

# Revised Estimated 2004 Discard and Total Catch of Selected Groundfish Species

Dr. James Hastie  
Fishery Resource Analysis and Monitoring Division  
Northwest Fisheries Science Center  
September 29, 2006

## Introduction

This report summarizes estimates of 2004 discard for selected groundfish species based on available landings and logbook records and onboard observation of trawl and fixed-gear commercial fishing vessels. Estimates of total mortality for these species are obtained by combining the discard estimates with mortality information obtained from additional sources.

The West Coast Groundfish Observer Program (WCGOP) at the Northwest Fisheries Science Center (NWFSC) began at-sea observation of vessels with limited-entry permits in the Fall of 2001. Observation of open-access vessels targeting groundfish was initiated in 2003. Reports summarizing observing protocols and collected data can be found at

<http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/index.cfm>.

**This report revises estimates that were published in an earlier report dated May 18, 2006.** Total mortality estimates provided in the original report were based on a compilation of information from a large number of sources. In August 2006, it was discovered that a portion of the landed catches for some species had been inadvertently counted twice in assembling the total fishery estimates. The analysis included tribal and research catches of rebuilding species provided by the Pacific Fishery Management Council's Groundfish Management Team. However, the summarization of shore-side commercial landings also included fish ticket records from the tribal fishery as well as fish landed in association with the bottom trawl research survey. For a few rockfish species, retained catches in the at-sea whiting fishery were also double counted. Landed catches reported in the current analysis have been revised to address these issues. The derivations of discard amounts that are based on WCGOP observations of commercial fishing sectors remain unchanged from the previous analysis.

## Methods

Discard estimates for each fleet begin with summarizing WCGOP observer data according to depth and area strata. For each fleet, observer data are stratified by depth, area, and/or season, based on the amount of available observer data and the distribution of observed and fleet fishing effort. The methods used to expand these data for each fleet vary somewhat, since vessel logbook data, which provide fishing location

and depth information for most of the trawl fleet, are not available for the fixed-gear fleets.

### Groundfish trawl fishery

Fleet-wide discard estimates associated with groundfish trawling are derived from WCGOP observer data and logbook and fish ticket data obtained from the Pacific Fisheries Information Network (PacFIN). Observer data are stratified by area, depth, and season. The management line at 40°10' N. Lat. is used to partition northern and southern areas. Bi-monthly cumulative limit periods are combined to form two seasons, representing winter (January-April and November-December) and summer (May-October). The northern area includes five depth strata, however, only four are used in the south, due to the paucity of observed trips in depths shallower than 100 fathoms. The number of observed tows and retained catch of target species within each stratum are reported in Table 1. For this analysis, target species include all flatfish, sablefish, and thornyheads, and also slope rockfish in the area south of 40°10' N. Lat. Since regulations severely limit or eliminate the retention of rebuilding species, estimating fleet discard for those species by applying a ratio of discarded-to-landed catch to landings is not reliable. Consequently for rebuilding or bycatch species, retained target-species catch is used as a measure of effort for expanding discard from observed trips. Table 2 shows aggregate discard ratios for several species in each stratum. For bycatch species (upper panel), the discard ratios represent the discarded poundage for each species divided by the retained target species poundage. For target species (lower panel), the ratio of discarded-to-retained pounds is presented for each species.

Logbook data are then stratified in the same manner as observer data, and the retained amounts of individual target species are aggregated for each stratum (Table 3). For each target species, an initial estimate of discard is calculated by multiplying the retained poundage by the appropriate discard ratio reported in Table 1. For bycatch species, estimated discard is calculated by multiplying aggregate target species poundage in each stratum by the corresponding discard ratio. Logbook data do not include records for all trawl trips, and for purposes of this analysis, records without recorded depth or latitude-longitude coordinates are not included. To adjust for these factors, the discard amounts are expanded to reflect the difference in landed catch reported in fish tickets and logbooks. For target species, the expansion ratio is equal to fish ticket pounds for each species divided by the logbook pounds for each state and 2-month period. For bycatch species, the ratio of fish ticket-to-logbook poundage for combined target species is used.

