

## GROUND FISH MANAGEMENT TEAM STATEMENT ON 2005 UPDATES TO THE MODEL USED TO PROJECT TRAWL CATCH AND BYCATCH

The model used by the Groundfish Management Team (GMT) to project trawl catch of target species and bycatch of rebuilding species was updated by Dr. Jim Hastie of the Northwest Fisheries Science Center (NWFSC) for review of 2005 management at the April Council meeting. The primary focus of the update was to incorporate new fishery and observer data into the model. However, other minor changes, such as separating English sole from 'other flatfish' in the model were also implemented. Three sources of data used in the model were updated: NWFSC observer data, fishticket landings data, and trawl logbook data.

### Observer Data

Observer data are used to quantify the rates of coincident catch (referred to herein as "bycatch") for rebuilding species, relative to target species catch and the proportions of species catch that are retained and discarded. New observer data cover the period from September 2003 to August 2004. New data were processed for model inclusion in the same manner as used for the 2004 model update. However, some of the data were filtered differently to allow calculation of model parameters that are consistent with the new 2005 requirement that selective flatfish gear be used shoreward of the Rockfish Conservation Area (RCA), north of 40°10' N latitude. Modeling of the 2005 fishery that was conducted in 2004 used summarized bycatch rates from the Oregon exempted fishing permit (EFP) provided by Oregon Department of Fish and Wildlife. In producing depth-based rates for use in the model, all catch by a vessel on a particular trip was attributed to the deepest tow start depth recorded for that trip. In updating model parameters for 2005, NWFSC observer records were used to assign EFP catch to depth categories on a tow-by-tow basis. In addition to EFP trips, all other observed use of selective flatfish gear was included in calculating model bycatch parameters.

In accordance with the 2004 recommendation of the Scientific and Statistical Committee, rates of bycatch and discard for each area and depth stratum were calculated separately for each 12-month period of observer program data collection. Model parameters were calculated as weighted averages of the 12-month rates, with higher weights assigned to the most recent data. All rates, except those for the northern nearshore fishery, were combined using the following weighting by observation year: Year-3: 50.0%; Year-2: 33.3% ; Year-1: 16.7%. Use of selective flatfish gear in the north was only observed during the 2<sup>nd</sup> and 3<sup>rd</sup> years of observer data collection. As a result, an alternative weighting was used to combine those rates: Year-3: 66.7%; Year-2: 33.3%. Because the preponderance of selective gear observations occurred between the months of May and October, these data were only used to calculate rates for use during bi-monthly periods 3, 4, and 5 in the model. As in the 2004 modeling of the 2005 fishery, the rates included for other periods were derived by applying the ratio of winter-to-summer rates from data for small footrope gear to the summer selective-gear rates. Discard rates applied to the selective-gear fishery are also derived from small-footrope data.

A comparison of bycatch and discard rates used in the 2004 and 2005 models is provided in Tables 1-4. Tables 1 and 2 summarize model rates for the bycatch of rebuilding species, for the nearshore and offshore depth strata, respectively. The values in these tables indicate the projected catch of each species as a percentage of the combined retained catch of all target species. Tables 3 and 4 summarize, for major target species, the percentages of total catch which are projected to be discarded, for the nearshore and offshore depth strata, respectively.

### Fishticket Data

Fishticket data are used to document the amount of target species landings for each permitted trawl vessel in the fishery. Each vessel's recent history of landings forms the basis for the projections of target species catch under specified management regimes. The 2004 model utilized fishticket data from the years 2000-2003. For the current update of the model, data from 2000 were replaced by data from 2004. Weighted averages of bi-monthly species landings were calculated using the following annual weighting: 2004: 50.0%; 2003: 27.2%; 2002: 14.8%; 2001: 8.0%.

### Logbook Data

Trawl logbook data are used in developing a baseline apportionment of each vessel's target species catch among depth zones. As with fishtickets, data are drawn from the most recent 4-year period. Early in the calendar year, however, logbook data are often incomplete for the preceding year. For periods where data are not complete for the most recent year, the prior 3 years are used. In updating these data for the 2005 model, it was discovered that a substantial portion of Oregon logbook data for 2004 were missing the recorded depth information. As a result, 2004 data were not used for Oregon. For data completeness reasons, California logbook data were only used for the first six months of 2004. Where all four years of data were available, the same weighting for combining data as described above for fishtickets was used to calculate weighted averages. Where only three years were available, the following weighting was used: 2003: 55%; 2002: 30%; 2001: 15%.

