

# Public Testimony Sign-Up Sheet


## Agenda Item D-1(e) GOA Specs

NAME (PLEASE PRINT)		AFFILIATION
1	✓ Jon Warrick	Oceana
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NOTE to persons providing oral or written testimony to the Council: Section 307(1)(I) of the Magnuson-Stevens Fishery Conservation and Management Act prohibits any person "to knowingly and willfully submit to a Council, the Secretary, or the Governor of a State false information (including, but not limited to, false information regarding the capacity and extent to which a United State fish processor, on an annual basis, will process a portion of the optimum yield of a fishery that will be harvested by fishing vessels of the United States) regarding any matter that the Council, Secretary, or Governor is considering in the course of carrying out this Act.

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver   
Executive Director

DATE: November 27, 2007

SUBJECT: Final GOA Groundfish Specifications for 2008 and 2009

ESTIMATED TIME 8 HOURS (all D-1 items)
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ACTION REQUIRED

Review and approve GOA SAFE report (including Ecosystem and Economic SAFEs) and approve final GOA Harvest Specifications for 2008-2009 including:

1. Acceptable Biological Catch (ABC), and annual Total Allowable Catch (TAC).
2. TAC considerations for the State Pacific cod fishery.
3. Prohibited Species Catch Limits

BACKGROUND

At this meeting, the Council makes final recommendations on groundfish and bycatch specifications as listed above to manage the 2008 and 2009 Gulf of Alaska (GOA) groundfish fisheries.

GOA SAFE Document

The groundfish Plan Teams met in Seattle November 13-16, 2007 to prepare the final SAFE reports and to review the status of groundfish stocks. The GOA SAFE report forms the basis for the recommended GOA groundfish specifications for the 2008 and 2009 fishing years. Note that there are three volumes to the SAFE report: a stock assessment volume, a fishery evaluation volume ("economic SAFE"), and an ecosystems considerations volume. The introduction to the GOA SAFE report was mailed to the Council and Advisory Panel in late November 2007. The full GOA SAFE report, the economic SAFE report and the ecosystem considerations volume were mailed to the SSC November 20th. The Joint Plan Team and GOA Plan Team minutes are attached as Items D-1(e)(1) and D-1(e)(2), respectively. An overview of the GOA SAFE report and ecosystem considerations volume will be provided to you at the meeting.

Two year OFL and ABC Determinations

Amendment 48 to the GOA groundfish FMP made two significant changes with respect to the stock assessment process. First, since new data during years when no groundfish surveys are conducted are limited, annual assessments are no longer required for long-lived GOA species. These species include the rockfishes, flatfishes, and Atka mackerel. A trawl survey was conducted in the GOA in the summer of 2007 thus this year we present full assessments for all species. The second significant change 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 2008 and 2009.

In September of this year, preliminary projections of ABC and OFL levels for 2008 and 2009 were made on the basis of the 2008 specifications. In this SAFE report, the Plan Team has revised most of those projections. Such revisions are typically due to the development of new models; collection of new catch, survey, age composition, or size composition data; or use of new methodology for recommending ABC.

### ABCs, TACs, and Apportionments

At this meeting, the Council will establish final catch specifications for the 2008 and 2009 fisheries. The SSC and AP recommendations will be provided to the Council during the meeting. Item D-1(e)(3) lists the 2007 specifications and catch (through November 4, 2007) and GOA Plan Team recommendations for OFLs and ABCs for 2008 and 2009. The sum of the GOA Plan Team's recommended ABCs for 2008 is 536,191 t. The sum of the ABCs increased 9% compared with last year. This increase is primarily driven by increases in the flatfish stocks. ABC levels increased in deep water flatfish (2%), shallow water flatfish (19%), arrowtooth flounder (23%), and flathead sole (14%). ABC levels also increased in some rockfish, such as Pacific ocean perch (2%), rougheye rockfish (30%), shortraker rockfish (7%) and other slope rockfish (3%). The species with ABCs that declined relative to 2007 are pollock (-12%), sablefish (-11%), northern rockfish (-8%), pelagic shelf rockfish (-6%), demersal shelf rockfish (-7%), thornyhead rockfish (-14%) and big skates (-6%).

The abundances of rex sole, Dover sole, flathead sole, arrowtooth flounder, Pacific ocean perch, rougheye rockfish, northern rockfish, and dusky rockfish are above target stock size. The abundances of pollock and sablefish are below target stock size. The target biomass levels for other deep-water flatfish, shallow-water flatfish, shortraker rockfish, demersal shelf rockfish, other pelagic shelf rockfish, other slope rockfish, thornyhead rockfish, Atka mackerel, and skates are unknown. The status of Pacific cod is unknown based on the present stock assessment. However, in 2006 it was estimated to be above the  $B_{40\%}$  target level. None of the groundfish stocks are overfished nor are they approaching an overfished condition.

In June of 2005, the Council took final action to implement a calculation change to the other species complex in the GOA under amendment 69 to the GOA FMP. The 5% TAC calculation was modified such that the Council may recommend a TAC at or below 5% of the sum of the target species TACs during the annual specifications process. The Council's intent was to establish a TAC level which would meet incidental catch needs in other directed fisheries with the potential to establish this TAC at a higher level which could allow for directed fishing on the complex but be placed low enough to prevent excessive harvest of a single targeted species or on the complex as a whole. This interim measure is intended to provide additional flexibility in responding to potential conservation concerns as they arise until more comprehensive management changes can be made to the other species complex (i.e., analysis of individual species level assessments).

During this specifications process, the Council will recommend an other species TAC level at or below 5% of the sum of the target groundfish TACs. In order to provide the Council information to establish a TAC for the other species complex, the Plan Team discussed the incidental catch needs for directed fisheries. Information regarding these incidental catch needs is contained in the summary section of the introduction to the GOA SAFE Report. Additional information on other species is provided in the executive summaries of the other species assessments which are included as appendices to the GOA SAFE report. Full assessments for these species were presented to the Plan Team in 2006 in anticipation of a forthcoming amendment analysis to evaluate establishing separate harvest specifications (individually or by complex) for these species. This year the Plan Team requested updated information as available for each species or complex. Additionally, information is presented on forage fish in the GOA.

### TAC Considerations for State Pacific Cod Fishery

Since 1997, the Council has reduced the GOA Pacific cod TAC to account for removals of not more than 25% of the Federal P. cod TAC from the state parallel fisheries. The relative percentage in the Central GOA was increased by the Board of Fisheries in March 2005 from 24.25 in 2004 to 25%. Using the area apportionments of the 2008 and 2009 Pacific cod ABC recommended by the Plan Team, the Federal TAC for Pacific cod would be adjusted as listed below.

