

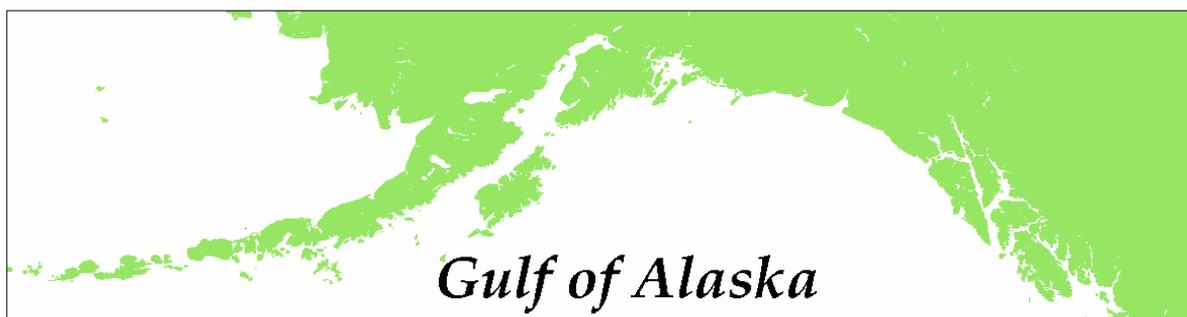
APPENDIX B

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT

FOR THE GROUND FISH RESOURCES OF THE GULF OF ALASKA

Compiled by

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with contributions by

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Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska

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Summary

by

The Plan Team for the Groundfish Fisheries of the Gulf of Alaska

Introduction

The *National Standard Guidelines for Fishery Management Plans* published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). The SAFE reports are intended to summarize the best available scientific information concerning the past, present, and possible future condition of the stocks and fisheries under federal management. The FMPs for the groundfish fisheries managed by the Council require that drafts of the SAFE reports be produced each year in time for the December North Pacific Fishery Management Council (Council) meetings.

The SAFE report for the Gulf of Alaska (GOA) groundfish fisheries is compiled by the Plan Team for the Gulf of Alaska Groundfish FMP from chapters contributed by scientists at NMFS Alaska Fisheries Science Center (AFSC) and the Alaska Department of Fish and Game (ADF&G). The stock assessment section includes recommended acceptable biological catch (ABC) levels for each stock and stock complex managed under the FMP. The ABC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other management strategies for the fisheries.

The GOA Groundfish Plan Team met in Seattle on November 15-19th, 2004 to review the status of stocks of seventeen species or species groups that are managed under the FMP. The Plan Team review was based on presentations by ADF&G and NMFS AFSC scientists with opportunity for public comment and input. Members of the Plan Team who compiled the SAFE report were James Ianelli and Diana Stram (co-chairs), Sandra Lowe, Jeff Fujioka, Jon Heifetz, Bill Bechtol, Bob Foy, Bill Clark, Sarah Gaichas, Victoria O'Connell, Tom Pearson, Nick Sagalkin, Beth Sinclair, and Eric Eisenhardt.

The GOA FMP recognizes single species and species complex management strategies. Single species management is recommended for stocks that are easily targeted by the harvesting sector and for which minimal mixing of other species occurs in the targeted catch. In the Gulf of Alaska, Pacific cod, pollock, sablefish, Pacific ocean perch, thornyhead rockfish, flathead sole, rex sole, arrowtooth flounder, northern rockfish, and Atka mackerel are managed as single species. Other groundfish species that are usually caught in groups have been managed as complexes (also called assemblages). For example, shorttraker and roughey rockfish, other slope rockfish, pelagic shelf rockfish, demersal shelf rockfish, deepwater flatfish, shallow water flatfish, and "other species" have been managed within complexes.

The FMP authorizes splitting species, or groups of species, from the complexes for purposes of promoting the goals and objectives of the FMP. Atka mackerel was split out from "other species" beginning in 1994. In 1998, black and blue rockfish were removed from the GOA FMP and management was deferred to ADF&G. Beginning in 1999, osmerids (eulachon, capelin and other smelts) were removed from the "other species" category and placed in a separate forage fish category (a new assessment was presented last year to address ecosystem considerations). Also presented in 2003 was a separate assessment of skates since it appeared that a directed fishery had developed in the GOA. In 2004, Amendment 63 to the FMP was approved which moved skates from the other species category into a target species category whereby individual OFLs and ABCs for skate species and complexes could be established. The Team received an update on the skate assessment (though there were no new survey data) and noted that progress has been made on monitoring. However, data are still limiting the effectiveness of NMFS ability to manage skates.

Groundfish catches are managed against TAC specifications for EEZ and near coastal waters of the GOA. State of Alaska internal water groundfish populations are not surveyed by NMFS and catches from

internal water fisheries should not be counted against the TAC. The Team has recommended that these catches represent unassessed fish, and should not be counted against an ABC or TAC. Beginning in 2000, the pollock assessment has incorporated the ADF&G survey pollock biomass, therefore, the Plan Team acknowledges that it would be appropriate to reduce the Western (W), Central (C) and West Yakutat (WY) combined GOA pollock ABC by the anticipated Prince William Sound (PWS) harvest level for the State fishery. Therefore, the 2005 PWS GHL of 910 mt should be deducted from the W/C/WY pollock ABC before area apportionments are made.

The Plan Team has provided subarea ABC recommendations on a case by case basis since 1998 based on the following rationale. The Plan Team recommended splitting the EGOA ABC for species/complexes that would be disproportionately harvested from the West Yakutat area by trawl gear. The Team did not split EGOA ABCs for species that were prosecuted by multi-gear fisheries or harvested as bycatch. For those species where a subarea ABC split was deemed appropriate, two approaches were examined. The point estimate for WY biomass distribution based on survey results was recommended for seven species/complexes to determine the WY and East Yakutat/Southeast Outside subarea ABC splits. For some species/complexes, a range was recommended bounded by the point estimate and the upper end of the 95% confidence limit from all three surveys. The rationale for providing a range was based on a desire to incorporate the variance surrounding the distribution of biomass for those species/complexes that could potentially be constrained by the recommended ABC splits. In prior assessments, the Team recommended this range for the pelagic shelf rockfish complex. However, the last two survey estimates (2003 and 1999) of the WY proportion were considerably smaller than in previous surveys. Concerned that the abundance may have actually decreased in WY, the Team no longer recommends using the upper 95% CI. The Team continues to support this rationale for determining 2005 ABCs for Pacific ocean perch. The Team presents both the point estimate and the upper 95% confidence limit, but based its 2005 recommendations on the upper 95% confidence limit.

No Split	Split, Point Estimate	Split, Upper 95% CI
Pacific cod	Pollock	Pacific ocean perch
Atka mackerel	Sablefish	
Shortraker/rougheye	Deep-water flatfish	
Thornyhead	Shallow-water flatfish	
Northern rockfish	Rex sole	
Demersal shelf rockfish	Arrowtooth flounder	
	Flathead sole	
	Other slope rockfish	
	Pelagic shelf rockfish	

Amendment 48 considerations

There were two significant changes that affect the presentation of the Plan Team's report for 2005. First, since new data during years when no groundfish surveys are conducted are limited, Amendment 48 to the GOA Groundfish FMP on TAC streamlining indicated that annual assessments are no longer required for long-lived GOA species. These species include the rockfishes, flatfishes, and Atka mackerel. The second significant change also stemming from Amendment 48 is that the proposed and final specifications can be specified for a period of up to two years. This requires providing ABC and OFL levels for 2005 and 2006 this year.

New data summary

Since the Stock Assessment and Fishery Evaluation Report (SAFE) for 2004 was issued (NPFMC 2003), the following new information has been incorporated in the stock assessments:

- 1) Pollock: (a) total catch and age composition from the 2003 fishery; (b) biomass and age composition from the 2004 Shelikof Strait echo integration trawl (EIT) survey; (c) biomass and length composition from the 2004 ADF&G coastal trawl survey
- 2) Pacific cod: (a) size composition data from the 2003 and preliminary estimates for the 2004 fisheries; (b) catch data for 2003 were updated and preliminary catch data for 2004; (c) errors in the size composition data from the January-May 2000 pot fishery and the June-August 2001 trawl fishery were corrected.
- 3) Sablefish: (a) relative abundance and length data from the 2004 longline survey, (b) relative abundance and length data from the 2003 longline fishery, and (c) age data from the 2003 longline survey and longline fisheries.
- 4) Flatfish: This species complex is now assessed on a biennial cycle. No updated information was presented for other deep water flatfish and shallow water flatfish. For rex sole an age-structured model was presented for review but was not utilized for ABC and OFL recommendations. For Dover sole the following information was updated: (a) an age-structured model was utilized for ABC and OFL recommendations; (b) fishery catch data; (c) fishery size compositions; (d) NMFS bottom trawl survey biomass and standard errors; (e) NMFS bottom trawl survey size compositions; (f) NMFS bottom trawl survey age compositions.
- 5) Arrowtooth: This species is now assessed on a biennial cycle. No updated information was presented.
- 6) Flathead sole: This species is now assessed on a biennial cycle. No updated information was presented.
- 7) Pacific ocean perch: This species is now assessed on a biennial cycle. Catch data for 2003 and an estimated 2004 catch were used for revised projections.
- 8) Northern rockfish: This species is now assessed on a biennial cycle. Catch data for 2003 and an estimated 2004 catch were used for revised projections.
- 9) Shortraker and rougheye: Separate ABCs were recommended by the Plan Team (as last year). Catch estimates were reexamined for species composition and provided in an attachment to this section.
- 10) Other slope rockfish: This species complex is now assessed on a biennial cycle. No updated information was provided for this group.
- 11) Pelagic shelf rockfish: This species complex is now assessed on a biennial cycle. No updated information was provided for yellowtail, dark, and widow rockfishes. For dusky rockfish, (a) a new model relative to the one presented in 2003; (b) age data for the 2000 and 2002 fisheries; (c) age data for the 2003 survey; (d) additional age data for the 1987 and 2001 surveys; (e) 2004 fishery lengths; (f) updated 2003 fishery catch and estimated 2004 fishery catch.
- 12) Demersal shelf rockfish: This species is now assessed on a biennial cycle. (a) new average weight data from the EYKT, CSEO, and SSEO areas, and (b) new estimates of area-specific biomass.
- 13) Thornyheads: This species is now assessed on a biennial cycle. No updated information on this species was presented.

- 14) Atka mackerel: This species is now assessed on a biennial cycle. No updated information on this species was presented.
- 15) Skates: This species is now assessed on a biennial cycle. No updated information on this species was presented.
- 16) Groundfish, generally: Updated catch data from the NMFS Observer Program and Regional Office for 2003 and through November 6th, 2004. The annual NMFS longline survey continued to provide abundance indices for a number of key groundfish species.

Management Areas and Species

The Gulf of Alaska (GOA) management area lies within the 200-mile U.S. Exclusive Economic Zone (EEZ) of the United States (Figure 1). Five categories of finfishes and invertebrates have been designated for management purposes. They are, target species, other species, prohibited species, forage fish species and non-specified species. This SAFE report describes stock status of target species only. Species or complexes included in each of the first three categories are listed below.

Target Species	Other Species	Prohibited Species
Pollock	Octopi	Pacific halibut
Pacific cod	Squids	Pacific herring
Flatfishes	Sculpins	Pacific salmon
Rockfishes	Sharks	Steelhead trout
Sablefish		King crabs
Atka mackerel		Tanner crabs
Skates		

No specifications are set for forage fish and catch records need not be kept. All other species of fish and invertebrates taken incidentally that are not managed by other FMPs and are associated with groundfish fisheries are designated as “non-specified species”. No specifications are set and catch records need not be kept. A species or species group from within the target species category may be split out and assigned an appropriate harvest level. Similarly, species in the target species category may be combined and a single harvest level assigned to the new aggregate species group. The harvest level for demersal shelf rockfish in the Eastern Regulatory Area is specified by the Council each year. However, management of this fishery is deferred to the State of Alaska with Council oversight.