### Modeling Issues

Following inclusion of the new data, the model's projections of target species were tuned through comparison with landings from 2004 and the first two months of 2005. Fleet-wide scaling adjustments were made to baseline vessel species landings, in order to improve the ability of the model to track reported landings, given the management measures in place during those 7 periods. Due to the inability to include the 2004 Oregon logbook data, and concerns over the effect of higher fuel prices on fleet depth distribution and possible impacts on canary bycatch, April 2005 management options were modeled assuming a somewhat higher propensity for vessels to fish nearshore than in the 2004 modeling. It is anticipated that the Oregon logbook data issue will be addressed in time for those data to be included in the model before the June Council meeting.

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Table 1. Comparison of inshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Lingcod			
			<=50 fm	<=60 fm	<=75 fm	<=100 fm
<b>Lingcod</b>						
North of 40°10'	1,2,6	Old	0.135%	0.255%	1.483%	2.459%
		New	0.325%	1.415%	2.176%	2.754%
		change	+0.189%	+1.160%	+0.694%	+0.295%
	3,4,5	Old	0.506%	0.737%	1.996%	1.918%
		New	1.305%	2.920%	3.400%	3.164%
		change	+0.799%	+2.182%	+1.404%	+1.247%
South of 40°10'	1,2,6	Old	2.849%	2.300%	2.354%	2.942%
		New	4.588%	3.805%	3.331%	4.165%
		change	+1.739%	+1.505%	+0.977%	+1.224%
	3,4,5	Old	0.487%	3.126%	3.289%	3.790%
		New	0.740%	3.736%	4.081%	4.559%
		change	+0.253%	+0.610%	+0.792%	+0.769%
<b>Canary</b>						
North of 40°10'	1,2,6	Old	0.000%	0.003%	0.068%	0.187%
		New	0.000%	0.013%	0.047%	0.109%
		change	+0.000%	+0.010%	-0.020%	-0.078%
	3,4,5	Old	0.000%	0.003%	0.059%	0.084%
		New	0.001%	0.023%	0.053%	0.088%
		change	+0.001%	+0.021%	-0.006%	+0.004%
South of 40°10'	1,2,6	Old	0.027%	0.034%	0.014%	0.026%
		New	0.071%	0.076%	0.047%	0.054%
		change	+0.044%	+0.042%	+0.032%	+0.028%
	3,4,5	Old	0.000%	0.024%	0.104%	0.087%
		New	0.001%	0.030%	0.105%	0.106%
		change	+0.001%	+0.006%	+0.002%	+0.019%
<b>Widow</b>						
North of 40°10'	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.003%
		change	+0.000%	+0.000%	+0.000%	+0.003%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,2,6	Old	0.000%	0.001%	0.000%	0.002%
		New	0.000%	0.023%	0.016%	0.017%
		change	+0.000%	+0.022%	+0.016%	+0.015%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	-0.000%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 1 (cont.). Comparison of inshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Lingcod			
			<=50 fm	<=60 fm	<=75 fm	<=100 fm
<b>Bocaccio</b>						
North of 40°10'	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,2,6	Old	0.308%	0.715%	0.541%	1.137%
		New	0.169%	4.737%	3.489%	3.847%
		change	-0.139%	+4.021%	+2.947%	+2.710%
	3,4,5	Old	0.000%	0.060%	0.304%	1.299%
		New	0.000%	0.058%	0.339%	1.143%
		change	+0.000%	-0.002%	+0.035%	-0.156%
<b>Cowcod</b>						
North of 40°10'	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,2,6	Old	0.000%	0.034%	0.034%	0.044%
		New	0.000%	0.250%	0.187%	0.378%
		change	+0.000%	+0.216%	+0.152%	+0.334%
	3,4,5	Old	0.000%	0.002%	0.002%	0.038%
		New	0.000%	0.001%	0.022%	0.049%
		change	+0.000%	-0.000%	+0.020%	+0.012%
<b>Yelloweye</b>						
North of 40°10'	1,2,6	Old	0.000%	0.000%	0.007%	0.017%
		New	0.000%	0.000%	0.001%	0.001%
		change	+0.000%	+0.000%	-0.006%	-0.016%
	3,4,5	Old	0.000%	0.001%	0.008%	0.006%
		New	0.005%	0.006%	0.005%	0.004%
		change	+0.005%	+0.004%	-0.003%	-0.002%
South of 40°10'	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.049%	0.034%	0.034%
		change	+0.000%	+0.049%	+0.034%	+0.034%
	3,4,5	Old	0.034%	0.019%	0.019%	0.019%
		New	0.021%	0.012%	0.012%	0.012%
		change	-0.013%	-0.007%	-0.007%	-0.007%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 1 (cont.). Comparison of inshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Lingcod			
			<=50 fm	<=60 fm	<=75 fm	<=100 fm
<b>Darkblotched</b>						
North	1,2,6	Old	0.000%	0.001%	0.035%	0.163%
		New	0.001%	0.002%	0.034%	0.114%
		change	+0.001%	+0.001%	-0.000%	-0.049%
	3,4,5	Old	0.004%	0.001%	0.063%	0.155%
		New	0.048%	0.055%	0.148%	0.205%
		change	+0.044%	+0.054%	+0.084%	+0.051%
South	1,2,6	Old	0.000%	0.002%	0.002%	0.005%
		New	0.000%	0.002%	0.002%	0.003%
		change	+0.000%	-0.001%	-0.001%	-0.002%
	3,4,5	Old	0.000%	0.000%	0.000%	0.026%
		New	0.000%	0.000%	0.000%	0.014%
		change	+0.000%	+0.000%	+0.000%	-0.012%
<b>Pacific ocean Perch</b>						
North	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.004%
		change	+0.000%	+0.000%	+0.000%	+0.004%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.017%
		change	+0.000%	+0.000%	+0.000%	+0.017%
South	1,2,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%