### Fixed-gear sablefish fishery

Fleet-wide discard estimates associated with fixed-gear sablefish fishing are derived from WCGOP observer data and fishticket data obtained from PacFIN. WCGOP observation of fixed-gear vessels targeting sablefish began in 2001 and has focused on those participating in the limited-entry primary fishery. Due to the limited numbers of trips observed south of 40°10' N. Lat., discard ratios are calculated through pooling all

observations for 2004 within each gear group (longline and pot). Few vessels (limited entry or open access) were observed while fishing for sablefish under the “daily-trip-limit” provisions. However, in this analysis, observations from the primary fishery are assumed to be representative of bycatch and discard occurrences associated with all fixed-gear sablefish fishing north of 36° N. Lat. Because there are no logbook data indicating the depth of fishing, it is not possible to apply the same depth-stratified approach used for the trawl fleet. Consequently, the coast-wide observer data are summarized, by gear, across the two depth zones where the fishery was permitted to take place in 2004: greater than 100 fm, north of 40°10' N. Lat., and greater than 150 fm, south of 40°10' N. Lat. As presented in Table 4, discarded amounts of sablefish are calculated for each gear and area, using fish ticket landings and the corresponding discard ratios. Since only a fraction of discards die, an assumed mortality percentage is applied. In accordance with the rate of survival assumed by the Pacific Council’s Groundfish Management Team (GMT), 20% of the discarded poundage is assumed to represent mortality. For rebuilding species, observed discard ratios relative to retained sablefish, are then used to calculate estimated amounts of mortality for each.

#### Near-shore fixed-gear fishery

Fleet-wide discard estimates associated with near-shore groundfish fishing are derived from observer data, fishticket data obtained from PacFIN, and other parameters developed by the GMT. WCGOP began pilot coverage of vessels targeting near-shore rockfish and associated species, such as cabezon and kelp greenling, in 2003. Data collected from these vessels from January 2003 through August 2004 were summarized in a report published on the NWFSC web site in May of 2005 ([http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/nearshore/datareport\\_nearshore\\_may2005.cfm](http://www.nwfsc.noaa.gov/research/divisions/fram/observer/datareport/nearshore/datareport_nearshore_may2005.cfm)). Data from the remainder of 2004 have not yet been released. It should be noted that the coverage of observed trips and tonnage reported in Table 5 reflect lower levels of coverage than for other fleets, and in turn greater uncertainty in estimating discard relationships. Table 6 summarizes bycatch ratios for rebuilding species and the number of observed gear sets used to calculate them. Table 7 summarizes the observed catch weight of target and rebuilding species, and the percentage of each species or species-group’s catch that was discarded.

In May 2005, the values presented in Tables 6 and 7 were used by the GMT, in conjunction with other information provided by Team members, in constructing the framework for evaluating discard in the near-shore fisheries presented in Tables 8 and 9. For the purposes of estimating 2004 discard in near-shore groundfish fisheries, the framework and parameters developed by the GMT have not been updated, except for the target species landed catch amounts. However, an overview of the process embodied in these two tables is presented below for purposes of clarity. Table 8 summarizes the calculation of discard for target species. Landed weights for each species/group are expanded to total catch estimates, using all-depth retention rates. Using observer and state-agency information, total catch is then distributed among 3 depth intervals: 0-10 fm, 11-20 fm, and 21-50 fm. Within each of those strata, depth-specific gross discard and mortality estimates are calculated using observed discard

ratios and assumed rates of discard survival. The estimated retained catch of all target species within each area/depth stratum is used with observer-derived discard ratios to estimate the discard mortality of rebuilding species in these fisheries (Table 9).

## Results

Discard Estimates from the three fisheries discussed above are combined with information regarding other sources of mortality in Table 10. Other sources of fishing mortality include:

1. Shore-side landings, as documented in PacFIN,
2. Retained and discarded catch in the at-sea Pacific hake fishery, as provided by the NMFS NW Regional office,
3. Mortality in the shore-side tribal fisheries, as provided by the tribes through the GMT.
4. Recreational landings and discard mortality, as provided through the GMT by state agencies,
5. Additional sources of mortality—such as research, Experimental Fishing Permits, and non-groundfish fisheries--for rebuilding species, as specified in the GMT's bycatch scorecard at the November 2004 PFMC meeting (Table 11).