**Plan Team recommended 2008-2009 Gulf of Alaska Pacific cod ABCs, and resulting TACs and state Guideline Harvest Levels (GHLs) (t).**

Specifications	Western	Central	Eastern	Total
ABC	25,932	37,901	2,660	66,493
State GHL	6,483	9,475	266	16,224
(%)	25	25	10	24.4
Federal TAC	19,449	28,426	2,394	50,269

**Prohibited Species Catch Limits**

In the GOA, Prohibited Species Catch (PSC) limits are established for halibut. Since 1995, total halibut PSC limits for all fisheries and gear types have totaled 2,300 t. This cap was reduced from 2,750 t after the sablefish IFQ fishery was exempted from the halibut PSC requirements in 1995. The halibut PSC apportionments recommended based upon the 2006 apportionments for the Gulf of Alaska groundfish fisheries are shown below.

**GOA Pacific halibut PSC Limits**

2008-2009 Trawl		2008-2009 Hook and Line		
Jan 20 - Apr 1	550 t	1st trimester	Jan 1 - Jun 10	250 t
Apr 1 - Jul 1	400 t	2nd trimester	Jun 10 - Sep 1	5 t
Jul 1 - Sep 1	600 t	3rd trimester	Sept 1 - Dec 31	35 t
Sept 1 - Oct 1	150 t			
Oct 1 - Dec 31	300 t	DSR	Jan 1 - Dec 31	10 t
TOTAL	2,000 t			300 t

Trawl fishery categories			
Season	Shallow Water	Deep Water	Total
Jan 1 - Apr 1	450 t	100 t	550 t
Apr 1 - Jul 1	100 t	300 t	400 t
Jul 1 - Sep 1	200 t	400 t	600 t
Sep 1 - Oct 1	150 t	any rollover	150 t
Oct 1 - Dec 31	<i>no apportionment</i>		300 t
TOTAL	900 t	800 t	2,000 t

## Joint BSAI/GOA Plan Team Minutes

The meeting of the Bering Sea and Aleutian Islands and Gulf of Alaska Groundfish Plan Teams convened on November 13th at 9am at the Alaska Fishery Science Center, Seattle, WA.

Members of the Plan Teams in attendance included:

Loh-Lee Low	AFSC REFM(BSAI chair)	Jim Ianelli	AFSC REFM (GOA co-chair)
Kerim Aydin	AFSC REFM	Diana Stram	NPFMC (GOA co-chair)
David Carlile	ADF&G	Sandra Lowe	AFSC REFM
Steve Hare	IPHC	Jeff Fujioka	AFSC ABL
Jane DiCosimo	NPFMC	Jon Heifetz	AFSC ABL
Theresa Tsou	WDFW	Robert Foy	AFSC RACE
Brenda Norcross	UAF	Nick Sagalkin	ADF&G
Andy Smoker	NMFS AKRO	Cleo Brylinsky	ADF&G
Grant Thompson	AFSC REFM	Tom Pearson	NMFS AKRO
Dan Lew	AFSC	Sarah Gaichas	AFSC REFM
Kathy Kuletz	USFWS	Steve Hare	IPHC
Lowell Fritz	NMML	Kathy Kuletz	USFWS

Ken Goldman (ADF&G, member of the GOA Team) and Ward Testa (NMML, GOA Team) were absent. Mike Sigler (AFSC ABL, BSAI Vice-Chair) was absent for the Joint Team meeting but participated by phone for some BSAI specific assessment reviews. Approximately 40 members of the public and State and Agency staff attended the meeting.

### Introductions

Changes were made to the agenda as attached. It was noted that the Pacific cod assessments for the BSAI and GOA would be available during the week. The review of GOA Pacific cod was rescheduled for Friday morning (GOA Team only) while the previously scheduled Joint Team review of Pacific cod for Thursday was changed to be a review of the BSAI assessment only. Minutes for Pacific cod assessments in both areas are thus contained in the separate team minutes and not within the Joint Team minutes as previously scheduled.

The Teams discussed membership issues noting that several Team members were absent. Ivan Vining has taken a position outside of ADF&G and can no longer continue on the BSAI Plan Team. The Teams noted his years of valuable contribution to the assessment review process as a member of the BSAI Plan Team and wish him well in his future endeavors. When his position is filled by ADF&G that person may be appointed to the BSAI Plan Team. Mike Sigler was unable to attend but indicated he would participate for the reviews of Pacific cod and Pollock (BSAI) via telephone. The GOA Team again noted Ward Testa's (NMML) absence as one that limits the ability to comment on marine mammal issues facing fisheries. The Teams expressed concern about this issue and urged the Council to appoint marine mammal experts who will participate on a regular basis.

The Teams discussed the possibility of having alternates appointed that could fill in as added expertise for meetings. It was noted that such alternates may lack the desired institutional knowledge and commitment to the review process. The Teams reiterated their desire that the Council stress the importance that members be allotted time in their work schedules to allow for adequate participation. Regular communications from the Council chair to Plan Team member agencies to this effect are strongly encouraged.

The Teams noted some revisions to the SAFE report this year. First, an attempt to have a consistent summary structure between the GOA and BSAI was made. Also, at the request of the SSC, the addition of a phase plane-type diagram to give a summary status report of fishing mortalities and relative biomass level information for each region.

## **Sablefish**

Dana Hanselman presented an overview of the sablefish assessment. Three models were presented: one based on the model used in 2006, and two alternative configurations (model 2 and model 3) incorporating updated growth parameters and updated growth parameters with informative priors on catchability coefficients respectively. These changes were presented to the Teams and encouraged at the September 2007 meeting.

Survey estimates for sablefish abundance were generally lower this year. The fishery RPW was lower. Longline survey RPW by area shows an overall decline in all three areas. Biomass estimates from 2005 to 2007 in the GOA trawl survey also declined. A comparison of the observer data with logbook data indicates a relatively stable trend in both datasets, but a consistent decline in the Central GOA. The IPHC survey data indicate an increase since 2006. Steven Hare noted that the IPHC data also show an increase in smaller, younger fish (note not necessarily juveniles).

The author reviewed model 3 results in detail, and showed results from retrospective analyses. The author noted that the retrospective pattern suggests that recent abundances tend to be biased high. In response to discussions, the author noted that model configuration issues and parameter assumptions are likely the cause but plans to investigate sources for this bias will continue.

The Teams discussed the differences between models 2 and 3. The author noted the main distinction is the addition of informative prior distributions on catchability for each abundance index in model 3 which performs as a stabilizer to the model. This is the main argument for choice of model 3 over model 2 as otherwise the objective function was slightly higher, mainly due to the addition of the prior distributions.

The treatment of whale depredation by the longline survey was discussed and a question on how IPHC surveys compare was raised. Steve Hare noted that the IPHC has more stations and thus can drop stations due to whale depredation issues but they do use all stations regardless of fishing issues. The issue of fishery/survey interactions was discussed, particularly relative to how the IPHC surveys are conducted differently. This has been addressed in previous assessments and it was noted that in recent years the survey timing and fishing fleet effort have little overlap. It was noted that some of the actual survey station locations were known to be good fishing spots that are well known to fishermen. Hence the potential for direct interaction was thought to be a possible concern.

