sebastes elongatus*  
halfbanded, *Sebastes semicinctus*  
honeycomb, *Sebastes umbrosus*  
Mexican, *Sebastes macdonaldi*  
pink, *Sebastes eos*  
pinkrose, *Sebastes simulator*  
pygmy, *Sebastes wilsoni*  
redstriped, *Sebastes proriger*  
rosethorn, *Sebastes helvomaculatus*  
rosy, *Sebastes rosaceus*  
silvergrey, *Sebastes brevispinus*  
speckled, *Sebastes ovalis*  
squarespot, *Sebastes hopkinsi*  
starry, *Sebastes constellatus*  
stripetail, *Sebastes saxicola*  
swordspine, *Sebastes ensifer*  
tiger, *Sebastes nigorcinctus*  
vermilion, *Sebastes miniatus*  
yelloweye, *Sebastes ruberrimus*  
yellowtail, *Sebastes flavidus*

aurora, *Sebastes aurora*  
bank, *Sebastes rufus*  
blackgill, *Sebastes melanostomus*  
darkblotched, *Sebastes crameri*  
Pacific ocean perch (POP), *Sebastes alutus*  
redbanded, *Sebastes babcocki*  
rougheye, *Sebastes aleutianus*  
sharpchin, *Sebastes zacentrus*  
shortraker, *Sebastes borealis*  
yellowmouth, *Sebastes reedi*

## Appendix B

Port groups used in West Coast Groundfish Observer Program sampling of nearshore commercial fixed-gear groundfish fisheries

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