Estimated mortality from all sources is summarized in the third-to-last column. The last two columns report the total catch Optimum Yields (OYs) and Allowable Biological Catches (ABCs), as published in the Federal Register. For all species (or groups) included in Table 10, estimated 2004 fishing mortality was below the specified ABC. The only species for which estimated mortality exceeded the OY was canary rockfish, where the OY of 47.3 mt was exceeded by 0.8 mt.

## Conclusions

Observer data collected by the WCGOP are used, in conjunction with data and information from a variety of sources, to estimate total levels of fishing mortality for major groundfish species. Estimated 2004 fishing mortalities for all of the species (or groups) analyzed are less than the specified ABCs. When comparing any of the mortality estimates to ABC or Optimum Yield amounts, it should be recognized that considerable uncertainty may be associated with discard estimates/assumptions from fisheries that have partial at-sea observation, or in the case of most non-groundfish fisheries, no at-sea observation at all.

Table 1. --Number of limited-entry trawl tows and retained target species poundage observed by the West Coast Groundfish Observer Program in 2004, by depth interval, area and season.

Area	Depth intervals (fathoms)	Winter <sup>1</sup>		Summer <sup>1</sup>	
		Number of observed tows	target species <sup>2</sup> retained lbs	Number of observed tows	target species <sup>2</sup> retained lbs
North of 40°10'					
	0-50	143	169,783	483	533,043
	51-75	164	158,449	496	646,807
	151-200	177	724,372	161	653,321
	201-300	508	2,330,542	288	1,007,533
	>300	198	709,423	170	503,181
South of 40°10'					
	0-100	47	21,858	118	153,556
	151-200	55	95,158	47	138,165
	201-300	101	398,342	119	492,927
	>300	178	676,715	104	338,339

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5

<sup>2</sup> Target species are defined as all flatfish, sablefish and thornyheads in both areas and also slope rockfish in the southern area.

Table 2.--Discard ratios for major west coast bycatch and target species for 2004, by area and depth interval in trawl tows observed during 2004, by the West Coast Groundfish Observer Program.

	North of 40°10'						South of 40°10'				
	Depth intervals (fathoms)						Depth intervals (fathoms)				
	0-50	51-75	151-200	201-300	>300	All depths	0-100	151-200	201-300	>300	All depths
<b>Rebuilding species</b>											
(Ratio of species pounds discarded to total target species pounds retained)											
Lingcod	0.03356	0.04852	0.01048	0.00070	0	0.00971	0.04622	0.04403	0.00044	0	0.00807
Canary	0.00379	0.00459	0.00024	0	0	0.00078	0.00419	0	0	0	0.00031
Widow	0.00033	0.00186	0.00107	0	0	0.00040	0.00007	0.00124	0	0	0.00013
Yelloweye	0.00030	0.00006	0.00003	0	0	0.00003	0.00009	0.00000	0	0	0.00001
Bocaccio							0.01146	0.00305	0.00001	0	0.00117
Cowcod							0.00133	0.00001	0	0	0.00010
POP	0.00001	0.00027	0.03374	0.00662	0.00097	0.00983					
Darkblotched	0.00536	0.00251	0.04163	0.01414	0.00534	0.01576	0.00000	0.02385	0.00051	0.00001	0.00261
<b>Target Species</b>											
(Ratio of each species' discarded-to-retained pounds)											
Sablefish	0.134	0.154	0.485	0.379	0.196	0.310	0.412	0.691	0.239	0.187	0.241
Shortspine	0	0.006	0.770	0.302	0.250	0.331	0	0.786	0.350	0.319	0.328
Longspine	0	0	0.679	0.644	0.154	0.212	0	0.078	0.290	0.143	0.153
Dover	0.229	0.069	0.044	0.015	0.085	0.037	2.093	0.315	0.050	0.136	0.099
Petrale sole	0.087	0.095	0.003	0.003	0.346	0.031	0.063	0.015	0.001	0.010	0.037
English sole	0.254	0.184	0.020	0.007	0.019	0.160	0.784	0.590	0.167	0	0.669
Arrowtooth	1.271	2.868	0.073	0.078	0.084	0.247	1.983	15.936	4.879	18.246	6.043
Otr. Flatfish	0.174	0.386	0.120	0.068	0.566	0.181	0.070	0.825	0.155	2.948	0.160
Slope Rock.	0.002	0.191	0.314	0.228	0.059	0.259	34.632	0.287	0.080	0.026	0.189
Yellowtail	0.535	0.130	312.866	12.890	0	0.314					
Chilipepper							24.191	0.883	0.017	0.000	3.549

Table 3. --Number of limited-entry trawl tows and retained target species poundage reported in west coast groundfish trawl logbooks for 2004.