The author noted that pre-IFQ, the fishery and survey trends were similar while post-IFQ the fishery trend is flat while the other surveys are variable or declining. This imparts stability (modeling-wise) but is a concern regarding the contrasting trend. The author noted that fishery catchability is divided into pre and post-IFQ parameters. The author also noted that the 2006 longline survey increase compared with trends previously and in conjunction with the 2007 values. No length data is currently available from the IPHC survey. It was suggested that an evaluation of the length-composition from the bottom trawl survey be compared with the halibut survey due to similar timing and sampling areas. Some smaller fish were observed in the 2007 IPHC data. Cleo Brylinsky noted that it might be possible to add another person to the survey

(she is pursuing this for additional yelloweye information collection) and if possible ADF&G could work with someone to share costs and duties to obtain additional length data for sablefish. Some problems were discussed with respect to the relative workload for the additional person in times of high yelloweye density (and the difficulty of taking sablefish length samples at that time) and the necessity of releasing sablefish immediately (rather than the ability to sample as time and workload allows).

Apportionment:

The Teams reiterated that the current apportionment scheme approved by the Council could be modified subject to Team review. Currently the survey is weighted twice as much as the fishery data due to general concerns about using fishery data as a relative abundance index. This was re-evaluated given that fishery data are more comprehensive throughout the year compared to the survey "snapshot" which occurs during summer months. An even weighting scheme (survey and fishery) was presented and the authors indicated no strong preference related to conservation concerns.

The Teams discussed the variable ages of fish by area in fishery catches. The Teams discussed means by which the author could better model the spatial dynamics and to what extent a change in apportionment could be incorporated into the assessment. There could be spatial differences in selectivity by region that could feed back into the assessment. It was noted that a movement model could be used to help inform spatial allocation issues in the future using updated tag-recapture information. It was suggested that the movement model could form a reasonable operating model to use in the context of a MSE.

The future of the logbook reporting program and the need for funding support was highlighted. The precision of estimates in recent years is related to the increased data reporting through logbooks, especially the voluntary logbook program. Cooperative research funds have covered the cost of paying IPHC to collect and provide the logbook data. Availability of these funds are subject to Center priorities for this money. Logbooks from observed and non-observed vessels are used together to comprise the logbook fishery data. Catch by hook is recorded on the logbook by the vessel. All logbook data is confidential and vessel identification is stripped from these data. The Teams strongly recommended that continued funding be secured for this important data collection program noting that these data are critical to the assessment.

The Teams discussed the use of the default apportionment scheme to report numbers for area apportionments. The author included a table using the even weighting scheme as an alternative. The Teams and authors noted that either apportionment scheme was acceptable. However, given the potential for bias in the use of fishery data would argue for the continuation of the current weighting scheme.

The Teams agreed with the author in selecting model 3. The Teams suggested additional analyses (e.g., time-varying selectivity) for future assessments. Time varying changes in the catchability could also be evaluated, particularly if there have been changes in the fishery since the implementation of the IFQ system. The Teams discussed changes in the fishery since the IFQ were instituted, with members of the public noting that the fishery has spread out in time. Members of the public also noted minor changes in the fishery since the IFQ. Some changes included more auto-baiters in the fishery, which is easier but less efficient than hand-baiting. They also noted that there was some time lag in the spreading out of the fishery since the IFQ as the fisherman became accustomed to the changes and there has been consolidation of boats within the first 3 years of the IFQ program. Clarification on the degree to which mixed sets are targeted

(halibut and sablefish) was requested and it was noted that this practice was relatively uncommon.

It was noted that pot fishing is increasing in the BSAI area but is prohibited in the GOA. To date, data are too spotty to allow for modeling this as a separate fishery but the authors continue to report on changes.

The Team supports more investigation into the retrospective analysis to ascertain why this has shown the observed decreasing trend. The Team approves the ABCs as recommended by the author based upon the use of model 3. Tom Pearson noted some rounding error in the area apportionments in the GOA that need to be fixed in the assessment. The author indicated these will be revised for the final assessment. The Team commended the authors on improvements to the assessment and the responsiveness of authors to requests made in previous years.

The meeting adjourned at 12:00pm.



NPFMC GROUND FISH PLAN TEAMS

DRAFT AGENDA

November 13<sup>th</sup>-16<sup>th</sup>, 2007

**A. Joint Plan Team Meetings**

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Tuesday November 13 <sup>th</sup>		<b>Room 2076 (Traynor room)</b>
9:00 am	Introductions, Adoption of Agenda, Council Actions, Review of report summaries, minutes, assignments etc...	
9:30 am	Sablefish	
12:00 pm	Lunch	
<i>Reconvene in separate BSAI/GOA teams till Thursday AM</i>		
Thursday November 15 <sup>th</sup>		
9:00 am	Pacific cod (with BSAI and GOA spec discussions)	
12:00	Lunch ( <i>reconvene in separate teams for Thursday afternoon</i> )	

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**B. Bering Sea/Aleutian Islands Groundfish Plan Team**

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Tuesday November 13 <sup>th</sup>		<b>Room 2076 (Traynor room)</b>
1:00 pm	EBS Pollock, AI Pollock, Bogoslof Pollock	
Wednesday November 14 <sup>th</sup>		
9:00 am	Yellowfin sole, Rock sole, Flathead sole, Alaska Plaice, Arrowtooth flounder, Other flatfish	
12:00 pm	Lunch	
1:00 pm	Skates, other species	
3:00 pm	Atka mackerel	
Thursday November 15 <sup>th</sup>		
1:00 pm	Greenland turbot	
2:00 pm	Off year report for POP, Northern rockfish, Red rockfish, other rockfish	
3:30 pm	Table preparation, Report writing/finalizing, other business	
Friday November 16 <sup>th</sup>		
9:00 am	Table preparation, Report writing, other business	
1:00 pm	Report finalization	
5:00 pm	Adjourn	

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**C. Gulf of Alaska Groundfish Plan Team**

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Tuesday November 13 <sup>th</sup>		<b>Room 1055 (Observer training room)</b>
1:00 pm	Other species, sharks	
2:00 pm	Forage fish, Grenadiers	
2:45 pm	Arrowtooth flounder, Flathead sole, SWF, DWF (Dover sole), rex sole	
Wednesday November 14 <sup>th</sup>		
9:00 am	GOA pollock	
12:00 pm	Lunch	
1:00 pm	Pacific ocean perch, northern rockfish	
3:00 pm	shortraker, rougheye, other slope rockfish	
Thursday November 15 <sup>th</sup>		
1:00 pm	PSR, demersal shelf rockfish, thornyheads	
3:00 pm	Atka mackerel, Skates, mop up	
Friday November 16 <sup>th</sup>		
9:00 am	Table preparation, Report writing, other business	
1:00 pm	Report finalization	
5:00 pm	Adjourn	

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## **Gulf of Alaska Plan Team Minutes**

The meeting of the Gulf of Alaska groundfish Plan Team convened on November 13<sup>th</sup> at 1pm at the Alaska Fishery Science Center, Seattle, WA.