Note: these percentages are calculated as:  $100 * (\text{rebuilding species catch mt}) / (\text{combined target species retained mt})$

Table 2. Comparison of offshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Lingcod			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.162%	0.159%	0.128%	0.000%
		New	0.244%	0.182%	0.123%	0.000%
		change	+0.081%	+0.023%	-0.005%	+0.000%
	2,5	Old	0.028%	0.017%	0.018%	0.000%
		New	0.052%	0.033%	0.017%	0.000%
		change	+0.023%	+0.016%	-0.001%	+0.000%
	3,4	Old	1.718%	0.055%	0.035%	0.000%
		New	0.101%	0.053%	0.027%	0.000%
		change	-1.616%	-0.001%	-0.008%	+0.000%
South of 40°10'	1,6	Old	1.243%	0.926%	0.112%	0.017%
		New	0.989%	0.760%	0.095%	0.012%
		change	-0.254%	-0.166%	-0.017%	-0.006%
	2,5	Old	0.171%	0.116%	0.079%	0.001%
		New	0.258%	0.212%	0.188%	0.016%
		change	+0.087%	+0.095%	+0.109%	+0.015%
	3,4	Old	0.024%	0.023%	0.022%	0.016%
		New	0.454%	0.021%	0.013%	0.009%
		change	+0.429%	-0.003%	-0.009%	-0.007%