Biological Reference Points

A number of biological reference points are used in this SAFE. Among these are the fishing mortality rate (F) and stock biomass level (B) associated with MSY (F_{MSY} and B_{MSY} , respectively). Fishing mortality rates reduce the level of spawning biomass per recruit to some percentage P of the pristine level ($F_{P\%}$). Fishing mortality rate reduces the slope of the yield per recruit curve (plotted against F) to 10% of the slope at the origin ($F_{0.1}$). The fishing mortality rate used to compute ABC is designated F_{ABC} , and the fishing mortality rate used to compute the overfishing level (OFL) is designated F_{OFL} .

Definition of Acceptable Biological Catch and the Overfishing Level

Amendment 56 to the GOA Groundfish FMP, approved by the Council in June 1998, defines ABC and OFL for the GOA groundfish fisheries. The new definitions are shown below, where the fishing mortality rate is denoted F , stock biomass (or spawning stock biomass, as appropriate) is denoted B , and the F and B levels corresponding to MSY are denoted F_{MSY} and B_{MSY} respectively.

Acceptable Biological Catch is a preliminary description of the acceptable harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is capped as described under “overfishing” below.

Overfishing is defined as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is reliable for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For tier (1), a pdf refers to a probability density function. For tiers (1-2), if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For tiers (1-5), if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For tiers (1-3), the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers (2-4), a designation of the form “ $F_{X\%}$ ” refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to X% of the equilibrium level of spawning per recruit in the absence of any fishing. If

Tier	1)	Information available: <i>Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.</i>
	1a)	Stock status: $B/B_{MSY} > 1$ $F_{OFL} = \mu_A$, the arithmetic mean of the pdf $F_{ABC} \leq \mu_H$, the harmonic mean of the pdf
	1b)	Stock status: $\alpha < B/B_{MSY} \leq 1$ $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
	1c)	Stock status: $B/B_{MSY} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$
	2)	Information available: <i>Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{35\%}$, and $F_{40\%}$.</i>
	2a)	Stock status: $B/B_{MSY} > 1$ $F_{OFL} = F_{MSY}$ $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$
	2b)	Stock status: $\alpha < B/B_{MSY} \leq 1$ $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
	2c)	Stock status: $B/B_{MSY} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$
	3)	Information available: <i>Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.</i>
	3a)	Stock status: $B/B_{40\%} > 1$ $F_{OFL} = F_{35\%}$ $F_{ABC} \leq F_{40\%}$
	3b)	Stock status: $\alpha < B/B_{40\%} \leq 1$ $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
	3c)	Stock status: $B/B_{40\%} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$
	4)	Information available: <i>Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.</i> $F_{OFL} = F_{35\%}$ $F_{ABC} \leq F_{40\%}$
	5)	Information available: <i>Reliable point estimates of B and natural mortality rate M.</i> $F_{OFL} = M$ $F_{ABC} \leq 0.75 \times M$
	6)	Information available: <i>Reliable catch history from 1978 through 1995.</i> $OFL =$ the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information $ABC \leq 0.75 \times OFL$

reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For tier (3), the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F = F_{40\%}$.

Overview of Stock Assessments

The current status of individual groundfish stocks managed under the FMP is summarized in this section.

The abundances of Pacific cod, Pacific ocean perch, northern rockfish, dusky rockfish, thornyheads, flathead sole, Dover sole, and arrowtooth flounder are above target stock size. The abundances of pollock and sablefish are below target stock size. The relative abundances of other deep-water flatfish, shallow-water flatfish, rex sole, shortraker rockfish, roughey rockfish, demersal shelf rockfish, other pelagic shelf rockfish, other slope rockfish, Atka mackerel, and skates are unknown.

Tables 1 and 2 provide a summary of the current status of the groundfish stocks, including catch statistics, ABCs, and TACs for 2004, and recommendations for ABCs and overfishing levels (OFLs) for 2005 and 2006. The added year was included to assist NMFS management since the TAC setting process allows for a period of up to two years to review harvest specifications. Fishing mortality rates (F) and OFLs used to set these specifications are listed in Table 3. ABCs and TACs are specified for each of the Gulf of Alaska regulatory areas illustrated in Figure 1. Table 4 provides a list of species for which the ABC recommendations are below the maximum permissible. Table 5 provides historical groundfish catches in the GOA, 1956-2004.

The sum of the preliminary 2005, 2006 ABCs for target species are 539,263 mt (2005), 542,456 mt (2006) which are within the FMP-approved optimum yield (OY) of 116,000 - 800,000 mt for the Gulf of Alaska. The sum of 2005 and 2006 OFLs are 713,667 mt and 662,918 mt, respectively. The Team notes that because of halibut bycatch mortality considerations in the high-biomass flatfish fisheries, an overall OY for 2005 will be considerably under this upper limit. For perspective, the sum of the 2004 TACs was 271,776 mt, and the sum of the ABCs was 506,642 mt.

The following conventions in this SAFE are used:

- (1) "Fishing mortality rate" refers to the full-selection F (i.e., the rate that applies to fish of fully selected sizes or ages). A full-selection F should be interpreted in the context of the selectivity schedule to which it applies.
- (2) For consistency and comparability, "exploitable biomass" refers to projected age+ biomass, which is the total biomass of all cohorts greater than or equal to some minimum age. The minimum age varies from species to species and generally corresponds to the age of recruitment listed in the stock assessment. Trawl survey data may be used as a proxy for age+ biomass. The minimum age (or size), and the source of the exploitable biomass values are defined in the summaries. These values of exploitable biomass may differ from listed in the corresponding stock assessments if the technical definition is used (which requires multiplying biomass at age by selectivity at age and summing over all ages). In those models assuming knife-edge recruitment, age+ biomass and the technical definitions of exploitable biomass are equivalent.
- (3) The values listed as 2003 and 2004 ABCs correspond to the values (in mt) approved by NMFS. The Council TAC recommendations for pollock were modified to accommodate revised area apportionments in the measures implemented by NMFS to mitigate pollock fishery interactions with Steller sea lions and for Pacific cod removals by the State water fishery of not more than 25% of the Federal TAC. The values listed for 2005 and 2006 correspond to the Plan Team recommendations.
- (4) The exploitable biomass for 2003 and 2004 that are reported in the following summaries were estimated by the assessments in those years. Comparisons of the projected 2005 biomass with previous years' levels should be made with biomass levels from the revised hindcast reported in each assessment.
- (5) The values used for 2006 were either rolled over (typically for Tier 4 and below) or based on projections. Note that projection values often assume catches and hence their values are likely to change (as are the Tier 4 and lower numbers when new data become available).

Rockfish harvest strategy evaluations

Recently, the use of the $F_{40\%}$ harvest strategy has come into question for rockfish in an NPFMC harvest strategy review. Adoption of a more conservative strategy such as $F_{50\%}$ has been suggested for West Coast rockfish in recent literature. These papers do not apply particularly well to Gulf of Alaska rockfish, which likely are more resilient than West Coast stocks. At this year's meeting, additional analyses on rockfish issues (slope rockfish section below) were presented and for Pacific ocean perch, the results suggested that the $F_{40\%}$ was sufficiently precautionary. Therefore, we recommend continuing to harvest at $F_{40\%}$ for stocks where reliable harvest rate estimates are available, unless new information suggests otherwise. An analysis on age-specific reproductive viability was presented that showed the effect on SPR rate calculations. Two alternative projection methods (a management strategy evaluation) were presented. These methods illustrate that the level of uncertainty is much greater than what is typically presented in the SAFE report. This work is part of the continuing research on Management Strategy Evaluations.

Stock status summaries

1. Walleye Pollock

Status and catch specifications (mt) of pollock and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2005 and 2006 are those recommended by the Plan Team. Catch data are current through 11/06/2004. The W/C/WYK ABC for 2006 is projected assuming 2005 catch equals 106,530 mt. Similarly, the OFL value for 2006 assumes that the 2005 catch equals the 2005 OFL (153,030 mt). Note that the projections for 2006 are subject to change in 2005. The 2005 and 2006 ABCs are reduced by 910 mt to accommodate the anticipated Prince William Sound GHL.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
GOA	2003	727,830	86,710	54,350	54,350	49,300
	2004	769,420	99,750	71,260	71,260	61,073
	2005	765,180	153,030	91,710		
	2006		111,940	91,910		
W/C/WYK	2003	699,120	78,020	47,950	47,950	49,300
	2004	740,440	91,060	64,740	64,740	61,073
	2005	736,200	144,340	85,190		
	2006		103,250	85,390		
EYK/SEO	2003	28,710	8,610	6,460	6,460	0
	2004	28,980	8,690	6,520	6,520	0
	2005	28,980	8,690	6,520		
	2006		8,690	6,520		

The age-structured model developed using AD Model Builder and used for GOA Pollock assessments in 1999-2003 is fundamentally unchanged. This year's pollock chapter features the following new data: (1) total catch and age composition from the 2003 fishery; (2) biomass and age composition from the 2004 Shelikof Strait echo integration trawl (EIT) survey; and (3) biomass and length composition from the 2004 ADF&G crab/groundfish trawl survey.

The 2003 NMFS bottom trawl survey biomass estimate increased 86% over a comparable area surveyed in 2001. The 2004 Shelikof Strait EIT survey biomass estimate increased 8% over the 2003 estimate. Biomass estimates of Shelikof Strait fish ≥ 43 cm (a proxy for spawning biomass) increased approximately five-fold from the 2003 estimate, primarily due to maturation of the relatively strong 1999 year class. The 2004 ADF&G crab/groundfish survey biomass estimate increased 48% from 2003. Increases in spawning biomass are due to maturation of the relatively strong 1999 and 2000 year classes.

However, spawning biomass is projected to peak in 2005 and decline in following years due to a lack of significant recruitment since the 2000 year class.

The stock assessment authors evaluated five models: Model 1 estimated the NMFS trawl survey catchability; Model 2a fixed trawl survey catchability at 1.0 (similar to previous assessments) and estimated other catchabilities; Model 2b is configured as 2a, except for a temporary change to $F_{50\%}$ in 2005 and 2006; Model 2c was similar to 2a, except that the 1999 year class was assumed to be average in abundance for yield projections (the authors' and Plan Team's 2004 ABC recommendation was based on this assumption as a precautionary measure); Model 3 was similar to 2a, except that the weights used to fit the model to the ADF&G survey time series were reduced; Model 4 was similar to 2a, except that the weights used to fit the model to the EIT survey time series were reduced.

The Plan Team concurred with the authors' choice of Model 2 configuration for assessment results, but did not concur with the authors' recommendation in selecting Model 2b (temporary change to $F_{50\%}$ in 2005 and 2006) for yield projections. The Plan Team concurred with the authors on the use of Model 2 estimate of the 1999 year class (1.2 billion recruits) for projections. While successive annual assessments have continued to reduce the estimated strength of the 1999 year class, the percent change in the estimate is considerably smaller than in previous estimates, suggesting it is reasonable to expect some consistency in subsequent assessments. The uncertainty about the mean estimate of the 1999 year class suggests a very low probability that the true mean is as low as the average estimated recruitment value of 0.8 billion recruits.