Members of the GOA plan team in attendance included:

Jim Ianelli	AFSC REFM (GOA co-chair)
Diana Stram	NPFMC (GOA co-chair)
Sandra Lowe	AFSC REFM
Jeff Fujioka	AFSC ABL
Jon Heifetz	AFSC ABL
Robert Foy	AFSC Kodiak
Nick Sagalkin	ADF&G
Cleo Brylinsky	ADF&G
Tom Pearson	NMFS AKRO
Sarah Gaichas	AFSC REFM
Steve Hare	IPHC
Kathy Kuletz	USFWS

Ward Testa (NMML) and Ken Goldman (ADF&G) were unable to attend. Approximately 15 State and agency staff and members of the public also attended. The revised agenda for the meeting is contained in the Joint Plan Team minutes.

### **Sharks**

Jon Heifetz reviewed the summary for the shark assessment. The Team discussed the justification for the use of maximum incidental catch (as recommended by the assessment author last year) as opposed to the use of average catch for Tier 6 calculations. Tom Pearson noted that it was based on the fact that there is no history of a directed fishery, thus all catch is incidental and the use of average incidental catch would be inappropriate.

The Team noted that the SSC decided that biomass estimates for Bering Sea sharks are not reliable thus Tier 5 was unacceptable. However, the team discussed that dogfish, which are not present in the Bering Sea but are more abundant in the Gulf, are more likely to have adequate survey biomass estimates than other shark species. Not all Team members agreed that Tier 6 should be based on the maximum incidental catch for sharks and not on the average as it is more appropriate and seems acceptable relative to current knowledge on the different life histories. Fisheries most likely impacted by a low Tier 6 based ABC would be sablefish hook and line which catches dogfish as bycatch. Julie Bonney asked if there was any information on the incidental catch of sharks in the sablefish IFQ fishery, or if any catch information from the halibut fishery is included. If these data are missing then true incidental catch would be higher as only landed catch is recorded. The Team requested that for the analysis of "other species" category that the Council is undertaking ABC's based on Tier 6 using both average catch and maximum average catch be evaluated.

The Team requested an examination of dogfish assessed as a Tier 5 species separate from the other shark species in the complex but concurs with the Tier 6 (maximum historical catch) recommendation at this time for the entire complex. The Team reiterates comments from November 2006. The Team recommends both ABC approaches be presented for analytical purposes.

November 2007

**Octopus:**

Liz Connors provided a summary of the octopus assessment. She noted that consistent with discussions last year, the average Tier 6 approach appears to be too conservative for some species, e.g., octopus and squid. Using Tier 6, average catch for octopus would have constrained the pot cod fishery since the estimated Tier 6 OFL would have been exceeded in a number of years. The author encouraged splitting out and monitoring octopus outside of the complex, but noted they may never be appropriately managed within the present Tier system and the use of trawl surveys.

The Team requested clarification that observed octopus caught off Kodiak tended to be smaller and in poorer condition. The author noted that these octopus were observed to be smaller, thinner and with more lesions than octopus in the Bering Sea. These octopus were all from pot fishing boats. These observations may indicate diet-related issues.

The team discussed to what extent there is an interest in commercial fishing for octopus. Nick Sagalkin noted that there have been some inquiries in getting a commissioners permit. Liz commented that it would be useful to have some experimental fishery on octopus in order to collect data. Tom Pearson noted that NMFS also received inquiries about directed fishing for squid or octopus. The Plan Team supports the use of an experimental fishery for octopus in order to collect additional data on this species. The Team refers back to comments expressed in the November 2006 GOA plan Team Minutes regarding alternative management options and approaches for this and other applicable species.

**Squid:**

Olav Ormseth presented an overview of the squid assessment. Historical catches (or records thereof) are very low, thus Tier 6 calculations are problematic. Two approaches are presented in the assessment which includes and excludes the 2006 high catch level; results showed a profound effect from the addition of this one year of data.

Using Tier 5 for squid was problematic due to the lack of reliable  $M$  estimates. Alternative assumptions for  $M$  were presented. Option 2 incorporated a decay function for the OFL calculation. Team members questioned the timing of the decay function. The author indicated that relative timing for this is not well known, but this approach would account for the high turnover in the species. Two alternatives were also included for survey biomass estimates.

The Team discussed the high squid biomass from trawl survey in 2007 as compared with the historic high 2006 fishery catch levels. The Team discussed the need for better information on squid lifespan and mortality. The Team discussed the possibility of moving squid into the forage fish category. Julie Bonney noted that this could pose a problem for the pollock fishery with the MRA for the forage fish and the possibility of running into high catches as with 2006 and thereby exceeding this MRA in that fishery. The Team noted that it would be possible to adjust the MRA in that case and that consideration should be given to incorporation of squid into the forage fish category.

**Forage Fish**

Olav Ormseth presented an overview of the executive summary for forage fish. The assessment concentrated on capelin and eulachon this year. The Team discussed the wide range in capelin estimates presented which included the estimates of biomass from the trawl survey, EIT survey and the mass-balance model. The Team noted the wide range in these numbers and the need to figure out which is most representative of the actual biomass. For example, it is unclear whether the EIT survey adequately samples the GOA capelin population. Some ideas were discussed

including modifying the EIT survey to more effectively sample nearshore areas where there is additional capelin. It was commented that the best time and areas for acoustic capelin surveys would be between January-February in the inner bays of Kodiak. The current biomass estimates for capelin based on bottom-trawl surveys biomass are known to be biased low.

For eulachon, the surveys provide somewhat better estimates of overall biomass but the author still noted that this represents an underestimate. New to the assessment are some information compiling state harvests. Reported catch data reports may be unreliable. The author noted that there is some potential for increased examination of inshore runs as an index of eulachon biomass in the future. The Team suggested looking into the British Columbia fishery for eulachon and its influence on demand in Alaska.

The Team requested having an expanded assessment for species such as forage fish in off years in order for the Team to have greater time to review and discuss the information presented.

### **Sculpins**

Rebecca Reuter presented an overview of the executive summary for sculpins including updated catch and biomass estimates. The catch of sculpins is low compared to the recommended ABCs and OFLs. The authors still recommend Tier 5, but note that they are lacking life history information for GOA although some new data is available from the Bering Sea. Biomass estimates are considered reliable. The most prevalent bycatch species will have better observer-collected data this year. In the Bering Sea, as data improves, the authors are recommending that individual species be split out and separate Tier 5 specifications be computed (and summed) for ABCs and OFLs. The catch is monitored by individual species though fishery catches remain low. Natural mortality estimates are widely varying,  $M \sim 0.08$  to 0.36 by species thus use of an average rate seemed inappropriate given this variability. Some additional information came from age data (maximum age) as a result of an NPRB research project. Additional funding is needed for non-target species. ADF&G collected some GOA sculpin species and this will improve information for subsequent assessments.

### **Grenadiers**

Dave Clausen presented an overview of the grenadiers summary. He reiterated the fact that these are a non-specified species and have no associated management measures. These should be included in the future for specifications purposes in the FMP. Catch of grenadiers is predominantly giant grenadiers thus the author again recommends using giant grenadier as a proxy for the complex, noting that the other two grenadier species are only caught in the survey at deeper water stations.