Area	Depth intervals (fathoms)	Winter <sup>1</sup>		Summer <sup>1</sup>	
		Number of tows	target species <sup>2</sup> retained mts	Number of tows	target species <sup>2</sup> retained mts
North of 40°10'					
	0-50	446	120	2,854	1,134
	51-75	383	122	2,852	2,511
	151-200	744	1,083	840	1,181
	201-300	1,540	2,899	977	1,414
	>300	568	921	498	683
South of 40°10'					
	0-100	1,821	90	2,056	146
	151-200	166	120	255	220
	201-300	303	410	436	697
	>300	412	616	398	672

<sup>1</sup> Winter season includes bi-monthly periods 1, 2, 6; the Summer season includes periods 3, 4, 5

<sup>2</sup> Target species are defined as all flatfish, sablefish and thornyheads in both areas and also slope rockfish in the southern area.

Table 4.--Estimated discard of rebuilding species and sablefish associated with all fixed-gear sablefish landings north of 36° N. Lat. during 2004

	South of 40°10'			Nouth of 40°10'			Summary for area north of 36° N. Lat.
	(seaward boundary of the RCA at 150 fm)			(seaward boundary of the RCA at 100 fm)			
	Gear rates and discard		Combined discard	Gear rates and discard		Combined discard	
Longline	Pot	Longline		Pot			
<b>Sablefish</b>							
Sets observed in each area and depth range							
number of sets	20	43		248	90		
observed sablefish catch	24,125	129,344		254,304	128,900		
Observed sets used for discard ratios in each depth range							
number of sets	146	127		268	133		
observed sablefish catch	146,045	257,357		278,430	258,243		
<b>Total landings (mt)</b>	<b>294</b>	<b>159</b>		<b>1,140</b>	<b>521</b>		<b>2,113</b>
Area percent, by gear	65%	35%		69%	31%		
Coast-wide percent, by gear/area	14%	8%		54%	25%		
Observed sablefish discard ratio	9.8%	42.2%		11.5%	42.1%		21.1%
Total estimated discard	29	67		131	219		446
Estimated discard mortality <sup>1</sup> (mt)	6	13		26	44		89
Estimated total mortality	<b>300</b>	<b>172</b>		<b>1,166</b>	<b>564</b>		<b>2,203</b>
<b>Rebuilding species discard ratios <sup>2</sup></b>							
Lingcod	0.018%	0.273%		0.144%	0.284%		
Canary rockfish	0.016%	0%		0.101%	0%		
Widow rockfish	0%	0%		0%	0%		
Yelloweye rockfish	0.023%	0%		0.089%	0%		
Bocaccio rockfish <sup>3</sup>	0%	0%		0%	0%		
Cowcod rockfish <sup>3</sup>	0%	0%		0%	0%		
Pacific ocean perch	0%	0%		0.002%	0.002%		
Darkblotched rockfish	0.042%	0.009%		0.029%	0.009%		
<b>Estimated rebuilding species discard (mt)</b>							
Lingcod	0.1	0.4	<b>0.5</b>	1.6	1.5	3.1	<b>3.6</b>
Canary rockfish	0.0	0.0	<b>0.0</b>	1.1	0.0	1.1	<b>1.2</b>
Widow rockfish	0.0	0.0	<b>0.0</b>	0.0	0.0	0.0	<b>0.0</b>
Yelloweye rockfish	0.1	0.0	<b>0.1</b>	1.0	0.0	1.0	<b>1.1</b>
Bocaccio rockfish <sup>3</sup>	0.0	0.0	<b>0.0</b>	0.0	0.0	0.0	<b>0.0</b>
Cowcod rockfish <sup>3</sup>	0.0	0.0	<b>0.0</b>	0.0	0.0	0.0	<b>0.0</b>
Pacific ocean perch	0.0	0.0	<b>0.0</b>	0.0	0.0	0.0	<b>0.0</b>
Darkblotched rockfish	0.1	0.0	<b>0.1</b>	0.3	0.0	0.4	<b>0.5</b>

<sup>1</sup> As assumed by the PPMC's Groundfish Management Team, the rate of mortality for discarded sablefish in the fixed-gear fishery is assumed to be 20%.