Area	2-month periods	Model inputs	Canary			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.007%	0.007%	0.000%	0.000%
		New	0.004%	0.003%	0.000%	0.000%
		change	-0.003%	-0.004%	+0.000%	+0.000%
	2,5	Old	0.006%	0.003%	0.000%	0.000%
		New	0.007%	0.003%	0.000%	0.000%
		change	+0.001%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.012%	0.012%	0.000%	0.000%
		New	0.012%	0.009%	0.000%	0.000%
		change	+0.000%	-0.003%	+0.000%	+0.000%
South of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	-0.000%	+0.000%	+0.000%	+0.000%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 2 (cont.). Comparison of offshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Widow			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.020%	0.014%	0.005%	0.000%
		New	0.014%	0.010%	0.004%	0.000%
		change	-0.006%	-0.004%	-0.002%	+0.000%
	2,5	Old	0.026%	0.024%	0.024%	0.000%
		New	0.023%	0.022%	0.021%	0.000%
		change	-0.004%	-0.003%	-0.003%	+0.000%
	3,4	Old	0.004%	0.003%	0.004%	0.000%
		New	0.006%	0.004%	0.005%	0.000%
		change	+0.003%	+0.001%	+0.001%	+0.000%
South of 40°10'	1,6	Old	0.002%	0.001%	0.000%	0.000%
		New	0.001%	0.001%	0.000%	0.000%
		change	-0.000%	-0.000%	+0.000%	+0.000%
	2,5	Old	0.005%	0.001%	0.000%	0.000%
		New	0.004%	0.001%	0.001%	0.000%
		change	-0.001%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%

Area	2-month periods	Model inputs	Bocaccio			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,6	Old	0.398%	0.201%	0.000%	0.000%
		New	0.289%	0.160%	0.000%	0.000%
		change	-0.109%	-0.041%	+0.000%	+0.000%
	2,5	Old	0.042%	0.035%	0.000%	0.000%
		New	0.033%	0.024%	0.000%	0.000%
		change	-0.008%	-0.011%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.005%	0.001%	0.000%	0.000%
		change	+0.005%	+0.001%	+0.000%	+0.000%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 2 (cont.). Comparison of offshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Cowcod			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,6	Old	0.008%	0.002%	0.000%	0.000%
		New	0.006%	0.002%	0.000%	0.000%
		change	-0.001%	-0.000%	-0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	-0.000%	+0.000%	+0.000%	+0.000%

Area	2-month periods	Model inputs	Yelloweye			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	-0.000%	-0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	-0.000%	-0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
South of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 2 (cont.). Comparison of offshore bycatch rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	Darkblotched			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 38°	1,6	Old	0.808%	1.021%	0.920%	0.000%
		New	1.762%	1.770%	1.475%	0.000%
		change	+0.954%	+0.750%	+0.556%	+0.000%
	2,5	Old	0.291%	0.175%	0.149%	0.000%
		New	0.599%	0.492%	0.417%	0.000%
		change	+0.308%	+0.317%	+0.268%	+0.000%
	3,4	Old	0.623%	0.606%	0.604%	0.000%
		New	2.577%	2.171%	2.229%	0.000%
		change	+1.955%	+1.565%	+1.625%	+0.000%
South of 38°	1,6	Old	0.029%	0.026%	0.002%	0.000%
		New	0.126%	0.051%	0.035%	0.000%
		change	+0.097%	+0.024%	+0.032%	+0.000%
	2,5	Old	0.006%	0.006%	0.005%	0.000%
		New	0.062%	0.058%	0.057%	0.000%
		change	+0.056%	+0.053%	+0.052%	+0.000%
	3,4	Old	0.016%	0.016%	0.017%	0.000%
		New	0.491%	0.103%	0.105%	0.000%
		change	+0.475%	+0.087%	+0.087%	+0.000%

Area	2-month periods	Model inputs	Pacific ocean Perch			
			>150 fm	>180 fm	>200 fm	>250 fm
North of 40°10'	1,6	Old	1.341%	1.182%	1.078%	0.000%
		New	1.365%	1.152%	0.987%	0.000%
		change	+0.024%	-0.030%	-0.090%	+0.000%
	2,5	Old	0.275%	0.182%	0.163%	0.000%
		New	0.513%	0.405%	0.267%	0.000%
		change	+0.238%	+0.223%	+0.104%	+0.000%
	3,4	Old	1.084%	0.906%	0.768%	0.000%
		New	1.209%	0.830%	0.647%	0.000%
		change	+0.124%	-0.075%	-0.121%	+0.000%
South of 40°10'	1,6	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	2,5	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	+0.000%	+0.000%	+0.000%	+0.000%
	3,4	Old	0.000%	0.000%	0.000%	0.000%
		New	0.000%	0.000%	0.000%	0.000%
		change	-0.000%	-0.000%	-0.000%	+0.000%