The Plan Team agrees with the authors' concerns about the apparent lack of strong recruitment since the 2000 year class, the lower than expected spawning biomass estimates for Shelikof Strait, and the projected decline in biomass after 2005. However, the Plan Teams disagreed on the appropriate response to capture these concerns and uncertainty. The authors recommended a temporary change to an adjusted $F_{50\%}$ harvest rate in 2005 and 2006 to stabilize yields over the short-term, reduce the rate of biomass decline, and at the same time address any residual concerns about the strength of the 1999 year class. While the Plan Team supported these motivating factors, they disagreed on the selection of an appropriate SPR rate, i.e., the selection of $F_{50\%}$ and the time frame under which to apply this rate. As a way to capture elements of pollock stock biomass uncertainty and risk aversion, the Plan Team used the average of the 2004 ABC of 65,660 mt and the projected 2005 yield from an adjusted $F_{40\%}$ harvest strategy (constant buffer) of 106,530 mt for a **recommended 2005 pollock ABC of 86,100 mt** for GOA waters west of 140 degrees W. longitude (Note that this ABC recommendation includes the 910 mt for Prince William Sound). This harvest level also coincides closely with Scenario 4 of the projections where the recent 5-year average fishing mortality is used. The Team felt that a harvest level where the fishing mortality was held stable (rather than increasing) added an appropriate level of precaution.

Model 2a results produced an estimated 2005 spawning biomass of 213,200 mt, or 37% of unfished spawning biomass. The $B_{40\%}$ estimate is 229,100 mt. Because model estimated 2005 female spawning biomass is below $B_{40\%}$, Gulf of Alaska pollock are in Tier 3b. The projected 2005 age-3+ biomass estimate is 736,200 mt. Markov Chain Monte Carlo analysis indicated the probability of the stock being below $B_{20\%}$ to be less than 1% in 2005 and subsequent years. The 2005 OFL under Tier 3b is 144,340 mt.

No new survey information is available for pollock east of 140 degrees W. longitude (Southeast Alaska). Southeast Alaska pollock are in Tier 5 and the ABC and OFL recommendations based on natural mortality (0.30) and the biomass from the 2003 survey remain the same: **2005 Southeast pollock ABC of 6,520 and 2005 OFL of 8,690 mt.**

Area apportionments, including deduction of 910 mt for the state managed pollock fishery in Prince William Sound, are tabulated below.

Area apportionments for 2005 and 2006 pollock ABCs for the Gulf of Alaska (mt).						
Year	610	620	630	640	650	
	W	Central	Central	W. Yakutat	E.Yak/SE	Total
2005	30,380	34,404	18,718	1,688	6,520	91,710
2006	30,452	34,485	18,762	1,691	6,520	91,910

2. Pacific Cod

Status and catch specifications (mt) of Pacific cod and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch includes state management fisheries current through 11/06/2004.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
GOA	2003	428,000	70,100	52,800	40,540	52,500
	2004	501,000	102,000	62,810	41,076	54,590
	2005	472,000	86,200	58,100		
	2006		65,800	51,100		

The model specified was the same as in the past, updated with new fishery data.

The author described a new method for adjusting the maximum permissible ABC according to a risk-averse procedure that accounts for catch variability using the projection model. The previous calculations of risk-averse adjustments began in 1997 and were recomputed each year until 1999. During 2000-2003 the average adjustment factor of 0.87 was used. The Team accepted the ABC from the new approach since new data have been incorporated and the previous analysis had not been updated in five years. The author indicated that the approach is likely to change next year when an alternative model is presented. The Team therefore felt that this approach is acceptable for the interim but that as modeling work continues, modifications are likely and the current method may not be broadly applicable.

The current biomass in this year's assessment places the GOA Pacific cod stock in Tier 3a. Estimated 2005 spawning stock biomass is 91,700 mt, a decrease of 11% from the 2004 estimate but is above the $B_{40\%}$ value of 84,400 mt. The Team concurred with the author's recommendation to set the 2005 ABC at 58,100 mt (and 51,100 mt for 2006), corresponding to a fishing mortality rate of 0.24. The 2005 OFL under Tier 3a is estimated at 86,200 mt (65,800 mt for 2006), corresponding to a fishing mortality rate of 0.36. The Team concurred with the author's recommendation to apportion the 2005 and 2006 ABC according to the average of biomass distribution in the three most recent surveys:

	Apportionment	2005	2006
East	7%	4,067	3,577
Central	57%	33,117	29,127
West	36%	20,916	18,396
Total		58,100	51,100

3. Sablefish

Status and catch specifications (mt) of sablefish and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch data are current through 11/06/2004.						
Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2003	182,000	20,020	14,890	14,890	14,345
	2004	179,000	22,160	16,550	16,550	14,847
	2005	185,000	19,280	15,940		
	2006		17,530	15,105		

Sablefish are assessed as a single stock for the GOA and BSAI areas. This year's sablefish assessment contains the following new information: relative abundance and length data from the 2004 longline survey, relative abundance and length data from the 2003 longline fishery, and age data from the 2003 longline survey and longline fisheries.

The 2004 sablefish longline survey abundance index decreased 5% in weight for the combined stock compared to 2003, following an 8% decrease from 2002 to 2003. This decrease follows recent increases from low levels in 1994-1995. The relative abundance in 2004 is 4% higher than in 2000. The fishery abundance index decreased 12% from 2002 to 2003 (2004 data is not yet available).

Spawning biomass is projected to decrease by 2% from 2004 to 2005 and be at 37% of the unfished level. The 1997 year class is an important part of the recent increase in total biomass and is projected to account for 23% of 2005 spawning biomass. The recent increase in biomass appears to have peaked and spawning biomass projections will depend on the strength of upcoming year classes. The 1998 year class, once expected to be strong, appears to be average. The strength of more recent year classes is not yet known. While the overall stock abundance has increased in recent years, a consistent decline in biomass in the West Yakutat and Southeast/East Yakutat areas since the early 1990's was noted as a point of concern. The Eastern Gulf of Alaska is considered an important spawning area for the combined Alaska sablefish stock.

The SSC has determined that this stock is in Tier 3b. The estimated 2005 spawning biomass is 204,000 mt and below $B_{40\%}$ (223,000 mt). The maximum permissible ABC under Tier 3b ($F_{40\%}$ adjusted from 0.112 to 0.102) is 21,000 mt for all areas combined (GOA and BSAI). The OFL fishing mortality rate is 0.124 which translates into a 2005 OFL (combined areas) of 25,400 mt. Model projections indicate that this stock is neither overfished nor approaching an overfished condition. The Teams concurred with the authors' recommendation for the combined ABC and OFL.

Area apportionments for the 2005 ABC are based on a 5-year exponential weighting of the survey and fishery indices of relative population weight. The 2005 ABC is apportioned as Bering Sea 2,440 mt, Aleutian Islands 2,620 mt, and the Gulf of Alaska 15,940 mt. The GOA is further apportioned as Western 2,540 mt, Central 7,250 mt, West Yakutat 2,390 mt and East Yakutat/Southeast 3,760 mt. After adjusting for the 95:5 hook-and-line:trawl split in the Eastern Gulf of Alaska, the ABC for West Yakutat is 2,580 mt and for East Yakutat / Southeast is 3,570 mt.

The combined stock 2005 OFL of 25,400 mt is apportioned by region to the Bering Sea (2,950 mt), Aleutian Islands (3,170 mt), and Gulf of Alaska (19,280 mt) by the same method as the ABC apportionments.

Area apportionments of GOA sablefish ABC's (adjusted for the 95:5 gear split in the Eastern Gulf of Alaska) for 2005 are:

Western	Central	West Yakutat	E.Yak./SE	Total
2,540	7,250	2,580	3,570	15,940

Projected values for 2006 ABC and OFL are provided. At this time ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL.

Apportionments to region and areas in 2006 are in proportion to the 2005 apportionments. The 2006 GOA ABC is 15,105 mt apportioned: 2,407 mt in the Western, 6,870 mt in the Central, 2,445 mt in West Yakutat, and 3,383 mt in Southeast/East Yakutat. The projected 2006 Gulf of Alaska OFL is 17,530 mt.

Area apportionments of GOA sablefish ABC's (adjusted for the 95:5 gear split in the E. GOA) for 2006 are:

Western	Central	West Yakutat	E.Yak./SE	Total
2,407	6,870	2,445	3,383	15,105

These values are subject to change prior to the 2006 fishery pending new information and assessment.

4. Flatfish

Status and catch specifications (mt) of flatfish management categories and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Deep water complex	2003	68,260	6,430	4,880	4,880	950
	2004	99,620	8,010	6,070	6,070	680
	2005		8,490	6,820		
	2006		8,490	6,820		
Rex sole	2003	71,330	12,320	9,470	9,470	3,330
	2004	99,950	16,480	12,650	12,650	1,460
	2005		16,480	12,650		
	2006		16,480	12,650		
Shallow water complex	2003	349,990	61,810	49,340	21,620	4,470
	2004	375,950	63,840	52,070	20,740	2,940
	2005		63,840	52,070		
	2006		63,840	52,070		
Flathead sole	2003	291,420	51,560	41,390	11,150	2,000
	2004	292,670	64,750	51,720	10,880	2,390
	2005		56,500	45,100		
	2006		53,800	42,850		
Arrowtooth flounder	2003	1,813,980	181,390	155,140	38,000	23,320
	2004	2,453,390	228,130	194,930	38,000	15,220
	2005		253,900	216,900		
	2006		270,050	230,740		

Area apportionment for 2005 flatfish					
Flatfish species or group	Western	Central	WYAK	EYAK/SE	Total
Deep water complex	330	3,340	2,120	1,030	6,820
Rex sole	1,680	7,340	1,340	2,290	12,650
Shallow water complex	21,580	27,250	2,030	1,210	52,070
Flathead sole	11,690	30,020	3,000	390	45,100
Arrowtooth flounder	26,250	168,950	11,790	9,910	216,900

Deep water flatfish

Status and catch specifications (mt) of **deep water flatfish (including Dover sole)** and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Year	Biomass	OFL	ABC	TAC	Catch
2003	68,260	6,430	4,880	4,880	950
2004	99,620	8,010	6,070	6,070	680
2005		8,490	6,820		
2006		8,490	6,820		

The deep water flatfish complex is made up of Greenland turbot, deep sea sole and Dover sole. The 2004 exploitable biomass for Greenland turbot and deep sea sole was based on results from the 2003 NMFS trawl survey which only went to a depth of 700 m. Greenland turbot and deep-sea sole ABC's were estimated at Tier 6 with $ABC=0.75$ OFL and $OFL=$ average catch from 1978 to 1995. Dover sole estimates within the deep water flatfish complex are described below. Total deep water flatfish ABC for 2005 was 755 mt greater than the 2004 estimate. Total deep water flatfish OFL for 2005 was 480 mt greater than the 2004 estimate.

Area apportionments of deep water flatfish ABC's for 2005 (using $F_{40\%}$) are based on the fraction of the 2003 survey biomass in each area.

Western	Central	West Yakutat	East Yakutat/SE	Total
330	3,340	2,120	1,030	6,820

Dover sole

Status and catch specifications (mt) of **Dover sole** in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 10/08/2004 (note that Dover sole are managed as part of the deep water flatfish complex).

Year	Biomass	OFL	ABC	TAC	Catch
2003	68,210				950
2004	99,330	7,760	5,880	5,880	682
2005	102,395	8,240	6,640		
2006		8,240	6,640		

Dover sole remained a part of the deep water flatfish complex although a new age-based model with age and length data was presented. Survey biomass estimates, survey age and length data, and fishery length data were used in the model. The Dover sole assessment now falls under a Tier 3a assessment. The 2005 ABC using $F_{40\%}=0.121$ was estimated at 6,642 mt, which was 755 mt greater than the 2004 ABC. The 2005 OFL using $F_{35\%}=0.152$ was estimated at 8,241 mt, which was 480 mt greater than the 2004 OFL.