This species is recommended for Tier 5 management given reliable biomass estimates for the GOA based on trawl survey estimates. The author recommends a natural mortality rate of 0.057 based upon Pacific grenadier. A maximum age of 58 years has been estimated from aging of grenadiers recently. Thus  $M = 0.074$  could be a more appropriate estimate. He noted that the recent ages have not been validated. A maturity study is on-going and information on size and age and female maturity may be available soon. This year the observer program is collecting additional information on giant grenadiers and length and sex information is forthcoming from this in addition to species composition. The author noted that estimates of catch in the halibut fishery for sharks and other species are still important. The Team reiterates previous comments regarding the need for additional data from this fishery.

The Team discussed the timing of the other species amendment process and the possibility of evaluating grenadiers separately for incorporation into the FMP as a managed species. The

Council may comment on this at its December meeting in conjunction with the report from the nontarget committee.

### **Flathead sole**

Buck Stockhausen presented the overview of the flathead sole assessment. Bycatch and discard information were summarized in the assessment. Arrowtooth flounder are caught primarily as bycatch in this fishery but are discarded. The Team suggested breaking out crab and salmon by species in future assessments to better evaluate prohibited species catch. Team members noted a steady decline for all prohibited species, but consistent trends amongst halibut, crab and salmon.

The author provided an overview of the assessment model. This is a straightforward update of the previous full assessment. Age 3+ biomass is starting to increase while spawning stock biomass remains stable. Spawning stock biomass is likely to increase in the near future as new year classes mature and increase the level of the spawning stock. A question was raised regarding the magnitude of estimated recruitment from 2006. The authors indicated that this is highly uncertain at this point and that the estimated is based on length data not survey data. Retrospective analyses comparing 2003 and 2005 assessments indicate consistency with the 2007 assessment results.

The author recommended using maximum permissible  $F_{ABC}$ . The Plan Team concurred with the author's 2008 and 2009 ABC and OFL recommendations. The apportionment is based on the percentage of survey biomass in each area from the most recent survey.

### **Rex Sole**

Buck Stockhausen presented the overview of the rex sole assessment. He noted that TACs are well below ABCs for this species, which is also limited by halibut bycatch. The survey indicates considerable biomass of rex sole in trawl exclusion zones in southeast Alaska out of the reach of the trawl fishery. Arrowtooth flounder is common in bycatch and not retained. The Team also suggested breaking out the prohibited species catch of crab and salmon by species in the next assessment. There is a substantial increase in crab bycatch in 2006. The other PSC also increased but was within the range of previous years.

The model represents a straightforward update of previous model assessment incorporating all new data as available. Additional age data are needed for this species and so that growth estimates can be used to refine the age-length matrix. Maturity and selectivity issues persist for this species (selectivity is for fish much older than the age at 50% maturity). Also, the estimates of survey and fishery selectivities differ substantially. It was noted that the "observed" ages are primarily from bycatch in other fisheries and may not reflect the pattern should a directed fishery develop.

Recruitment has been high from 2001-2003. Given the time series, it may be possible to estimate a stock recruitment relationship. Current model results were consistent with the 2005 assessment. Note that while the current model computer code was developed and customized for rex sole, the data have also been implemented in SS2 and still indicated similar issues with selectivity (therefore not a model based issue). Team members suggested the author try to acquire more recent age data from the recent surveys.

### ***ABC recommendations:***

Similar to 2005, the author recommended the use of the model to estimate current adult spawning biomass to apply in the Tier 5 ABC calculation. The Team concurred and believes that the model is tracking biomass better than the survey and therefore agrees with the author's recommended

approach. This species is up for MSC certification. The Team also recommended that authors address CIE review comments as applicable for this stock in the next assessment. The ABCs are apportioned by area based on the most recent survey. The team suggested further evaluation into the origin of the length data in the fishery by area. The author noted that additional explorations are planned for the coming year on this.

### **Deepwater flatfish (DWF)**

Buck Stockhausen presented the overview of the deep water flatfish assessment. Dover sole is the largest component of the complex, representing 99% of the catches in recent years. The balance is made up of limited catches of Greenland turbot and deep-sea sole. There are very limited catches of DWF in recent years. Julie Bonney commented that the Dover sole market is poor and that recent catches indicate limited directed fishing. The fleet prefers to reserve their halibut bycatch limits for other fisheries.

Survey biomass estimates of deep-sea sole and Greenland turbot remain low. Four alternative models for Dover sole were considered. Models varied by consideration of selectivity and survey types. Team members questioned the use of constant selectivity for the survey due to the depth-stratification and depth limits in some years. The author noted that he evaluated length composition by deepwater and shallow water component, and the deepwater component did not substantially change the length composition.

The author recommended the use of the base model with the understanding that it leads to a more conservative estimate of biomass than other alternative model configurations. ABC and OFL recommendations for Dover sole are based on Tier 3 recommendations with Tier 6 recommendations for Greenland turbot and deep-sea sole. Beth Stewart questioned to what extent the GOA Greenland turbot is assumed to be a spillover from the Bering Sea population. The author noted that it could be spillover but could also be in the natural part of its range as the species has an extended range. Beth commented that Dover sole is a valuable species and will be targeted when there is sufficient biomass to support a directed fishery, thus measures should be taken to anticipate when we might need to be more precautionary in anticipation of a directed fishery. Buck noted that Dover sole currently it is not being observed in the survey catches, thus it would be difficult to track anything other than an increase in fishery catches. The Team discussed the process for taking more precautionary measures and noted that this could be similar to the skate issue, in that if there was an increase in annual catches, we would expect a discussion of this in the assessment and there would likely be an immediate need to address this by management measures for conservation purposes.

The Team approved of the ABCs and OFLs for 2008 and 2009 as recommended by the author. The Team expressed appreciation for the added effort to improve the presentation of flatfish assessment results.

### **Arrowtooth flounder**

Jack Turnock presented an overview of the arrowtooth flounder assessment. The assessment indicated an increase in ABCs due to an updated age transition matrix. Recent retention has been close to 60%. The assessment uses a similar model formulation common to other flatfish models. Age length data have been added through 2005 and this has led to more information on growth differences between males and females. The survey biomass estimate of arrowtooth flounder increased slightly over the 2005 value. However, the level of mature biomass declined relative to the 2005 assessment due to lower estimated growth used in the model.

New information has been included on GOA arrowtooth diet. Pollock represents a proportion of arrowtooth diet and this coupled with the large number of arrowtooth, indicates that a significant level of pollock are estimated to be consumed by arrowtooth. Total natural mortality for arrowtooth was the same as in previous assessments but may change in the future based on new growth estimates.

The Team approved of the ABCs and OFLs recommended by the assessment authors.