<sup>2</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 West Coast Groundfish Observer Program during the 2004 limited-entry, fixed-gear primary fishery.

<sup>3</sup> Please note that the observer data include few observations from south of Ft. Bragg, CA, so these rates may underestimate the true bycatch of these species.



Table 5.--Number of observed open-access, fixed-gear trips occurring at less than 50 fm and associated landed tonnage, by port group and gear from January 1, 2003 to August 31, 2004.

Port Group	Hook and Line		Pot	
	Number of trips	Landed catch (mt)	Number of trips	Landed catch (mt)
Astoria	16	1.2	*	
S Oregon	71	7.3		
Crescent City	114	14.6		
Fort Bragg	12	0.3	10	0.3
Monterey	24	1.2		
Morro Bay	77	3.9	12	2.5
Santa Barbara	15	0.6	15	1.8
Los Angeles	31	0.7	32	3.2
ALL PORTS	360	29.7	*	

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 6.--Ratios of bycatch, for eight<sup>1</sup> rebuilding species, per 100 pounds of retained nearshore target species, by area and depth, from open-access, fixed-gear sets observed between January 1, 2003 and August 31, 2004 by the West Coast Groundfish Observer Program.

	0 - 10 fm	11 - 20 fm	21 - 50 fm
<b>North of 40°10'</b>			
Number of applicable observed sets	152	173	19
Species catch per 100 lb of retained nearshore species			
Canary Rockfish	0.413	1.646	5.344
Lingcod	27.593	36.700	73.092
Widow Rockfish	0.024	0.021	0.173
Yelloweye Rockfish	0.142	1.109	9.404
<b>South of 40°10'</b>			
Number of applicable observed sets	254	68	
Species catch per 100 lb of retained nearshore species			Insufficient data
Canary Rockfish	0.012	1.756	
Lingcod	23.936	33.773	
Widow Rockfish	0	0	
Yelloweye Rockfish	0	0	

<sup>1</sup> No bycatch of bocaccio, cowcod, darkblotched rockfish or Pacific ocean perch were observed on these sets.

Table 7.--Discard percentages for target and rebuilding species, by area and depth, from open-access, fixed-gear sets observed between January 1, 2003 and August 31, 2004 by the West Coast Groundfish Observer Program.

Area Species	0 - 10 fm		11 - 20 fm		21 - 50fm		All Depths	
	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>North of 40°10'</b>								
Target species								
Black Rockfish	15,193	2%	16,189	1%	744	0%	32,125	1%
Blue Rockfish	912	16%	2,431	12%	182	14%	3,525	14%
Other minor nearshore rockfish	601	6%	1,530	5%	1,043	2%	3,175	4%
Cabezon	1,471	21%	2,467	21%	184	20%	4,122	21%
Kelp Greenling	988	23%	1,570	18%	83	14%	2,641	20%
Rebuilding species								
Canary Rockfish	66	100%	308	99%	85	100%	458	100%
Widow Rockfish	4		4		3		11	
Yelloweye Rockfish	23	100%	207	100%	150	100%	379	100%
Lingcod	4,408	43%	6,860	40%	1,164	15%	12,431	39%
<b>South of 40°10'</b>								
Target species								
Shallow nearshore species	4,347	24%	943	52%	54	40%	5,344	29%
Deeper nearshore species	1,920	18%	2,234	13%	27	100%	4,181	16%
Kelp Greenling	1,588	62%	19	87%	10	100%	1,617	62%
Cabezon	10,864	29%	263	72%	33	100%	11,160	30%
California Sheephead	13,199	36%	2,702	35%	239	15%	16,141	35%
Rebuilding species								
Bocaccio Rockfish					27	8%	27	8%
Canary Rockfish	2	100%	63	100%	6	100%	72	100%
Lingcod	4,422	42%	1,258	56%	24	56%	5,704	45%

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

Table 8.--Estimated nearshore target species discard mortality, derived using the Groundfish Management Team nearshore model with 2004 landed catches.