Rex Sole

Status and catch specifications (mt) of rex sole and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Year	Biomass	OFL	ABC	TAC	Catch
2003	71,330	12,320	9,470	9,470	3,330
2004	99,950	16,480	12,650	12,650	1,460
2005		16,480	12,650		
2006		16,480	12,650		

No new data were used for the 2005 assessment of rex sole. The 2003 trawl survey biomass estimates were used to calculate ABC's for 2005. The ABC's for rex sole were estimated with $F_{ABC}=0.75$ $M=0.15$ and $F_{OFL}=M=0.2$ (Tier 5).

Area apportionments of rex sole ABC's for 2005 (using $F_{40\%}$) are based on the fraction of the 2003 survey biomass in each area.

Western	Central	West Yakutat	East Yakutat/SE	Total
1,680	7,340	1,340	2,290	12,650

Shallow water flatfish

Status and catch specifications (mt) of shallow water flatfish and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Year	Biomass	OFL	ABC	TAC	Catch
2003	349,990	61,810	49,340	21,620	4,470
2004	375,950	63,840	52,070	20,740	2,940
2005	375,950	63,840	52,070		
2006		63,840	52,070		

The shallow water complex is made up of northern rock sole, southern rock sole, yellowfin sole, butter sole, starry flounder, English sole, sand sole, and Alaska plaice. No new data were used for the 2005 assessment of shallow water flatfish. The 2003 survey biomass estimates were used to calculate ABC's for 2005. The 2005 exploitable biomass for each group is based on results from the 2003 NMFS trawl survey. ABC and OFL were calculated by species, with individual species identified as Tier 4, or 5, depending upon the available data. The ABC's for northern and southern rock sole were estimated based on Tier 4 with $F_{ABC}=F_{40\%}$ (southern rock sole $F_{40\%}=0.162$; northern rock sole $F_{40\%}=0.204$) and $F_{OFL}=F_{35\%}$ (southern rock sole $F_{35\%}=0.192$; northern rock sole $F_{35\%}=0.245$) while other flatfish ABC's were estimated with $F_{ABC}=0.75$ M and $F_{OFL}=M$ (Tier 5). Total shallow water flatfish complex ABC and OFL for 2005 was the same as 2004.

Area apportionments of shallow water flatfish ABC's for 2005 (using $F_{40\%}$) are based on the fraction of the 2003 survey biomass in each area.

Western	Central	West Yakutat	East Yakutat/SE	Total
21,580	27,250	2,030	1,210	52,070

5. Arrowtooth flounder

Status and catch specifications (mt) of arrowtooth flounder and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Year	Biomass	OFL	ABC	TAC	Catch
2003	1,813,980	181,390	155,140	38,000	23,320
2004	2,453,390	228,130	194,930	38,000	15,220
2005		253,900	216,900		
2006		270,050	230,740		

The 2005 exploitable arrowtooth flounder biomass is estimated with an age-based model. This model uses the same configuration as the 2002 assessment model, updated with 2003 catch and fishery length data and 2004 catch projection data. Data from halibut trawl surveys in the 1960's, groundfish trawls in the 1970's, and NMFS triennial trawl surveys from 1984 to 2003 were included in the model. Fishery selectivities were estimated using a smoothing function as in the 2002 assessment model. Like previous assessments, natural mortality for males was set higher than for females to obtain a sex ratio of about 70% females in the population. Length composition data were fit using a fixed length-age transition matrix estimated from survey length at age data.

Similar to last year, the ABC estimate was based on Tier 3a calculations where the estimated 2005 female spawning biomass is greater than the $B_{40\%}$ estimate. Therefore, $F_{OFL}=F_{35\%}=0.168$ and $F_{ABC}=F_{40\%}=0.142$, resulting in an ABC recommendation of 216,900 mt. This ABC is 21,970 mt larger than last year's estimate of 194,930 mt. The projected ABC for 2006 is 230,740, and the 2006 OFL is 270,050 mt.

Area apportionments of arrowtooth flounder ABC's for 2005 (using $F_{40\%}$) are based on the fraction of the 2003 survey biomass in each area.

Western	Central	West Yakutat	East Yakutat/SE	Total
26,250	168,950	11,790	9,910	216,900

6. Flathead sole

Status and catch specifications (mt) of flathead sole and projections for 2005 and 2006. ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Year	Biomass	OFL	ABC	TAC	Catch
2003	291,420	51,560	41,390	11,150	2,220
2004	292,670	64,750	51,720	10,880	2,390
2005	292,670	56,500	45,100		
2006		53,800	42,850		

The 2005 exploitable flathead sole biomass is estimated with an age-based model. This model uses the same configuration as the 2002 assessment model, updated with 2003 catch and fishery length data and 2004 catch projection data. Analysis of maturity by age and length for the 2003 assessment was used to estimate fishing mortality values. The Plan Team concludes that reliable estimates of $B_{40\%}$ exist and that the projected 2004 female spawning biomass was estimated well above the $B_{40\%}$ level. Therefore, flathead sole would be in Tier 3a of the ABC and overfishing definitions. Under this definition, $F_{OFL}=F_{35\%}$, and F_{ABC} is less than or equal to $F_{40\%}$. The ABC for 2005 using $F_{40\%}=0.47$ was estimated at 45,100 mt which is 8,250 mt lower than the 2004 ABC. The overfishing level using $F_{35\%}=0.63$, results in 56,500 mt.

Area apportionments of flathead sole ABC's for 2005 (using $F_{40\%}$) are based on the fraction of the 2003 survey biomass in each area.

Western	Central	West Yakutat	East Yakutat/SE	Total
11,690	30,020	2,990	390	45,100

Slope rockfish

Status and catch specifications (mt) of slope rockfish management category and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. For stocks where age-structured assessments are available, ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch data are current through 11/06/2004.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Pacific ocean perch	2003	335,457	16,240	13,660	13,660	10,861
	2004	285,066	15,840	13,340	13,340	11,518
	2005	286,367	16,266	13,575		
	2006		15,887	13,292		
Northern rockfish	2003	112,072	6,560	5,530	5,530	5,343
	2004	104,438	5,790	4,870	4,870	4,736
	2005	108,274	6,050	5,091		
	2006		5,640	4,750		
Shortraker & roughey	2003	66,830	2,340	1,620	1,620	1,402
	2004	73,000	2,510	1,318	1,318	973
Shortraker rockfish	2005	32,723	982	753		
	2006		982	753		
Roughey rockfish	2005	40,281	1,531	1,007		
	2006		1,531	1,007		
Other slope rockfish	2003	107,960	6,610	5,040	990	1,072
	2004	89,460	5,150	3,900	670	872
	2005	89,460	5,150	3,900		
	2006		5,150	3,900		

Area apportionments of ABC for slope rockfish for 2005.

Species	Western	Central	Eastern	West		Total
				Yakutat	East Yak./SE	
Pacific ocean perch	2,567	8,535		841	1,632	13,575
Northern rockfish	808	4,283				5,091
Shortraker rockfish	155	324	274			753
Roughey rockfish	188	557	262			1,007
Other slope rockfish	40	300		130	3,430	3,900

For 2005, GOA slope rockfish have been moved to a biennial stock assessment schedule to coincide with new survey data. This year's SAFE chapters consist of executive summaries with appendices.

7. Pacific ocean perch

Status and catch specifications (mt) of Pacific ocean perch and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC for 2006 is projected assuming 2005 catch equals the ABC and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch data are current through 11/06/2004.

Species	Year	Biomass ¹	OFL	ABC	TAC	Catch
Pacific ocean perch	2003	335,457	16,240	13,660	13,660	10,745
	2004	285,066	15,840	13,340	13,340	11,518
	2005	286,367	16,266	13,575		
	2006		15,887	13,292		

¹Total biomass from the age-structured model

The generic rockfish model continues to be the primary assessment tool. The model was constructed with AD Model Builder software. The model is a separable age-structured model with allowance for size composition data. The data sets used included total catch biomass for 1961-2004; size compositions from the fishery for 1963-77 and 1990-97; trawl survey age compositions for 1984-1999; fishery age composition for 1998-2002; and survey biomass estimates for 1984-2003. The new data in the model were updated 2002 and 2003 catches and estimated 2004 catch.

The ABC is based on Tier 3a. The estimated 2005 female spawning biomass of 92,400 mt is greater than $B_{40\%}$ (86,160 mt), where $B_{40\%}$ is determined from the average recruitment of the 1977-1997 year classes. The estimate of $F_{40\%}$ is 0.060. According to the definition for Tier 3a, F_{ABC} is ≤ 0.060 , so that $ABC \leq 13,575$ mt. The Plan Team concurred that the 2005 ABC for Pacific ocean perch be set at 13,575 mt. This ABC is similar to last year's ABC of 13,340 mt. The stock is neither overfished, nor approaching an overfished status. The OFL ($F_{35\%} = 0.071$) is 16,266 mt.

The Team and authors also concurred with the method of ABC apportionment used in the past. This results in weighting of 4:6:9 for biomass in the 1999, and 2001, and 2003 surveys, respectively, and area apportionments of 19% for the Western area, 63% for the Central area, and 18% for the Eastern area. Therefore, recommended ABCs for 2005 are 2,567 mt for the Western area, 8,535 mt for the Central area, and 2,473 mt for the Eastern area. Using the same apportionment produces OFLs of 3,076 mt in the Western area, 10,226 mt in the Central area, and 2,964 mt in the Eastern area.

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. Since Pacific ocean perch are caught exclusively with trawl gear, there is concern that the entire Eastern area TAC not be taken in the area between 140° and 147° W longitude, that remains open to trawling. Thus, as was done last year, the Team recommends that a separate ABC be set for Pacific ocean perch in WYAK. The weighted average method described above results in a point estimate of 0.22 for the proportion of the exploitable biomass in the Eastern area that occurs in WYAK. However, there is considerable uncertainty in this estimate. In an effort to balance this uncertainty with associated costs to the industry, the Team recommends that apportionments to WYAK be based on the weighted average of the upper 95% confidence limit of the proportion of biomass in WYAK (0.34). This corresponds to an ABC of 841 mt for WYAK. Under this apportionment strategy, very little of the 1,632 mt assigned to the remaining Eastern area (East Yakutat/Southeast Outside area) is expected to be harvested.

Recently, there has been a heightened interest in management strategy evaluation and better ways to capture the real uncertainty in projections of future spawning biomass and catches. In attachment 7C, two preliminary alternative methods of projecting the GOA Pacific ocean perch stock into the future are compared to the standard method used by stock assessment scientists.

Last year the SSC stated general concerns about possible age-distribution truncation in rockfish, because fecundity and larval success for older rockfish may be much higher. In attachment 7B a simple analysis applying data for black rockfish to GOA Pacific ocean perch is presented. Here the maturity curve for Pacific ocean perch is adjusted to reflect possibly better larval viability spawned from older females. This

analysis shows a 3% decrease in spawning biomass and a 14% decrease in projected ABC. Research similar to the recent work conducted for black rockfish should be initiated for other rockfish such as Pacific ocean perch.

8. Northern Rockfish

Status and catch specifications (mt) of northern rockfish and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC for 2006 is projected assuming 2005 catch equals the ABC, and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch data are current through 11/06/2004.