Note: these percentages are calculated as: 100 \* (rebuilding species catch mt) / (combined target species retained mt)

Table 3. Comparison of inshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	<=50 fm	<=60 fm	<=75 fm	<=100 fm	
Sablefish	North	Old	25%	54%	71%	52%	
		New	60%	49%	53%	44%	
		change	+34.9%	-4.7%	-18.7%	-8.5%	
	3,4,5	Old	30%	50%	58%	51%	
		New	22%	38%	37%	33%	
		change	-8.2%	-11.8%	-21.7%	-17.9%	
	South	1,2,6	Old	14%	85%	81%	90%
			New	55%	95%	83%	86%
			change	+41.8%	+9.2%	+1.7%	-3.6%
		3,4,5	Old	91%	91%	64%	80%
			New	97%	97%	50%	47%
			change	+5.9%	+6.0%	-14.1%	-33.1%
Longspine	North	Old	0%	0%	0%	67%	
		New	0%	0%	0%	67%	
		change	+0.0%	+0.0%	+0.0%	-0.3%	
	3,4,5	Old	0%	0%	0%	0%	
		New	0%	0%	1%	0%	
		change	+0.0%	+0.0%	+0.3%	+0.0%	
	South	1,2,6	Old	0%	0%	0%	0%
			New	0%	0%	0%	0%
			change	+0.0%	+0.0%	+0.0%	+0.0%
		3,4,5	Old	0%	0%	0%	0%
			New	0%	0%	0%	0%
			change	+0.0%	+0.0%	+0.0%	+0.0%
Shortspine	North	Old	0%	0%	0%	1%	
		New	0%	0%	0%	3%	
		change	+0.0%	+0.0%	+0.0%	+2.3%	
	3,4,5	Old	0%	2%	8%	12%	
		New	0%	1%	3%	8%	
		change	+0.0%	-0.4%	-5.0%	-3.9%	
	South	1,2,6	Old	0%	0%	0%	0%
			New	0%	0%	0%	0%
			change	+0.0%	+0.0%	+0.0%	+0.0%
		3,4,5	Old	0%	0%	0%	5%
			New	0%	0%	0%	4%
			change	+0.0%	+0.0%	+0.0%	-0.5%

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 3 (cont.). Comparison of inshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	<=50 fm	<=60 fm	<=75 fm	<=100 fm	
Dover sole	North	1,2,6	Old	87%	33%	40%	34%
		New	53%	27%	29%	25%	
		change	-33.9%	-6.8%	-10.9%	-8.9%	
		3,4,5	Old	22%	12%	12%	14%
		New	21%	10%	8%	10%	
		change	-0.9%	-2.2%	-4.0%	-4.6%	
	South	1,2,6	Old	85%	99%	99%	85%
		New	92%	100%	100%	93%	
		change	+7.4%	+0.4%	+0.3%	+7.2%	
		3,4,5	Old	30%	91%	91%	68%
		New	76%	95%	95%	93%	
		change	+46.7%	+4.0%	+4.1%	+25.4%	
Petrale sole	North	1,2,6	Old <sup>a</sup>	11%	5%	15%	12%
		New	20%	10%	13%	12%	
		change	+8.9%	+4.3%	-1.1%	-0.5%	
		3,4,5	Old	10%	15%	15%	16%
		New	8%	10%	10%	11%	
		change	-1.3%	-4.9%	-4.6%	-4.8%	
	South	1,2,6	Old	26%	2%	5%	3%
		New	40%	6%	11%	10%	
		change	+14.1%	+3.7%	+6.1%	+6.9%	
		3,4,5	Old	6%	4%	4%	5%
		New	3%	4%	4%	5%	
		change	-2.7%	+0.0%	-0.0%	-0.6%	
Arrowtooth	North	1,2,6	Old	36%	64%	59%	59%
		New	100%	68%	63%	63%	
		change	+63.7%	+4.1%	+3.9%	+3.7%	
		3,4,5	Old	87%	75%	70%	67%
		New	72%	78%	74%	71%	
		change	-14.4%	+2.7%	+4.6%	+4.1%	
	South	1,2,6	Old	0%	0%	0%	33%
		New	100%	100%	100%	100%	
		change	+100.0%	+100.0%	+100.0%	+67.0%	
		3,4,5	Old	0%	3%	36%	36%
		New	0%	5%	36%	36%	
		change	+0.0%	+1.6%	+0.3%	+0.3%	