Area Species	All depths			0 - 10 fm							11 - 20 fm							
	landed mt	retention rate	catch mt	% of total catch	stratum	gross		discard		stratum	% of total catch	stratum	gross		discard		stratum	
					catch	discard	mt	%	mt	%		mt	catch	discard	mt	%	mt	%
<b>South of 40°10'</b>																		
Shallow nearshore species	42	71%	59	81%	48	24%	12	15%	1.7	38	18%	10	52%	5	45%	2.4	7	
Deeper nearshore species	46	84%	55	43%	24	17%	4	10%	0.4	20	53%	29	13%	4	40%	1.5	27	
Cabazon	47	70%	67	97%	65	29%	19	7%	1.3	48	2%	2	72%	1	7%	0.1	1	
Kelp Greenling	2	38%	5	98%	5	62%	3	7%	0.2	2	1%	0	87%	0	7%	0.0	0	
All nearshore groundfish	137	74%	184	77%	142	26%	37	10%	3.7	108	23%	41	25%	10	39%	4.0	35	
<b>North of 40°10'</b>																		
Black Rockfish	180	99%	183	47%	87	2%	2	10%	0.2	85	50%	92	1%	1	40%	0.4	92	
Blue Rockfish	12	86%	13	26%	3	16%	1	10%	0.1	3	69%	9	12%	1	40%	0.4	9	
Other minor nearshore rockfish	39	96%	41	55%	22	6%	1	20%	0.3	21	35%	14	5%	1	50%	0.4	14	
Cabazon	30	79%	38	36%	14	21%	3	7%	0.2	11	60%	23	21%	5	7%	0.3	19	
Kelp Greenling	24	80%	29	37%	11	23%	3	7%	0.2	9	59%	17	18%	3	7%	0.2	15	
All nearshore groundfish	284.9	94%	303	45%	137	7%	9	10%	0.9	129	52%	156	7%	11	16%	1.7	147	

Area Species	21 - 50 fm							0 - 50 fm						
	% of total catch	stratum	gross		discard		stratum	mortality from:			discard as a percentage of mortality			
		catch	discard	mt	%	mt	%	mt	landing	discard		total		
<b>South of 40°10'</b>														
Shallow nearshore species	1%	1	60%	0.4	100%	0.4	1	42	4.5	46.3	9.8%			
Deeper nearshore species	4%	2	60%	1.3	100%	1.3	2	46	3.2	49.5	6.5%			
Cabazon	0%	0	75%	0.1	7%	0.0	0	47	1.4	48.3	2.9%			
Kelp Greenling	1%	0	90%	0.0	7%	0.0	0	2	0.2	2.0	10.4%			
All nearshore groundfish	2%	3	61%	1.9	91%	1.7	3	137	9.4	146.1	6.4%			
<b>North of 40°10'</b>														
Black Rockfish	2%	4	0%	0.0	100%	0.0	4	180	0.5	180.9	0.3%			
Blue Rockfish	5%	1	14%	0.1	100%	0.1	1	12	0.6	12.2	4.9%			
Other minor nearshore rockfish	10%	4	2%	0.1	100%	0.1	4	39	0.7	39.7	1.8%			
Cabazon	4%	2	20%	0.3	7%	0.0	1	30	0.6	31.0	1.8%			
Kelp Greenling	3%	1	14%	0.1	7%	0.0	1	24	0.4	23.9	1.7%			
All nearshore groundfish	4%	12	6%	0.7	33%	0.2	11	285	2.8	287.7	1.0%			

Note: The model uses discard and retention percentages reported by the West Coast Groundfish Observer Program from data collected between January 1, 2003 and August 31, 2004.

Table 9.--Groundfish Management Team nearshore model for estimating target species discard mortality, with 2004 landed catches.