	Species	Year	Biomass ¹	OFL	ABC	TAC	Catch
	Northern rockfish	2003	112,072	6,560	5,530	5,530	5,343
		2004	104,438	5,790	4,870	4,870	4,736
		2005	108,274	6,050	5,091		
		2006		5,640	4,750		

¹Total biomass from the age-structured model

The generic rockfish model continues to be the primary assessment tool. There are no changes in the model from that used in last year's SAFE. The only new data in the model were the updated 2002 and 2003 fishery catches and estimated 2004 fishery catch.

Tier 3a is used to compute ABC and OFL. Current female spawning biomass ($B_{2005} = 38,272$ mt) is greater than $B_{40\%}$ (24,693 mt) where $B_{40\%}$ is determined from the average recruitment of the 1977-95 year classes. The current estimate of $F_{40\%}$ is 0.057. Applying Tier 3a results in $F_{ABC} \leq 0.057$ and an $ABC \leq 5,093$ mt. The authors and Plan Team recommended that the ABC for northern rockfish for the 2005 fishery in the GOA be set at 5,091 mt. The overfishing level based on Tier 3a ($F_{35\%} = 0.068$) is 6,050 mt.

Apportioning the ABC based on the same method used for Pacific ocean perch results in ABCs of 808 mt in the Western area and 4,283 mt in the Central area, and 2 mt in the Eastern area. Northern rockfish are combined with other slope rockfish in the Eastern area.

9. Shortraker, rougheye, and other slope rockfish

Status and catch specifications (mt) of shortraker, rougheye, and other slope rockfish management category and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

	Species	Year	Biomass ¹	OFL	ABC	TAC	Catch
	Shortraker & rougheye	2003	66,830	2,340	1,620	1,620	1,560
		2004	73,000	2,510	1,318	1,318	973
	Shortraker rockfish	2005	32,723	982	753		
		2006		982	753		
	Rougheye rockfish	2005	40,281	1,531	1,007		
		2006		1,531	1,007		
	Other slope rockfish	2003	107,960	6,610	5,040	990	1,072
		2004	89,460	5,150	3,900	670	872
		2005	89,460	5,150	3,900		
		2006		5,150	3,900		

¹Exploitable biomass based on trawl surveys.

The average of the exploitable biomasses in the three most recent trawl surveys (1999, 2001, and 2003) continues to be used to determine current exploitable biomass. This results in an exploitable biomass of 73,000 mt for shortraker/rougheye and 89,460 mt for "other" slope rockfish. The SSC has determined that reliable estimates of natural mortality exist for shortraker and "other" slope rockfish, thereby

qualifying for management under Tier 5. As in the past, the Plan Team recommends setting F_{ABC} at the maximum permissible rate of $0.75 \times M$ for shortraker and “other” slope rockfish, excluding sharpchin. The recommended F_{ABC} for shortraker rockfish is 0.023 (i.e., 0.75×0.03) and for “other” slope species is 0.038 (i.e., 0.75×0.05). Applying the definitions for ABC and OFL places rougheye and sharpchin rockfish in Tier 4 that allows for a $F_{ABC} = F_{40\%}$. But, as in the past, we recommend a lower harvest rate by applying $F_{ABC} = M$. This results in an F_{ABC} of 0.025 for rougheye rockfish and 0.05 for sharpchin.

At its December 2003 meeting, the SSC decided that to protect shortraker rockfish from disproportionate harvest within the shortraker/rougheye group, the historical method of determining ABC should be replaced by a new method: divide the ABC for shortraker rockfish by the estimated proportion of shortraker in the shortraker/rougheye catch. An important requirement of the computations in the new method is an accurate estimate of the proportion of the shortraker catch within the shortraker/rougheye group. Because the estimated proportion of the shortraker catch presented in the November 2003 SAFE report may have been biased, the SSC requested that new estimates be computed. The new estimates were based on the NMFS Alaska Regional Office catch accounting system rather than data from the Observer Program. This resulted in an ABC of 1,320 mt for shortraker/rougheye rockfish.

Attachment 9A of this year’s SAFE report presents alternative methods for computing ABC’s for shortraker/rougheye rockfish. This document contends that the data from the observer program provides the best available estimate of species composition in the catch and results in an ABC of 1,020 mt. The Plan Team reviewed the alternative methods and concluded that a logical management step is to establish separate ABC’s for each species. This results in recommended 2005 ABCs of 753 mt for shortraker rockfish and 1,007 mt for rougheye rockfish and OFLs of 982 for shortraker rockfish and 1,531 for rougheye rockfish.

If adopted, management of these two species in the GOA would be consistent with that in the BSAI, where separate ABCs for shortraker and rougheye were initiated in 2004. The Plan Team noted the difficulty in obtaining accurate species catch identification for shortraker and rougheye rockfish, especially from the longline fishery. Species identification is less of a problem in the BSAI, where observer coverage rates are relatively high for both trawl and longline vessels. In the GOA, however, observer coverage is low or non-existent on the small vessels that comprise most of the longline fleet. Successful management of shortraker and rougheye rockfish separately depends on accurate species identifications from fishermen and processors. A cooperative research project involving the Alaska Longline Fishermen’s Association and NMFS is planned for 2005 to obtain information on the species catch composition from un-observed longline vessels in the Gulf of Alaska. The project will also train shoreside processing crews to correctly identify the two species. Follow-up investigations will assess the success of the training program.

For “other” slope rockfish, applying the combination of F rates results in an ABC of 3,900 mt and an OFL of 5,150 mt. The Plan Team expressed concern about exceeding ABC for other slope rockfish in the Western and in Central areas in 2004. The Team noted that the ABC was exceeded by 600% in the WGOA and 176% in the CGOA. The impact of this should be investigated in future assessments when new survey data are available.

Attachment 9B contains a preliminary age structured model for rougheye rockfish. Recently, two years of survey age composition data became available for rougheye rockfish. The primary difference for rougheye rockfish is the incorporation of data from the sablefish longline survey. Two models were presented which incorporated all the available rougheye rockfish data. These models provided reasonable fits to the data. With improvements, the Plan Team anticipates that this model will form the basis for next year’s rougheye rockfish stock assessment.

10. Pelagic shelf rockfish

Status and catch specifications (mt) of pelagic shelf rockfish and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC for 2006 is projected assuming 2005 catch equals the ABC and OFL for 2006 is projected assuming 2005 catch equals the OFL. Catch data are current through 11/06/2004.						
Area	Year	Biomass ¹	OFL	ABC	TAC	Catch
GOA	2003	62,489	8,220	5,490	5,490	2,975
	2004	57,412	5,570	4,470	4,470	2,645
	2005	65,559	5,680	4,553		
	2006		5,510	4,415		

1. Represents total biomass for dusky rockfish from the age structured model and exploitable biomass for yellowtail, dark, and widow rockfishes from trawl surveys.

An age-structured model was first accepted in 2003 for dusky rockfish as an alternative to basing the ABC on average trawl survey biomass estimates. For this year's assessment, additional data for dusky rockfish included new age data from the 2000 and 2002 fisheries and the 2003 survey, additional age data from the 1987-2001 surveys, updated 2003 fishery catch, estimates of 2004 fishery catch, and 2004 fishery lengths.

The authors evaluated three models for dusky rockfish. Model 1, the base model, was presented in 2003 and updated with 2003 and 2004 catch data. Model 2 was the base model updated with survey and fishery length and age data and a reduced weighting on catch. Model 3 was identical to Model 2 but with an increased weighting on the survey biomass data. The Plan Team agreed with the authors that Model 3 best represented the available data. Model 1 exhibited positive residuals relative to survey biomass and Model 3 better represented strong cohorts, such as the 1995 and 1997 age classes which were evident in the survey, but not the fishery, age data. The better fit of Model 3 to all survey data showed substantial improvement over last year's model, particularly for the 1990-2001 year-classes that are currently recruiting to the fishery and survey. Current total biomass for dusky rockfish based on the age-structured model is estimated at 58,519 mt. Projected 2005 female spawning biomass for dusky rockfish is 17,770 mt compared to the estimate of $B_{40\%}$ of 14,300; therefore, dusky rockfish are in Tier 3a. The maximum permissible F_{ABC} is $F_{40\%} = 0.120$ which is associated with a yield of 4,060 mt and is the Plan Team's recommendation for the 2005 dusky rockfish ABC. The OFL ($F_{35\%} = 0.148$) is 5,020 mt. Based on model projections for dusky rockfish, the 2006 ABC is 3,920 mt and OFL is 4,830 mt.

There are no major changes in this year's pelagic shelf assessment for yellowtail, dark, and widow rockfishes because no new survey data is available for these species. The Plan Team recommended that the NPFMC consider removing dark rockfish from the FMP. The Plan Team concurred with the authors' recommendation to apply the 2004 values of exploitable biomass, ABC, ABC area apportionment, and OFL to yellowtail, dark, and widow rockfishes in 2005 and 2006. Current exploitable biomass for yellowtail, dark, and widow rockfishes was computed using the average of the 1999, 2001, and 2003 trawl survey estimates. This averaging technique was used because of the uncertainty of the biomass estimates and the desire to avoid placing too much emphasis on the results of an individual survey. Exploitable biomass estimates for 2005 and 2006 are 5,870 mt for yellowtail rockfish, 980 mt for dark rockfish, and 190 mt for widow rockfish for a total of 7,040 mt. Yellowtail, dark, and widow rockfishes are managed under Tier 5 as there are no reliable estimates of $F_{40\%}$ and $F_{35\%}$. The ABCs for yellowtail, dark, and widow rockfishes under Tier 5 are based on $F = 0.75M = 0.0675$ (it was assumed that M for these species is similar to that of dusky rockfish of 0.09). The 2005 and 2006 recommended ABC for yellowtail, dark, and widow rockfishes combined is 497 mt. The OFL ($F=M=0.09$) for yellowtail, dark, and widow rockfishes is 663 mt.

Apportionment of pelagic shelf rockfish is based on weighting of the NMFS trawl surveys at 4:6:9 for 1999, 2001, and 2003. Based on this weighting scheme, the percent distribution of pelagic shelf rockfish is 8.3% in Western, 67.3% in Central, and 24.4% in Eastern. The Eastern area is further apportioned

based on the point estimate of the weighted average of the estimates of the eastern Gulf biomass proportion that is in the West Yakutat (0.19). In the recent past, this apportionment was based on the upper 95% confidence bound to limit fluctuations and effects on industry. However, the last two survey biomass estimates were low for West Yakutat and may reflect lower biomass in this area. The Team recommends using the weighted average of the last three surveys rather than the upper confidence interval. Because of the relatively small ABC's for yellowtail, dark, and widow rockfishes and uncertainties regarding the area apportionment for these species, the Plan Team requests that the authors explore species catch composition by survey area for next year's assessment.

Area apportionments of ABC for pelagic shelf in 2005.					
Species	Western	Central	W. Yakutat	E. Yakutat/SE	Total
Dusky	336	2,732	188	800	4,056
Yellowtail, Dark, Widow	41	335	23	98	497
Total	377	3,067	211	898	4,553

11. Demersal shelf rockfish

Status and catch specifications (mt) of demersal shelf rockfish and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/04.						
Area	Year	Biomass	OFL	ABC	TAC	Catch
SEO	2003	17,510	540	390	390	229
GOA	2004	20,168	690	450	450	228
	2005	18,508	640	410		
	2006		640	410		

Demersal shelf rockfish (DSR) are on a biennial assessment cycle. No new survey data is available for this year. Biomass estimates were updated using recent average weight data. This resulted in a decrease in estimated biomass compared to 2004.