### **Shallow water flatfish (SWF)**

Shallow water flatfish has been split out as a separate chapter this year. New biomass estimates for all species are available from the 2007 survey. Northern and southern rock sole are Tier 4 species and the remaining species are Tier 5. The Team discussed the authors' projection of biomass for 2009 and the need for consistency with other assessments. The Team noted that in comparison with other species in Tier 4, the methodology used for SWF projections may indicate a higher level of precision than would be expected. The author will update projections for consistency in this chapter prior to distribution to the Council next week.

The apportionment table was not provided in the assessment but was later calculated based on the most recent survey percentage by area consistent with all flatfish assessments. The author agreed to add a table to the assessment for this apportionment.

The Team approved of the ABCs and OFLs as recommended.

### **Pollock**

Martin Dorn presented the pollock assessment. The assessment model has not changed from last year but has been updated with new information. The author noted that catch has been below TAC in recent years with the fishery unable to catch the full quota, particularly in area 610. Bycatch in 2006 was comprised of ~9% of species other than pollock. The squid bycatch in 2006 was the highest on record. Flatfish can also comprise a high percentage of the bycatch partly due to the fact that arrowtooth forage in midwater, coupled with the fact that pollock trawling in the GOA can be both pelagic and bottom trawl. PSC bycatch was summarized in the assessment this year. Notably Chinook salmon bycatch peaked in 2005 and Tanner crab was very high in 2006. Members of the public commented that some of this may be an artifact of expansion on the non-observed fleet. The Team discussed the potential problems with RO PSC bycatch estimates and that their validity and spatial nature should be evaluated. This could be particularly important for evaluating Tanner crab bycatch in 2006

The Team discussed the data presented on catch at age by area and season in 2006, noting that there were fewer length frequency samples taken in Chirikof than ages. The author agreed that this seemed anomalous and will investigate this. He noted that sample sizes have declined in recent years.

The Team discussed the acoustic results from Shelikof Strait in 2007 whereby the acoustic survey estimate was low and the total estimate the lowest in the time series. There has been a lack of juvenile pollock in Shelikof Strait in recent years. The Shumagin estimate was also very low in 2007, and there is no evidence of a trend in Chirikof. While only the Shelikof Strait acoustic data are used in the model, the other data are important for the allocation by area. Mike Guttormsen noted that timing-wise Sanak was surveyed post-spawning but in all other areas the timing of the survey has tended to be representative of pre-spawning. He noted that all indicators have declined substantially from last year with Shelikof and Shumagin at new lows. Beth Stewart

commented that the fishery in 610 found it very difficult to find fish in most seasons, with some seasons finding a mixture of only very small and very large fish.

Team members questioned the market for catch of smaller fish (e.g. 2 year olds), noting that there was some indication that these are used for bait. Catch of two year olds in Bering Sea are rare, especially since 1999 (post AFA). Members of the public commented that there is a limited market for 2 year olds, hence the fishery tries to avoid them but this is not always possible.

Size composition data from the Shumagins indicated a lack of 2 year olds, although Mike noted that the acoustic survey did find some in that region. The team discussed the relative spatial overlap between the ADF&G survey and the NMFS survey noting that ADF&G surveys further up into bays than NMFS.

The Team discussed the use of annual estimates versus long term estimates of spawning biomass and the utility of adjusting annually noting that if the stock were to move to Tier 1 annually adjusting spawning biomass would be necessary.

The Team reviewed the selectivity parameterization and the conservative impact to the model, such as the tradeoffs between a functional form of selectivity (dome shaped) with fixed Q. The Team suggested that next year the author investigate the use of an asymptotic survey selectivity with a freely estimated Q.

The Team reviewed the retrospective patterns on spawning biomass and discussed the difficulty in estimating relative year class size and impacts on projections. The author noted that recent strong year classes tend not to be utilized in the ABC projection due to large uncertainty. This is problematic in deciding on a more consistent approach to estimating larger year classes.

The short-term projection is for a continued decline in stock abundance. However, the overall medium-term projection is for improvement given indications of abundant juvenile pollock. The Team discussed the previously overly optimistic outlook for 2008 and the resulting estimated ABC compared to the current more conservative estimate for 2008. The Team notes that specifications from last year opens the 2008 A-season for this fishery. The Team suggested an MSE for this stock to project the relative impact of additional precaution in the assessment and ABC recommendations.

The author reviewed the southeast Alaska pollock data. Larger fish were observed this year based on the trawl survey. No fishery is possible in this area except with jig gear. The Team noted that it would be interesting to model this portion of the population given the lack of fishing.

***Allocation:***

An appendix is presented in the assessment for the allocation. The author noted that main change in the summer allocation this year is driven by dropping the 1999 survey from average and the proportional shift away from Shumagins.

Prince William Sound data is not yet available to update the assessment for this area. The Team held a discussion on the availability of this data in September and requested data which is available from the State to be incorporated into the assessment. The September GOA Plan Team minutes stated:

*The survey does not include PWS thus any contribution to the overall GOA pollock from this region are not assessed by the bottom trawl survey. The methodology for inclusion of PWS in the*



*assessment provides a compromise for how to incorporate dated ADF&G survey data in the assessment. The only survey data that has been made available to the assessment author thus far is from 1999. An expansion factor of 1% is applied to all the NMFS surveys to account for this biomass contribution from PWS. For management purposes, the resulting ABC for central and western GOA is then reduced by the guideline harvest level for PWS. Previous attempts to account for this biomass have been somewhat ad hoc and there has been only limited additional effort by ADF&G to survey this area. Comparisons of ADF&G and NMFS survey gear have indicated that the NMFS net is more effective on similar bottom areas. Thus it is likely that the ADF&G estimate of biomass is biased low. Other considerations are that the PWS fishery has historically been a spawning fishery at the entrance to PWS and it is not clear if the fish being caught are coming from PWS or from other areas of the gulf. Some genetic work has been done exploring the extent to which the spawning populations are distinct between the two regions. Results indicate some evidence of stock structure, but overall results are inconclusive.*

Based on discussion at that time, the Team requested that these State data be made available to the author in order to provide updated information on the relative contribution from the PWS stock. The Team reiterates this request from September 2007 and asks that the data be made available to the assessment author in a timely manner for incorporation into the assessment next year in lieu of this year.

***ABC recommendations:***

The author reviewed the indications of stock status and reiterated the necessity of being conservative with ABC recommendations for this stock. He summarized the following indications of stock status: low acoustic survey results in 2007, record low total estimated biomass in Shelikof Strait, variable survey estimates and trends, projections that spawning biomass will be at a minimum in 2008 and will increase in subsequent years, evidence that the three years of year classes 2004-2006 may be near average or average in abundance, and the pattern since 1999 that estimated stock size is higher in the final year than estimates for same year in subsequent assessments.

The elements of risk aversion incorporated into the model are the following: fixed trawl survey catchability at 1, and applying a more conservative harvest rate than the maximum permissible  $F_{ABC}$ . The combination of these two factors reduces the recommended ABC to approximately 54% of model point estimate.