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 3 (cont.). Comparison of inshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	<=50 fm	<=60 fm	<=75 fm	<=100 fm
Other flatfish						
North	1,2,6	Old	21%	21%	24%	28%
		New	9%	16%	19%	22%
		change	-11.6%	-4.7%	-5.0%	-6.0%
	3,4,5	Old	20%	21%	22%	24%
		New	17%	17%	18%	20%
		change	-2.9%	-4.2%	-4.2%	-4.0%
South	1,2,6	Old	35%	24%	23%	24%
		New	27%	15%	17%	17%
		change	-7.9%	-9.3%	-6.7%	-7.6%
	3,4,5	Old	12%	23%	21%	23%
		New	3%	7%	7%	9%
		change	-9.1%	-15.9%	-13.6%	-14.6%

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 4. Comparison of offshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	>150 fm	>180 fm	>200 fm	>250 fm
<b>Sablefish</b>						
North	1,6	Old	44%	42%	38%	32%
		New	44%	42%	40%	34%
		change	+0.5%	+0.6%	+1.7%	+1.5%
	2,5	Old	23%	22%	22%	19%
		New	31%	30%	29%	27%
		change	+7.7%	+7.4%	+7.3%	+8.0%
	3,4	Old	18%	18%	17%	15%
		New	23%	22%	21%	18%
		change	+4.6%	+4.0%	+4.0%	+3.2%
South	1,6	Old	36%	34%	32%	31%
		New	36%	33%	32%	33%
		change	+0.2%	-0.8%	-0.0%	+1.7%
	2,5	Old	29%	28%	28%	27%
		New	29%	27%	27%	27%
		change	-0.2%	-0.3%	-0.5%	+0.2%
	3,4	Old	16%	16%	16%	13%
		New	15%	15%	15%	13%
		change	-1.0%	-1.0%	-1.0%	-0.2%
<b>Longspine</b>						
North	1,6	Old	20%	20%	20%	19%
		New	21%	21%	20%	20%
		change	+0.6%	+0.7%	+0.8%	+0.8%
	2,5	Old	18%	18%	18%	18%
		New	18%	18%	18%	17%
		change	-0.6%	-0.6%	-0.7%	-1.0%
	3,4	Old	18%	18%	17%	16%
		New	15%	15%	15%	14%
		change	-2.3%	-2.1%	-2.2%	-2.3%
South	1,6	Old	19%	19%	19%	19%
		New	19%	19%	19%	19%
		change	-0.7%	-0.7%	-0.6%	-0.6%
	2,5	Old	13%	13%	13%	13%
		New	11%	11%	11%	11%
		change	-2.4%	-2.4%	-2.3%	-2.3%
	3,4	Old	9%	9%	9%	9%
		New	9%	9%	9%	9%
		change	+0.2%	+0.2%	+0.2%	-0.2%

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 4 (cont.). Comparison of offshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	>150 fm	>180 fm	>200 fm	>250 fm	
Shortspine	North	1,6	Old	38%	37%	36%	35%
		New	41%	41%	40%	37%	
		change	+3.2%	+3.2%	+3.5%	+2.1%	
		2,5	Old	35%	35%	35%	34%
			New	32%	32%	32%	32%
			change	-2.6%	-2.5%	-2.6%	-2.4%
		3,4	Old	48%	48%	46%	43%
			New	38%	35%	33%	30%
			change	-10.0%	-12.8%	-13.0%	-12.9%
	South	1,6	Old	36%	36%	35%	35%
			New	35%	35%	35%	34%
			change	-0.4%	-0.3%	-0.1%	-0.4%
2,5		Old	31%	31%	31%	31%	
		New	29%	28%	28%	28%	
		change	-2.5%	-2.5%	-2.5%	-2.4%	
3,4		Old	24%	24%	24%	23%	
		New	20%	20%	20%	19%	
		change	-3.9%	-3.8%	-3.8%	-4.2%	
Dover sole	North	1,6	Old	9%	8%	7%	7%
		New	6%	6%	5%	4%	
		change	-2.4%	-2.1%	-2.2%	-2.8%	
		2,5	Old	11%	11%	10%	12%
			New	7%	7%	7%	8%
			change	-4.1%	-4.0%	-3.7%	-4.0%
		3,4	Old	12%	11%	12%	15%
			New	9%	8%	9%	11%
			change	-3.1%	-3.1%	-3.1%	-3.8%
	South	1,6	Old	22%	22%	22%	22%
			New	15%	15%	14%	15%
			change	-7.6%	-7.8%	-7.5%	-7.4%
2,5		Old	12%	11%	11%	13%	
		New	11%	10%	10%	12%	
		change	-0.5%	-0.6%	-0.9%	-0.5%	
3,4		Old	11%	11%	11%	13%	
		New	8%	8%	8%	8%	
		change	-3.8%	-3.7%	-3.7%	-4.5%	