The group is managed under Tier 4 because reliable estimates of B_{msy} are unavailable. Exploitable adult biomass is based on the sum of the lower 90% confidence limits of biomass for each management area. Maximum allowable ABC under Tier 4 is set at $F_{40\%}=0.025$. Demersal shelf rockfish are particularly vulnerable to overfishing given their longevity, late maturation, and sedentary and habitat-specific residency. The Plan Team concurs with the author in recommending a harvest rate lower than the maximum allowed. By applying an $F=M=0.02$ to this biomass and adjusting for the 10% of other DSR species, the recommended 2005 ABC is 410 mt.

The OFL fishing mortality rate under Tier 4 is $F_{35\%}=0.031$, yielding 640 mt.

12. Thornyheads

Status and catch specifications (mt) of thornyheads and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. 2004 Catch data are current through 11/06/2004.						
Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2003	75,896	3,050	2,000	2,000	1,159
	2004	86,200 ¹	2,590	1,940	1,940	805
	2005		2,590	1,940		
	2006		2,590	1,940		

¹ The average of 1999 & 2003 NMFS bottom trawl survey biomass estimates used for the Tier 5 calculation

Thornyheads are on a biennial assessment cycle. No new survey data is available for this year. The author recommended, and the Plan Team concurred, that using the same information as presented in the

2003 assessment for 2004 is appropriate for 2005 and 2006. The average of the two most recent complete GOA trawl survey biomass estimates (1999 and 2003) was used to estimate exploitable biomass of 86,200 mt. The 2005 ABC was determined by multiplying the exploitable biomass by $M=0.03$ and 0.75 giving 1,940 mt. The ABC fishing mortality rate under Tier 5 is therefore $F_{ABC}=0.0225$. The corresponding OFL recommendation results in 2,590 mt.

The OFL fishing mortality rate under Tier 5 is set equal to the estimate of M , so $F_{OFL}=0.03$.

Area apportionments for thornyhead ABC's in 2005 (and 2006) are the same as those recommended for 2004.

Western	Central	Eastern	Total
410	1,010	520	1,940

13. *Atka mackerel*

Status and catch specifications (mt) of Atka mackerel and projections for 2005 and 2006. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Catch data are current through 11/06/2004.

Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2003		6,200	600	600	565
	2004		6,200	600	600	817
	2005		6,200	600		
	2006		6,200	600		

An assessment model for GOA Atka mackerel has not been developed. Updated catch data are presented and the significant increases in Atka mackerel catches in the 2004 fishery are discussed. Observations of Atka mackerel in the 2004 fishery (817 mt) and in the 2003 GOA trawl survey extended well into the GOA. Age data from the 2003 GOA survey were primarily comprised of age-4 fish from the 1999 year class, which has been documented as an above average year class in the Aleutian Islands Atka mackerel assessment. Fishery catches reflect similar length distributions found in the survey, and it is inferred that the 2004 fishery catches are primarily 5-year-olds from the 1999 year class. The 2004 Gulfwide Atka mackerel catch exceeded the TAC for the first time since a separate TAC was specified in 1994.

The SSC determined that reliable estimates of current biomass do not exist for GOA Atka mackerel due to high variability in the survey estimates; thus, GOA Atka mackerel are managed under Tier 6. The Plan Team continues to support measures to prevent directed fishing for Atka mackerel in the GOA. This was considered a conservative harvest policy for Atka mackerel because: (1) there are no reliable biomass estimates; (2) localized depletion may occur and they are an important component of Steller sea lion diet; (3) this species may have been overexploited previously in the GOA; and (4) although increased numbers of Atka mackerel are appearing in the GOA, they are comprised primarily of the 1999 year class. The Team notes that an ABC of 600 mt has usually been sufficient (except in 2004) to allow for non-target retention of Atka mackerel in other directed fisheries.

The Plan Team recommends 2005 ABC and 2006 ABC of 600 mt, and 2005 OFL and 2006 OFL under Tier 6 are 6,200 mt.

14. Skates

2004 catch specifications (mt) for skates. Skates were managed under a gulfwide OFL, ABC and TAC for all combined skate species except in the CGOA where big and longnose skates were managed under a separate ABC and TAC.					
Species group	Area	OFL	ABC	TAC	Catch
Big and Longnose skates	Central GOA		4,435	3,284	1,423
All skates(except CGOA Big and Longnose)	GOA wide		3,709	3,709	1,385
Skate complex (all)	GOA wide	10,589			2,808

Summary of OFLs and ABC for 2005 and 2006. Biomass estimates are averages from the 1999-2003 NMFS GOA bottom trawl surveys.					
Species group	Area	Average Biomass	ABC (area specific) 2005-2006	OFL (Gulfwide) 2005-2006	
Big skate	W	9,688	727		
	C	32,843	2,463		
	E	10,793	809		
	Total	53,324	3,999		5,332
Longnose skate	W	878	66		
	C	26,300	1,972		
	E	10,397	780		
	Total	37,575	2,818		3,757
Other skates	GW	17,689	1,327		1,769
All skates combined		114,900	8,144		10,858

Skates are on a biennial assessment cycle. No new survey data are available for this year.

In 2003, a directed fishery for certain skate species developed in the Gulf of Alaska (GOA). Until 2003, skates were managed as part of the "Other species" category under the GOA FMP, along with other potentially economically important species such as sharks, sculpins, squids, and octopi. In 2004, skates were managed separately from the rest of the Other species category, and big and longnose skates were managed separately from other skate species in the Central GOA.

Catches of skates this year in the directed fishery were lower in tonnage, but appeared to be similar in composition to those from 2003. Female big skates were dominant in 2004 sampled landings. While it is thought that effort was reduced in the GOA skate directed fishery in 2004 due to changing market conditions, there was at least one anecdotal report of substantial declines in catch rates relative to 2003. A full investigation of catch rates will be presented in the 2005 assessment using available information, but it may be difficult to obtain accurate information from an unobserved fleet.

Based on the information above, the assessment authors again recommended separate ABC and OFL based on Tier 5 criteria for big skates and longnose skates for each area in the GOA. Because no target fishery currently exists for all of the other skate species in the genus *Bathyraja*, the assessment authors recommended Gulfwide ABC and OFL for this species complex. Biomass estimates are the average of the most recent three surveys (1999, 2001, and 2003) except for the Eastern GOA which is the average of the 1999 and 2003 surveys. Natural mortality was estimated at $M=0.10$ based on empirical relationships for similar species in other areas. This M was extended to all skates in the complex because there is currently no information to indicate it should differ between species. When compared with estimates of historical catch in groundfish and halibut fisheries, these ABCs and OFLs appeared to permit historical levels of incidental skate catch in addition to a limited target fishery for big and longnose skates, albeit a

smaller target fishery than developed in 2003 in the Central GOA. However, the authors are not currently recommending a target fishery given the continued lack of fishery observation.

The Plan Team does not recommend that a target fishery for skates be permitted until more information is obtained from the fisheries and from the 2005 GOA trawl survey. Citing concerns with continued lack of observation of the skate target fishery combined with the potential sensitivity of the species group, the Plan Team recommended three species / group specific, gulfwide OFLs for big skates, longnose skates, and all other skates. This was intended to increase protection to sensitive species over the previous global skate complex OFL. The Plan Team reviewed skate catch to date in the GOA and determined that this measure was unlikely to constrain other target fisheries. The Plan Team agreed with the authors' recommended species and area specific ABCs for big skates and longnose skates. The Council may wish to discourage opportunities for directed skate fishing by setting TAC to appropriate incidental catch levels. The Plan Team also agreed with the authors' recommended gulfwide ABC for all other skate species in the genus *Bathyraja*.

The OFL fishing mortality rate under Tier 5 is set equal to the estimate of M , so $F_{OFL}=0.10$ for all skate species in the complex.

Other species

The Team requests that the Council develop a Plan Amendment to revise the current 5% level used in setting GOA "Other Species" TAC. In particular, it seems appropriate as an interim measure to modify the language so that the TAC could be set to $\leq 5\%$ of the sum of the target species TACs. The species and groups within this category have been substantially modified over the years (e.g., Atka mackerel were removed in 1994 and skates were removed in 2004). The Team also requests that the Council develop a comprehensive Plan Amendment that allows flexibility in managing individual species or species groups within this category. This mirrors initiatives taken by the BSAI groundfish Plan Team for the BSAI other species category.

Overview of Appendices

Sharks

The Joint Plan Teams reviewed a summary, included as an **attachment to the Squid and Other species section of the BSAI SAFE report**, of shark information for the GOA and BSAI. This follows a preliminary assessment in 2001, and summaries in recent SAFE report Ecosystem sections. The intent of the current review was to compile all available shark information into a single document. Because sharks were historically documented as other species or as unspecified sharks, there are inherent difficulties in identifying species-specific trends. The Plan Team suggested that the authors' future assessment efforts include additional survey data, such as the NMFS longline survey, and undertake these efforts with an objective of developing formal ABC and OFL recommendations.

Shelikof Strait echo-integration trawl survey

A report on echo integration-trawl survey results for walleye pollock in the Gulf of Alaska during February and March, 2004 is presented in **Appendix A**. Scientists from the Midwater Assessment and Conservation Engineering (MACE) Program of the Alaska Fisheries Science Center (AFSC) routinely conduct acoustic-trawl surveys in the Gulf of Alaska (GOA) to estimate walleye pollock (*Theragra chalcogramma*) distribution and abundance. Most of the effort has focused on the Shelikof Strait area, which has been surveyed annually since 1980, except in 1982 and 1999. With the exception of surveys in the Shumagin Islands area between 1994 and 1996 and in 2001, surveys outside the Shelikof Strait area have not indicated large amounts of pollock, although these efforts have been restricted temporally and spatially.

Acronyms

A collection of acronym definitions used in the SAFE has been included as **Appendix B**.

Table 1. Gulf of Alaska groundfish 2004 - 2006 OFLs and ABCs, 2004 TACs, and 2004 catches reported through November 6, 2004.

Species		OFL 2004	ABC 2004	TAC 2004	*Catch 2004	OFL 2005	ABC 2005	OFL 2006	ABC 2006
Pollock	W (610)		22,930	22,930	22,930		30,380		30,452
	C (620)		26,490	26,490	23,736		34,404		34,485
	C (630)		14,040	14,040	14,332		18,718		18,762
	WYAK		1,280	1,280	144		1,688		1,691
	SubTotal	91,060	64,740	64,740		144,340	85,190	103,250	85,390
	EYAK/SEO	8,690	6,520	6,520	0	8,690	6,520	8,690	6,520
	Total	99,750	71,260	71,260	61,142	153,030	91,710	111,940	91,910
Pacific Cod	W		22,610	16,957	15,218		20,916		18,396
	C		35,800	27,116	26,794		33,117		29,127
	E		4,400	3,960	112		4,067		3,577
	Total	102,000	62,810	48,033	42,124	86,200	58,100	65,800	51,100
Sablefish	W		2,930	2,930	1,986		2,540		2,407
	C		7,300	7,300	7,002		7,250		6,870
	WYAK		2,550	2,550	2,133		2,580		2,445
	SEO		3,770	3,770	3,726		3,570		3,383
	Total	22,160	16,550	16,550	14,847	19,280	15,940	17,530	15,105
Deep water flatfish ¹	W		310	310	7		330		330
	C		2,970	2,970	614		3,340		3,340
	WYAK		1,880	1,880	55		2,120		2,120
	EYAK/SEO		910	910	4		1,030		1,030
	Total	8,010	6,070	6,070	680	8,490	6,820	8,490	6,820
Rex sole	W		1,680	1,680	526		1,680		1,680
	C		7,340	7,340	936		7,340		7,340
	WYAK		1,340	1,340	0		1,340		1,340
	EYAK/SEO		2,290	2,290	0		2,290		2,290
	Total	16,480	12,650	12,650	1,462	16,480	12,650	16,480	12,650
Shallow water flatfish	W		21,580	4,500	136		21,580		21,580
	C		27,250	13,000	2,806		27,250		27,250
	WYAK		2,030	2,030	1		2,030		2,030
	EYAK/SEO		1,210	1,210	0		1,210		1,210
	Total	63,840	52,070	20,740	2,942	63,840	52,070	63,840	52,070
Flathead sole	W		13,410	2,000	831		11,690		11,111
	C		34,430	5,000	1,559		30,020		28,527
	WYAK		3,430	3,430	0		3,000		2,842
	EYAK/SEO		450	450	0		390		370
	Total	64,750	51,720	10,880	2,390	56,500	45,100	53,800	42,850
Arrowtooth flounder	W		23,590	8,000	2,837		26,250		27,924
	C		151,840	25,000	12,227		168,950		179,734
	WYAK		10,590	2,500	76		11,790		12,539
	EYAK/SEO		8,910	2,500	34		9,910		10,543
	Total	228,130	194,930	38,000	15,174	253,900	216,900	270,050	230,740

Table 1. (continued).