The Team agreed with the assessment author on the ABC and OFL recommendations for 2008 and 2009. The Team expressed concern about the possibility that despite being very conservative at the time, the results seems to be less conservative than intended in retrospect. The stock appears to indicate that it will increase in the near future. The Team discussed the projected increase in 2009 and the potential the increase will not be as high as projected.

Jon Warrenchuck commented on the recent high catches of eulachon in the fishery and requested comment to what extent this might represent a concern. The Team noted that the executive summary of the forage fish assessment evaluated state catches of eulachon and capelin. Additional stock identification work will ideally be forthcoming and more information may be available next year in an updated forage fish assessment. Martin noted that midwater tows in the EIT survey and the bycatch rate in that survey data could be used as a possible index of abundance. Mike Guttormsen commented that some catches in Shelikof indicated higher eulachon than pollock, and showed an increase in recent years. Bob Foy commented on some recent research from scientists in Canada indicating that an increase in eulachon abundance could be related to temperature changes in recent years, possibly causing a distributional change not an

actual increase in abundance. The Team noted that this should be explored more next year in the forage fish assessment.

### **Rockfish Assessments**

Dana Hanselman presented an overview of the general rockfish issues including similarities in model standardization, responses to CIE reviews and the rockfish pilot project.

Julie Bonney provided an overview of the rockfish pilot program given its first year of implementation. She reported on the percentage of CVs that have formed cooperatives as well as the employment statistics. The program appears to be having the intended impact on stability in the processing sector. The co-op contracts have additional rules that are being employed within and across co-ops setting standards for fishing practices designed to reduce bycatch of halibut. A higher percentage of the catch in this year was taken by pelagic gear given the flexibility afforded the fleet under this program. Greater use of pelagic gear decreased the mortality of halibut. No discards of CQ quotas are allowed at sea (100% retention) under this program. Jon Heifetz noted that for rockfish that are not part of the program but managed under MRAs (i.e. shortraker and rougheye) there has been a high amount of at sea discards, particularly for rougheye rockfish. Julie agreed that this is a technical problem with the program that may need to be addressed either by NMFS or the Council. Retention of these species is not allowed when vessels do dedicated sablefish trips; sablefish is not considered a basis species for retention. In the meantime the coops will try to address this within their individual allocations by having the appropriate CQ species mix on board to allow retention. Tom Pearson summarized the changes in both fishing practices as well as fishing areas as a result of the implementation of this program.

Julie also provided an overview of the first phase of an EFP employing electronic monitoring on CVs in the rockfish fishery. Dana requested clarification on why some dusky and northerns were not fully caught. Julie indicated that some of that is related to becoming more accustomed to the program and the difficulty of being weathered out of the fall fishery timing. She indicated that these problems will likely be sorted out better in the second year of the fishery with the fleet encouraged to catch those species earlier in the fishing year. Tom Pearson further commented that while in the past the TAC has been exceeded for several rockfish fisheries, this program has reduced the potential for exceeding the TAC. Some of the downfalls of this program include the cost of the observer requirements, and the vessel allocations based on the qualification period as established in the program. Some criticism still exists by Kodiak residences not involved in the fishery regarding rationalization as a fishery management regime. (Diana, note there was no fleet consolidation the first year 26 vessels in 2007 versus 25 in 2006). Nick Sagalkin noted that some additional issues exist whereby fishermen outside of the program are still being held to some of the program requirements. Currently the program has a fixed end date in 5 years (2011).

### **Pacific Ocean Perch**

Dana Hanselman presented the assessment for POP. The model has been updated with new data but retains the same model structure. He noted that the precision of biomass estimates from the survey has increased in recent years. More medium size catches of POP were spread across the GOA rather than relatively rare, but large survey catches.

The Team concurred with the assessment author on the recommended ABCs and OFLs for 2008 and 2009. For apportionments, the Team discussed the distributional shift eastward leading to a decline in the WGOA and relative increase in the CGOA and EGOA.

Dana summarized the data gaps and future research needs with an emphasis on habitat requirements for early life stages, trawlable vs untrawlable grounds, model assumptions (e.g.,

sample size weighting) and the catchability prior distribution. The Team discussed how to get around the trawlable vs untrawlable grounds issue, noting that the acoustic survey could assist in this. The Team encourages additional effort be expended on acoustic surveying for POP (and rockfish in general) in the GOA. Mark Zimmerman provided an update on his work with assimilating habitat data to synthesize for evaluating the trawlable and untrawlable areas in the GOA. The Team discussed the potential for this to be an increasingly important fishery in the GOA in the future.

### **Northern rockfish**

Dana Hanselman presented an overview of the northern rockfish assessment. The model was presented last year and has been updated with new data as available. The biomass estimate from the recent survey declined 37% from 2005. The precision of the survey biomass estimates continues to be poor for this species. Age compositions indicate that recruitment has been low and the fishery catches mainly older fish. The relative decline in projected spawning biomass for 2008 and 2009 leads to a decline in the projected ABC for this stock.

The apportionment calculation has been modified for all rockfish to now include the (previously excluded) 1-100 m depth strata. It was noted that historically, that depth strata was excluded based upon historic POP distribution when all rockfish were in the same complex for management. However, based on the distribution of northern rockfish, there is limited evidence to support continuing to exclude this depth strata. Based on the trawl survey, the northern rockfish in this stratum are about the same size as those in deeper stratum and thus should be considered part of the exploitable population. The new apportionment calculation leads to a greater apportionment for the WGOA. The weighting scheme 4:6:9 applies to the percentages. The Team discussed the rationale for weighting the percentages instead of the biomass noting that this was done rather ad hoc at the time and has been employed (on percentages ) ever since. The Team requests inclusion and a careful evaluation of the apportionment weighting (on biomass versus percentages) for next year's assessment. The Team concurred with the author's recommended ABC and OFLs for 2008 and 2009.

### **Rougheye rockfish**

Kalei Shotwell provided an overview of the rougheye rockfish assessment. She noted that there was a large increase in the trawl survey biomass estimate in 2007 from 2005. Four more years of survey age data were added to the model which increased the estimated recruitments. The addition of the new age data and a substantial increase in both surveys resulted in a 40% increase in estimated female spawning biomass and a 30% increase in the ABC for 2008. Information is included in the stock structure section of the assessment on the blackspotted rockfish because there are two species present in this complex, rougheye and blackspotted rockfish. At some trawl stations, both species are found in the same tow. There will be additional investigation done on life history characteristics of these two species and the potential for differential exploitation of each species. Some genetic sampling on the longline survey has been conducted to evaluate the distribution of the two species, but results are not yet available.

A sensitivity analysis on the use of data was included in last year's assessment and reevaluated in this assessment using new data from the 2007 model. Variance assumptions on the age/length composition data were also evaluated. Conclusions from this analysis were to consider increasing the weighting on the catch data index and to explore the model assumptions on age/length bins given that rougheye tend to be older than other rockfish and may be continuing to grow at the pooled age bin currently assumed.