	0 - 10 fm	11 - 20 fm	21 - 50 fm	Estimated bycatch			
				0 - 10 fm	11 - 20 fm	21 - 50 fm	0 - 50 fm
<b>South of 40°10'</b>							
Retained nearshore mt	104	31	1.2				
Rebuilding species	<i>Bycatch rates</i>						
Canary	0.01%	1.76%	1.76%	0.01	0.55	0.02	0.58
disc. mort. (%:mt)	10%	55%	100%	0.00	0.30	0.02	<b>0.32</b>
Lingcod							
catch (%:mt)	23.40%	33.77%	33.77%	24.44	10.49	0.40	35.33
landed (%:mt)	58%	44%	55%	14.18	4.62	0.22	19.01
discard (%:mt)	42%	56%	45%	10.27	5.88	0.18	16.32
disc. mort. (%:mt)	7%	7%	7%	0.72	0.41	0.01	1.14
total mortality				14.89	5.03	0.23	<b>20.15</b>
<b>North of 40°10'</b>							
Retained nearshore mt	128	145	11				
Rebuilding species	<i>Bycatch rates</i>						
Canary	0.41%	1.65%	5.34%	0.53	2.39	0.59	3.51
disc. mort. (%:mt)	10%	55%	100%	0.05	1.32	0.59	<b>1.96</b>
Widow	0.02%	0.02%	0.17%	0.03	0.03	0.02	<b>0.08</b>
Yelloweye	0.14%	1.11%	9.40%	0.18	1.61	1.03	2.83
disc. mort. (%:mt)	50%	90%	100%	0.09	1.45	1.03	<b>2.58</b>
Lingcod							
catch (%:mt)	27.59%	36.70%	73.09%	35.34	53.40	8.03	96.76
landed (%:mt)	57%	60%	85%	20.14	32.04	6.83	59.00
discard (%:mt)	43%	40%	15%	15.19	21.36	1.20	37.76
disc. mort. (%:mt)	7%	7%	7%	1.06	1.50	0.08	2.64
total mortality				21.21	33.53	6.91	<b>61.65</b>

**Estimated coast-wide discard mortality associated with near-shore groundfish targets**

<b>Canary</b>	<b>2.28</b>
<b>Widow</b>	<b>0.08</b>
<b>Yelloweye</b>	<b>2.58</b>
<b>Lingcod</b>	<b>3.79</b>

Table 10.--Estimated total mortality (mt) of major west coast groundfish species from commercial, tribal, and recreational fishing during 2004.

	2004 metric tons											Management reference points	
	Shore-side commercial fisheries				At-sea landed and discard	Shore-side WA Tribal	State estimates of total recreational fishing mortality			Remaining GMT Scorecard <sup>2</sup> Values	Estimated total fishing mortality	Optimum Yield (total catch)	Allowable Biological Catch
	Total landed catch	Estimated trawl discard	Estimated non-trawl discard <sup>1</sup>	Estimated Total mortality			WA	OR	CA				
Target species													
Sablefish <sup>3</sup> mortality	5,079	642 321	446 89	5,489	29	712	0	5			6,235	7,510	8,185
Shortspine <sup>4</sup>	582	174		756	5	6	0	0			767	983	1,030
Longspine <sup>3</sup>	658	137		795	0		0	0			795	2,443	2,461
Dover	6,777	355		7,132	0	81	0	0			7,213	7,440	8,510
Petrале	1,961	76		2,037	0	82	0	0			2,119	2,762	2,762
English	956	193		1,149	0	80					1,229	na	3,100
Arrowtooth	2,328	3,255		5,583	3	82					5,668	na	5,800
Otr. Flatfish	1,371	497		1,868	2	19					1,889	na	7,700
Slope rockfish	1,073	634		1,707	24	23					1,754	na	na
Yellowtail rockfish <sup>5</sup>	224	80		304	48	352	24	12			739	4,320	4,320
Chilipepper <sup>6</sup>	43	102		145	2		0	0	6		153	2,000	2,700
Pacific hake	96,365	2,666		99,031	120,736	6,848					226,615	250,000	514,441
Rebuilding species (as of 2004)													
Lingcod mortality	148.0	161.9 80.9	4.5	233.4	1.4	25.0	64.2	107.2	130.0	27.1	588.3	735.0	1,385
Canary	6.0	8.5	3.5	18.0	5.2	3.0	1.7	3.9	9.0	7.3	48.1	47.3	256
Widow	16.0	4.8	0.1	20.9	21.1	21.0	0.0	0.7	15.0	40.6	119.3	284.0	3,460
Yelloweye	1.7	0.4	3.7	5.7	0.0	1.0	3.7	2.4	0.6	2.3	15.7	22.0	53
Bocaccio <sup>6</sup>	11.9	8.7	0.0	20.6	0.0		0.0	0.0	71.0	13.3	104.9	250.0	400
Cowcod <sup>6</sup>	0.0	0.8	0.0	0.9	0.0		0.0	0.0	1.0	0.5	2.4	4.8	24
POP <sup>5</sup>	116.6	23.4	0.0	140.1	1.0	3.0	0.0			7.6	151.7	444.0	980
Darkblotched	181.0	37.1	0.5	218.6	7.4		0.0			4.9	230.9	240.0	240