Species		OFL 2004	ABC 2004	TAC 2004	*Catch 2004	OFL 2005	ABC 2005	OFL 2006	ABC 2006
Other Slope rockfish	W		40	40	242		40		40
	C		300	300	527		300		300
	WYAK		130	130	76		130		130
	EYAK/SEO		3,430	200	27		3,430		3,430
	Total	5,150	3,900	670	872	5,150	3,900	5,150	3,900
Northern rockfish	W		770	770	1,025		808		755
	C		4,100	4,100	3,711		4,283		3,995
	E3		0	0	0		0		0
	Total	5,790	4,870	4,870	4,736	6,050	5,091	5,640	4,750
Pacific ocean perch	W	2,990	2,520	2,520	2,195	3,076	2,567	3,019	2,525
	C	9,960	8,390	8,390	8,446	10,226	8,535	10,008	8,375
	WYAK		830	830	877		841		813
	SEO		1,600	1,600	0		1,632		1,579
	Total	2,890				2,964		2,860	
	Total	15,840	13,340	13,340	11,518	16,266	13,575	15,887	13,292
Shortraker rockfish	W						155		155
	C						324		324
	E						274		274
	Total					982	753	982	753
Rougheye rockfish	W						188		188
	C						557		557
	E						262		262
	Total					1,531	1,007	1,531	1,007
Shortraker/ rougheye rockfish	W		340	254	270				
	C		870	656	328				
	E		550	408	375				
	Total	2,510	1,760	1,318	973				
Pelagic shelf rockfish	W		370	370	277		377		366
	C		3,010	3,010	2,158		3,067		2,973
	WYAK		210	210	199		211		205
	EYAK/SEO		880	880	11		898		871
	Total	5,570	4,470	4,470	2,645	5,680	4,553	5,510	4,415
Demersal Shelf Rockfish	Total	690	450	450	228	640	410	640	410
Thornyhead rockfish	W		410	410	270		410		410
	C		1,010	1,010	400		1,010		1,010
	E		520	520	135		520		520
	Total	2,590	1,940	1,940	805	2,590	1,940	2,590	1,940
Atka Mackerel	Total	6,200	600	600	817	6,200	600	6,200	600
Big skates	W						727		727
	C						2,463		2,463
	E						809		809
	Total					5,332	3,999	5,332	3,999
Longnose skates	W						66		66
	C						1,972		1,972
	E						780		780
	Total					3,757	2,818	3,757	2,818
CGOA Big and longnose		4,435	3,284	1,423					
Other skates	Total			3,709	1,385	1,769	1,327	1,769	1,327
All skates (2003)		10,859	6,993	2,808					
Other Species	Total	NA	NA	12,942	1,625	NA	NA	NA	NA
Total		649,460	499,390		166,365	713,667	539,263	662,918	542,456

¹ "Deep water flatfish" includes Dover sole, Greenland turbot and deepsea sole.

² "Shallow water flatfish" includes rock sole, yellowfin sole, butter sole, starry flounder, English sole, Alaska plaice, and sand sole.

³ The EGOA ABC of 2 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

*2003 catch data through 11/06/04; source: NMFS Blend Reports.

Table 2. Gulf of Alaska 2004 ABCs, biomass, overfishing levels, and estimated trends (mt) for Western, Central, Eastern, Gulfwide, West Yakutat, and Southeast Outside regulatory areas.

Species	Area	2005			Abundance, ² Trend
		ABC	Biomass	Overfishing Level	
Pollock	W (61)	30,380			Below, Increasing
	C (62)	34,404			
	C (63)	18,718			
	WYAK	1,688			
	Subtotal	85,190	736,200	144,340	
	EYAK/SEO	6,520	28,980	8,690	
	TOTAL	91,710	765,180	153,030	
Pacific Cod	W	20,916			Above, Declining
	C	33,117			
	E	4,067			
	TOTAL	58,100	472,000	86,200	
Sablefish	W	2,540			Below, Declining
	C	7,250			
	WYAK	2,580			
	EY/SEO	3,570			
	TOTAL	15,940	185,000	19,280	
Deep water flatfish	W	330			Unknown, Unknown
	C	3,340			
	WYAK	2,120			
	EYAK/SEO	1,030			
	TOTAL	6,820	102,395 ⁴	8,490	
Rex sole	W	1,680			Above, Stable
	C	7,340			
	WYAK	1,340			
	EYAK/SEO	2,290			
	TOTAL	12,650	99,950 ⁵	16,480	
Shallow water flatfish	W	21,580			Unknown, ³ Stable
	C	27,250			
	WYAK	2,030			
	EYAK/SEO	1,210			
	TOTAL	52,070	375,950 ⁵	63,840	
Flathead sole	W	11,690			Above, Stable
	C	30,020			
	WYAK	3,000			
	EYAK/SEO	390			
	TOTAL	45,100	292,670 ⁵	56,500	
Arrowtooth flounder	W	26,250			Above, Increasing
	C	168,950			
	WYAK	11,790			
	EYAK/SEO	9,910			
	TOTAL	216,900	2,453,390 ⁵	253,900	

1/ The EGOA ABC of 2 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

2/ Abundance relative to target stock size as specified in SAFE documents.

3/ Historically lightly exploited therefore expected to be above the specified reference point.

4/ Biomass of Dover sole; biomass of Greenland turbot and deep-sea sole is unknown.

NOTE: ABCs are rounded to nearest 10. Overfishing is defined Gulf-wide, except for pollock and POP.

Table 2. (Continued).

Species	Area	2005			Abundance, ² Trend	
		ABC	Biomass	Overfishing Level		
Other Slope rockfish	W	40			Unknown, Unknown	
	C	300				
	WYAK	130 ¹				
	EYAK/SEO	3,430				
	TOTAL	3,900	89,460 ³	5,150		
Northern rockfish	W	808			Above, Declining	
	C	4,283				
	E	0 ¹				
	TOTAL	5,091	108,274	6,050		
Pacific ocean perch	W	2,567		3,076	Above, Declining	
	C	8,535		10,226		
	WYAK	841				
	EY/SEO	1,632		2,964		
	TOTAL	13,575	286,367	16,266		
Shortraker	W	155			Unknown, Unknown	
	C	324				
	E	274				
	TOTAL	753	32,723	982		
Rougheye	W	188			Above, Stable	
	C	557				
	E	262				
	TOTAL	1,007	40,281	1,531		
Pelagic shelf rockfish	W	377			Unknown, Unknown	
	C	3,067				
	WYAK	211				
	EY/SEO	898				
	TOTAL	4,553	65,559	5,680		
Dusky					Above, declining	
Demersal shelf rockfish	SEO	410	18,508	640	Unknown, unknown	
Thornyhead rockfish	Western	410			Above, Stable	
	Central	1,010				
	Eastern	520				
	Total	1,940	86,200 ³	2,590		
Atka mackerel	GW	600	Unknown	6,200	Unknown, increasing	
Skates	Big	W	727	9,688	Unknown, Stable	
		C	2,463	32,843		
		E	809	10,793		
		Total	3,999	53,324		5,332
		Longnose	W	66		878
C	1,972		26,300			
E	780		10,397			
Total	2,818		37,575	3,757		
"other" skates	Total	1,327	17,689	1,769		
All skates	Total	8,144	108,588	10,858		
Other species					TAC = 5% of GF TACS	

1/ The EGOA ABC of 2 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

2/ Abundance relative to target stock size as specified in SAFE documents.

3/ Historically lightly exploited therefore expected to be above the specified reference point.

4/ Biomass of Dover sole; biomass of Greenland turbot and deep-sea sole is unknown.

Table 3. Summary of fishing mortality rates and overfishing levels for the Gulf of Alaska, 2004.

Species	Tier	F _{ABC} ¹	Strategy	F _{OFL} ²	Strategy
Pollock	3b	0.185	F _{ABC}	0.32	F _{35%} adjusted
Pacific cod	3a	0.24	F _{ABC}	0.36	F _{35%}
Sablefish	3b	0.102	F _{40%} adjusted	0.124	F _{35%} adjusted
Deepwater flatfish	3a, 6 ³	0.121	F _{40%} , F _{ABC} ³	0.152	F _{35%} , F _{OFL} ⁴
Rex sole	5	0.15	F=.75M	0.20	F=M
Flathead sole	3a	0.47	F _{40%}	0.63	F _{35%}
Shallow water flatfish	4,5 ⁵	0.15-0.204	F=.75M, F _{40%} ⁵	0.2-0.245	F _{35%} , F=M ⁶
Arrowtooth	3a	0.142	F _{40%}	0.168	F _{35%}
Pacific ocean perch	3a	0.060	F _{40%}	0.071	F _{35%}
Shortraker/rougheye	5 ⁷ , 4	0.023/0.025	F=.75M, F=M ⁷	0.03/.038	F=M, F _{35%} ⁸
Other slope rockfish	4, 5 ⁹	0.03-0.075	F=.75M, F=M ⁹	0.04-0.10	F _{35%} , F=M ¹⁰
Northern rockfish	3a	0.057	F _{40%}	0.068	F _{35%}
Pelagic Shelf Rockfish	3a, 5 ¹¹	0.120, .067	F _{40%} , F=.75M ¹¹	0.148, 0.09	F _{35%} , F=M ¹²
Demersal Shelf Rockfish	4	0.02	F=M	0.031	F _{35%}
Thornyhead rockfish	5	0.0225	F=.75M	0.03	F=M
Atka mackerel	6	NA	F _{ABC} ¹³	NA	F _{OFL} ¹⁴
Skates	5	0.075	F=.75M	0.10	F=M

1/ Fishing mortality rate corresponding to acceptable biological catch.

2/ Maximum fishing mortality rate allowable under overfishing definition.

3/ F_{40%}= for Dover sole (Tier 3a), ABC=.75 x average catch (1978-1995) for other deepwater flatfish (Tier 6).

4/ F_{35%} for Dover sole (Tier 3a), average catch (1978-1995) for other deepwater flatfish (Tier 6).

5/ F_{40%} for northern and southern rocksole (Tier 4), F=.75M for remaining shallow water flatfish (Tier 5).

6/ F_{35%} for northern and southern rocksole (Tier 4), F=M for remaining shallow water flatfish (Tier 5).

7/ F=.75M for shortraker (Tier 5), F=M for rougheye (Tier 4).

8/ F=M for shortraker (Tier 5), F_{35%} for rougheye (Tier 4).

9/ F=M for sharpchin rockfish (Tier 4), F=.75M for other species (Tier 5).

10/ F_{35%} for sharpchin (Tier 4), F=M for other species (Tier 5).