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 4 (cont.). Comparison of offshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	>150 fm	>180 fm	>200 fm	>250 fm		
Petrale sole	North	1,6	Old	0%	0%	1%	3%	
		New	0%	1%	1%	2%		
		change	+0.1%	+0.1%	-0.2%	-0.9%		
		2,5	Old	1%	1%	1%	7%	
			New	1%	1%	1%	4%	
			change	+0.2%	+0.2%	-0.4%	-3.2%	
		3,4	Old	5%	4%	7%	2%	
			New	2%	2%	4%	1%	
			change	-2.3%	-2.0%	-3.4%	-0.8%	
	South	1,6	Old	0%	0%	0%	1%	
			New	1%	0%	0%	50%	
			change	+0.1%	-0.2%	-0.2%	+49.7%	
2,5		Old	10%	10%	1%	0%		
		New	6%	5%	0%	0%		
		change	-4.7%	-4.9%	-0.3%	+0.4%		
3,4		Old	3%	3%	3%	3%		
		New	1%	1%	2%	2%		
		change	-1.3%	-1.5%	-1.6%	-1.5%		
Arrowtooth		North	1,6	Old	49%	48%	43%	29%
			New	36%	35%	32%	18%	
			change	-13.5%	-13.4%	-11.1%	-10.6%	
	2,5	Old	20%	19%	18%	16%		
		New	13%	12%	12%	10%		
		change	-6.6%	-6.3%	-5.6%	-5.8%		
	3,4	Old	42%	42%	44%	55%		
		New	22%	23%	22%	28%		
		change	-19.4%	-19.2%	-21.4%	-26.7%		
	South	1,6	Old	96%	92%	59%	59%	
			New	98%	95%	94%	93%	
			change	+1.4%	+3.6%	+35.8%	+34.0%	
2,5		Old	100%	100%	100%	100%		
		New	91%	91%	92%	95%		
		change	-8.6%	-8.8%	-8.0%	-5.2%		
3,4		Old	78%	77%	77%	87%		
		New	82%	81%	81%	90%		
		change	+4.4%	+3.9%	+3.8%	+2.2%		

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$

Table 4 (cont.). Comparison of offshore discard rates used in the 2004 and 2005 bycatch models.

Area	2-month periods	Model inputs	>150 fm	>180 fm	>200 fm	>250 fm	
Other flatfish	North	1,6	Old	27%	26%	30%	30%
		New	24%	23%	23%	19%	
		change	-2.3%	-3.3%	-6.4%	-11.1%	
		2,5	Old	41%	43%	44%	50%
		New	28%	29%	30%	34%	
		change	-12.6%	-13.4%	-13.8%	-16.4%	
	South	1,6	Old	28%	28%	27%	29%
			New	28%	25%	24%	27%
			change	-0.2%	-2.9%	-2.8%	-2.5%
		2,5	Old	36%	42%	44%	55%
			New	34%	34%	33%	41%
			change	-1.6%	-8.4%	-11.1%	-14.2%
3,4	Old	33%	34%	34%	46%		
	New	25%	26%	26%	30%		
	change	-7.9%	-8.0%	-8.2%	-15.6%		

Note: these percentages are calculated as:  $100 * (\text{retained mt}) / (\text{catch mt})$