<sup>1</sup> Non-trawl discard includes estimates for the fixed-gear nearshore and sablefish fisheries. Sablefish fishery estimates are based on observations of the primary limited-entry, fixed-gear season. Since few observations were made in this fishery south of Ft. Bragg, CA, discard estimates for southern species, such as bocaccio and cowcod should not be viewed as complete.

<sup>2</sup> The Pacific Council's Groundfish Management Team produces a Bycatch Scorecard whose purpose is to account for all sources of expected mortality for species that are managed under rebuilding plans.

<sup>3</sup> Area north of 36° N. Lat.

<sup>4</sup> Area north of 34°27' N. Lat.

<sup>5</sup> Area north of 40°10' N. Lat.

<sup>6</sup> Area south of 40°10' N. Lat.

Table 11. --Groundfish Management Team Bycatch Scorecard from the November 2004 Pacific Fishery Management Council meeting

Fishery	Bocaccio a/	Canary	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
<b>Limited Entry Groundfish</b>								
Trawl- Non-whiting	47.4	18.3	0.4	268.1	104.7	95.0	2.5	0.2
Fixed Gear	13.4		0.1		20.0	0.3	0.5	2.5
<b>Open Access: Groundfish directed</b>	10.6		0.1		70.0	0.1		0.6
<b>Whiting</b>								
At-sea whiting motherships		6.2		3.0	0.8	0.1	11.4	0.0
At-sea whiting cat-proc				5.8	0.4	10.1	84.6	0.4
Shoreside whiting				0.7	0.7	0.7	28.6	0.0
Tribal whiting				0.0	0.0	0.2	1.6	0.0
<b>Open Access</b>								
CA Halibut	0.1	0.1		0.0	2.0	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	0.5
Pink shrimp	0.1	0.1	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
<b>Tribal</b>								
Midwater Trawl		1.3		0.0	0.1	0.0	40.0	0.0
Bottom Trawl		0.5		0.0	9.0	0.0	0.0	0.0
Troll		0.5		0.0	1.0	0.0		0.0
Fixed gear		0.3		0.0	15.0	0.0	0.0	2.3
<b>Recreational Groundfish</b>								
WA d/		1.7			71.7			3.4
OR		4.3			109.7		1.4	3.2
CA e/	62.8	8.5	1.8		268.9		8.2	3.7
<b>Research: Based on 2 most recent NMFS trawl shelf and slope surveys, the IPHC halibut survey, and LOAs with expanded estimates for south of Pt. Conception.</b>								
	2.0	3.1		4.0	3.0	3.0	0.5	1.0
<b>Non-EFP Total</b>	137.5	46.5	2.4	281.6	677.8	109.5	179.4	18.1
<b>EFPs f/</b>								
CA: NS FF trawl	10.0	0.1	0.5		20.0			0.5
OR: DTS g/		0.0		0.2		0.6		0.0
WA: AT trawl		1.0		0.7	0.8	4.0	0.0	0.0
WA: dogfish LL		0.0		0.0	0.5	0.0	0.0	0.0
WA: pollock		0.0					0.0	0.0
<b>EFP Subtotal</b>	10.0	1.1	0.5	0.9	21.3	4.6	0.0	0.5
<b>TOTAL</b>	147.5	47.6	2.9	282.5	699.1	114.1	179.4	18.6
<b>2004 OY</b>	250	47.3	4.8	240	735	444	284	22
<b>Difference</b>	102.5	-0.3	1.9	-42.5	35.9	329.9	104.6	3.4
<b>Percent of OY</b>	59.0%	100.6%	60.4%	117.7%	95.1%	25.7%	63.2%	84.7%
<b>Key</b>	= 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/ Estimates for yelloweye have not been updated.

e/ Estimates for bocaccio, cowcod, widow, and yelloweye have not been updated.

f/ 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.

g/ The darkblotched rockfish and Pacific ocean perch caps are not defined yet for this EFP but are expected to be lower than the placeholders in this scorecard.