11/ F_{40%} for dusky rockfish (Tier 3a), F=.75M for widow and yellowtail rockfish (Tier 5).

12/ F_{35%} for dusky rockfish (Tier 3a), F=M for widow and yellowtail rockfish (Tier 5).

13/ ABC for Atka mackerel is 600 mt for bycatch in other target fisheries.

14/ OFL for Atka mackerel is equal to average catch from 1978 to 1995.

Table 4. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2004 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum. Relative to last year, sablefish were removed from this table since the authors (and Plan Team) recommend the Max F_{ABC} value.

Species	Tier	2004		2005	
		$Max F_{ABC}$	$Max ABC$	F_{ABC}	ABC
Pollock	3b	0.27	124,800	0.185	86,100
Pacific cod	3a	0.31	73,800	0.24	58,100
Rougheye rockfish	4	0.032	1,290	0.025	1,010
Shortraker rockfish	5	0.023	750	0.023	750
Total Shortraker/Rougheye	4,5		2,040		1,760
Other slope rockfish (sharpchin)	4	0.053	1,100	0.05	1,040
Other slope rockfish (redstripe)	5	0.075	840	0.075	840
Other slope rockfish (harlequin)	5	0.045	400	0.045	400
Other slope rockfish (silvergrey)	5	0.03	1,130	0.03	1,130
Other slope rockfish (redbanded)	5	0.045	310	0.045	310
Other slope rockfish (minor species)	5	0.045	180	0.045	180
Total other slope rockfish	4,5		3,960		3,900
Demersal shelf rockfish	4	0.025	560	0.02	410
Atka mackerel	6	NA	4,700	NA	600

1/ The Plan Team recommended 2005 W/C pollock ABC of 85,190 mt is reduced by 910 mt to accommodate the Prince William Sound GHL. For comparisons in this table, the maximum permissible ABC of 124,800 mt should be compared with the full ABC of 86,100 mt.

Table 5. Groundfish landings (metric tons) in the Gulf of Alaska, 1956-2004.

Year	Pollock	Pacific Cod	Sable Fish	Flat Fish	Arrowtooth Flounder	Slope Rock Fish ^a
1956			1,391			
1957			2,759			
1958			797			
1959			1,101			
1960			2,142			
1961			897			16,000
1962			731			65,000
1963			2,809			136,300
1964	1,126	196	2,457	1,028		243,385
1965	2,749	599	3,458	4,727		348,598
1966	8,932	1,376	5,178	4,937		200,749
1967	6,276	2,225	6,143	4,552		120,010
1968	6,164	1,046	15,049	3,393		100,170
1969	17,553	1,335	19,376	2,630		72,439
1970	9,343	1,805	25,145	3,772		44,918
1971	9,458	523	25,630	2,370		77,777
1972	34,081	3,513	37,502	8,954		74,718
1973	36,836	5,963	28,693	20,013		52,973
1974	61,880	5,182	28,335	9,766		47,980
1975	59,512	6,745	26,095	5,532		44,131
1976	86,527	6,764	27,733	6,089		46,968
1977	112,089	2,267	17,140	16,722		23,453
1978	90,822	12,190	8,866	15,198		8,176
1979	98,508	14,904	10,350	13,928		9,921
1980	110,100	35,345	8,543	15,846		12,471
1981	139,168	36,131	9,917	14,864		12,184
1982	168,693	29,465	8,556	9,278		7,991
1983	215,567	36,540	9,002	12,662		7,405
1984	307,400	23,896	10,230	6,914		4,452
1985	284,823	14,428	12,479	3,078		1,087
1986	93,567	25,012	21,614	2,551		2,981
1987	69,536	32,939	26,325	9,925		4,981
1988	65,625	33,802	29,903	10,275		13,779
1989	78,220	43,293	29,842	11,111		19,002
1990	90,490	72,517	25,701	15,411		21,114
1991	107,500	76,997	19,580	20,068		13,994
1992	93,904	80,100	20,451	28,009		16,910
1993	108,591	55,994	22,671	37,853		14,240
1994	110,891	47,985	21,338	29,958		11,266
1995	73,248	69,053	18,631	32,273		15,023
1996	50,206	67,966	15,826	19,838	22,183	14,288
1997	89,892	68,474	14,129	17,179	16,319	15,304
1998	123,751	62,101	12,758	11,263 ¹	12,974	14,402
1999	95,637	68,613	13,918	8,821	16,209	18,057
2000	71,876	54,492	13,779	13,052	24,252	15,683
2001	70,485	41,614	12,127	11,817	19,964	16,479
2002	49,300 ^j	52,270	12,246	12,520	21,230	17,128
2003	49,300	52,500	14,345	10,750	23,320	18,678
2004 ^h	61,073	54,590	14,847	7,470	15,220	18,099

a/ Catch defined as follows: (1) 1961-78, Pacific ocean perch (*S. alutus*) only; (2) 1979-1987, the 5 species of the Pacific ocean perch complex; 1988-90, the 18 species of the slope rock assemblage; 1991-1995, the 20 species of the slope rockfish assemblage.

b/ Catch from Southeast Outside District.

c/ Thornyheads were included in the other species category, and are foreign catches only.

d/ After numerous changes, the other species category was stabilized in 1981 to include sharks, skates, sculpins, eulachon, capelin (and other smelts in the family Osmeridae and octopus. Atka mackerel and squid were added in 1989. Catch of Atka Mackerel is reported separately for 1990-1992; thereafter Atka mackerel was assigned a separate target species.

Table 5. (cont'd) Groundfish landings (metric tons) in the Gulf of Alaska, 1956-2004.

Year	Pelagic Shelf Rockfish	Demersal Shelf Rockfish ^b	Thorny Heads ^c	Atka Mackerel ^e	Skates	Other Species ^d	Total All Species
1956							1,391
1957							2,759
1958							797
1959							1,101
1960							2,142
1961							16,897
1962							65,731
1963							139,109
1964							248,192
1965							360,131
1966							221,172
1967							139,206
1968							125,822
1969							113,333
1970							84,983
1971							115,758
1972							158,768
1973							144,478
1974							153,143
1975							142,015
1976							174,081
1977			0	19,455		4,642	195,768
1978			0	19,588		5,990	160,830
1979			0	10,949		4,115	162,675
1980			1,351	13,166		5,604	202,426
1981			1,340	18,727		7,145	239,476
1982		120	788	6,760		2,350	234,001
1983		176	730	12,260		2,646	296,988
1984		563	207	1,153		1,844	356,659
1985		489	81	1,848		2,343	320,656
1986		491	862	4		401	147,483
1987		778	1,965	1		253	146,703
1988	1,086	508	2,786	-		647	158,411
1989	1,739	431	3,055	-		1,560	188,253
1990	1,647	360	1,646	1,416		6,289	236,591
1991	2,342	323	2,018	3,258		1,577	247,657
1992	3,440	511	2,020	13,834		2,515	261,694
1993	3,193	558	1,369	5,146		6,867	256,482
1994	2,990 ^f	540	1,320	3,538		2,752	232,578
1995	2,891	219 ^g	1,113	701		3,433	216,585
1996	2,302	401	1,100	1,580		4,302	199,992
1997	2,629	406	1,240	331		5,409	231,312
1998	3,111	552	1,136	317		3,748	246,113
1999	4,826	297	1,282	262		3,858	231,780
2000	3,730	406	1,307	170		5,649	204,396
2001	3,008	301	1,339	76		4,801	182,011
2002	3,318	292	1,125	85		4,040	173,554
2003	2,975	229	1,159	578		6,339	180,173
2004	2,645	228	805	817	2,808	1,625	180,227

e/ Atka mackerel was added to the Other Species category in 1988 and separated out in 1994

f/ PSR includes light dusky, yellowtail, widow, dark dusky, black, and blue rockfish; after 1998 black and blue were excluded.

g/ Does not include at-sea discards.

h/ Catch data reported through November 6, 2004.

i/ Includes all species except arrowtooth.

j/ Does not include state fisheries

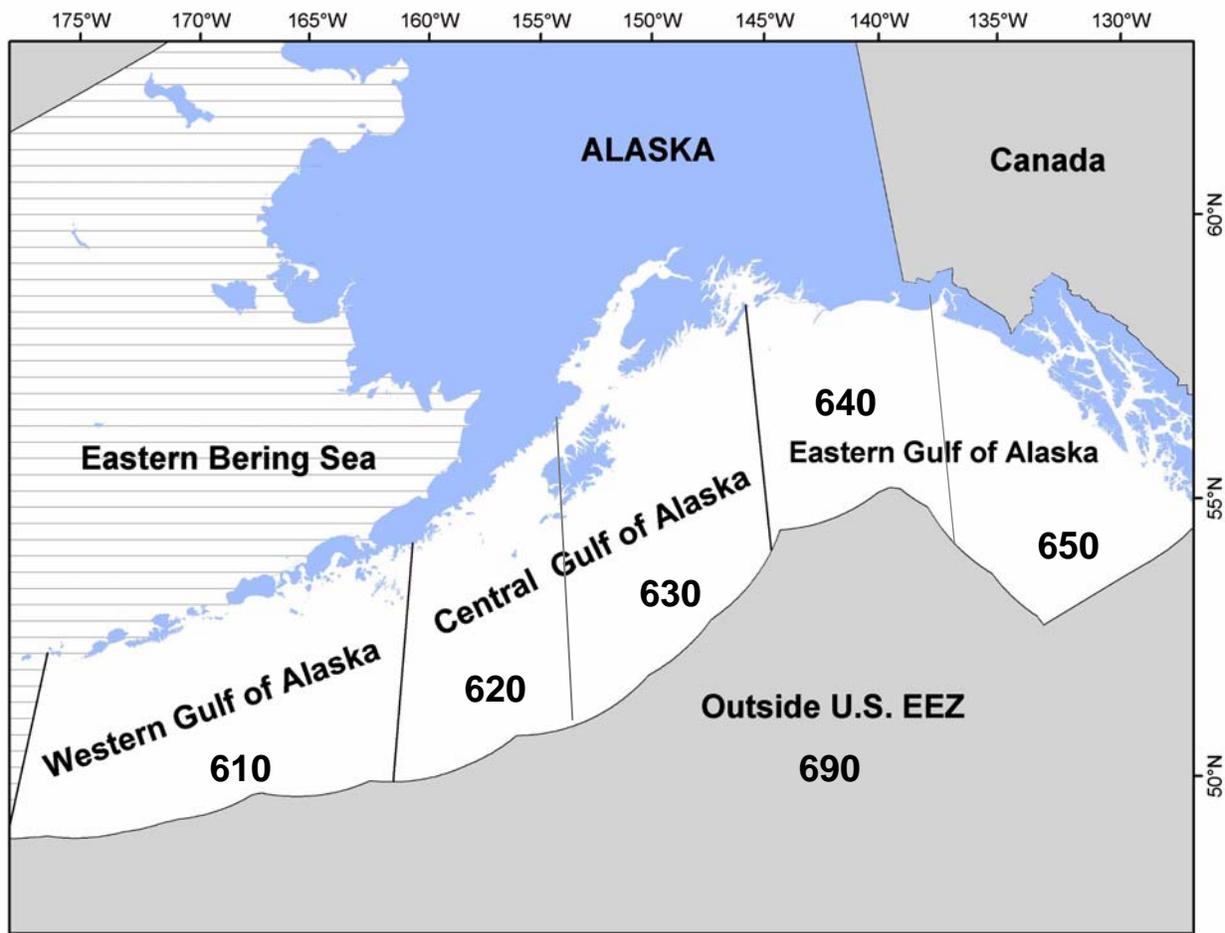


Figure 1. Gulf of Alaska statistical and reporting areas.