The Team discussed the relative increase in ABC for this species but given the improved data in the model and indications of increased abundance from both the longline and trawl survey this ABC seems appropriate. The Team noted that the TAC was not caught last year. Catch in future years is also unlikely to reach the TAC. The Team discussed MRAs and that arbitrarily keeping the ABC lower may compel discards. Jon Heifetz mentioned that there is evidence that sablefish compete with rockfish in the longline survey thus the longline survey may not be as useful for those species as an index of abundance. The Team discussed that the trawl survey increased from 2005 as did the longline survey. The trends are still fairly flat however and the Team discussed to what degree there is confidence in this relative increase from the model. The Team discussed the fact that the overall biomass is considered to be higher (not in trend but overall from previous estimates as shown in figure 11-11). The author noted that the maturity information is likely to be revised based upon additional available maturity data.

The Team recognizes that there are two species and it would be important to evaluate if there is disproportionate catch of one of these species in relation to abundance as well as potentially different life history characteristics for each species which might necessitate different assessments and specifications for each species or some consideration of differing management by species.

The Team approved the author's recommended ABCs and OFLs for 2008 and 2009.

### **Pelagic Shelf Rockfish**

Kalei Shotwell presented the assessment for pelagic shelf rockfish. This complex includes dusky rockfish which has an age structured assessment (tier 3) while dark, widow and yellowtail are Tier 5 with specifications all summed for a single OFL and ABC. For dusky rockfish, the trawl survey estimates decreased slightly and did not show indications of recent recruitment. Spawning biomass decreased in 2008. However, the model estimated total biomass estimate is slowly increasing until current year. Martin Dorn suggested reevaluating the confidence intervals around the model mode. The ABC is a slight decrease from the 2005 estimate.

Dark rockfish will be moved to state management effective in 2009 thus it is currently included in PSR complex for this specifications process. Catch of PSR increased in the CGOA due to implementation of the pilot rockfish project. Julie Bonney commented that catchability in the survey might be particularly problematic for this species as the fleet observes a tendency for the fish to avoid the net. The Team discussed the potential of increased age collections for rockfish in the CGOA in response to the Rockfish Pilot Program. However, it was noted that increasing the number of rockfish ages available for use in stock assessments is restricted by the number that can be aged and not the number that are sampled. The Team notes that there are implications of having an increase in samples obtained in the CGOA in proportion to other areas, and the authors will investigate potential problems this may cause relevant to the fishery age compositions.

The Team approves the author's recommended ABCs and OFLs for 2008 and 2009.

### **Shortraker and other slope rockfish**

Kalei Shotwell presented the assessment for shortraker and other slope rockfish. She noted that survey age results are newly available for these species. Shortraker are currently a Tier 5 species but with additional age data available there is the potential for an age-structured model in the future. Julie Bonney commented that it is useful to include the 2006 catch by area for comparison against 2007 and the potential impacts of small apportionments by area. Catch in 2007 was greater than the TAC in the WGOA. The ABC in the WGOA is very small. The change in apportionment by area is due to the downweighting of the 2003 survey this year compared to

previous years (due to relative weighting scheme for apportionment). The Team discussed the use of the relative weighting scheme used in apportionments but not employed in estimating the biomass where the last three surveys are utilized. The Team reiterates the request as noted previously to reevaluate the current use of the weighting scheme. The evaluation of the weighting scheme should be done for discussion at the plan team in 2008 (off-year). The Team approved the ABCs and OFLs for 2008 and 2009.

Other slope rockfish are Tier 5 species except sharpchin which is a Tier 4 species. New age data are available for multiple species. There is a slight increase in overall ABC for 2007. The Team notes a new mortality value used for silvergray rockfish due to a recent publication by Malecha et al. (2007). The Team approved the ABCs and OFLs for 2008 and 2009.

The Team discussed the present scheme of apportioning the OFL for POP by region, and the extent this is warranted. This originates from the rebuilding plan for POP and may no longer be necessary. TAC in EYAK/SEO is set to incidental catch levels. Silvergray rockfish is the only member of the complex with any potential for targeting and is located primarily in EGOA.

### **Demersal Shelf Rockfish (DSR)**

Cleo Brylinsky presented an overview of the demersal shelf rockfish assessment. New data included in the assessment include new density estimates for CSEO and new average weights for all four management areas in SEO. Exploitable biomass for 2008 decreased 6% from the 2006 estimate (based on the 2005 survey work). The Team discussed the averaging methods from all surveys in different years and questioned to what extent this could bias the results and mask a larger potential decline, particularly in light of the recent evidence of decline in one area. New average weights originate from the 2007 IPHC survey bycatch. Previously these average weights originated from the commercial fishery landings but in the absence of landed catch and a directed fishery, the data was collected from the IPHC. All landed DSR were considered (i.e. more than just the 20 hook protocol) and as a result average weight increased. As in years past, the ABC includes an additional 4% for the other rockfish species in the DSR assemblage. The author noted that in 2006, the BOF made an allocative decision to split the TAC 84/16 between commercial and sport fisheries respectively. Once a determination is made of the estimated incidental catch in other fisheries it will be determined whether or not a commercial fishery will occur.

The Team discussed the retention of DSR as incidental catch rather than bycatch. Full retention is required but there are anecdotal indications that some are being discarded. There are different regulations for the sportfish fishery versus the commercial fleet. The charter fleet must retain the first 3 DSR and then must release all subsequent DSR caught. Additional information has been provided by the sportfish managers in the assessment this year on retained and discarded yelloweye.

The author noted that east Yakutat will be next surveyed contingent upon funding. She noted that funding for the survey is unlikely next year. Additional emphasis needs to be placed on the estimation of rocky habitat. The Team discussed averaging or weighting surveys given indications of declines in recently surveyed regions. The Team discussed the potential ways to account for uncertainty in biomass estimates, noting that additional precaution is added by setting  $F=M$  given the vulnerability of the species to overfishing due to their longevity, late maturation and sedentary and habitat-specific residency. The Team is also concerned about the potential for under-reporting of catches. The survey index for this year has decreased. The Team noted that in the absence of additional survey information for the future the species would likely drop a tier level. The Team expressed concern about the potential lack of surveys for this stock. The Team

discussed the potential with a very low TAC of not meeting incidental catch needs in the halibut fishery. The ABC and OFL for 2008 and 2009 were approved by the team.

### **Thornyhead rockfish**

Sandra Lowe presented the assessment for thornyhead rockfish. The assessment has been updated with new data. The assessment methodology was modified by using the most recent survey to calculate a Tier 5 ABC and OLF instead of the average of the two most recent surveys, given that the 2005 and 2007 surveys covered all depth and area strata. Previous to 2005, not all depth and area strata were covered in each survey therefore an average had been used.

There was a 10% decline in the overall GOA 2007 trawl survey biomass estimate and the decline was greatest in the western GOA. The 2008 ABC recommendation represents a 13% decrease relative to the 2007 ABC/TAC due to the modification of using only the most recent survey (rather than the average) coupled with the decline in the survey biomass estimate.

The Team discussed the reasons for the substantial decline in the western GOA as compared to other areas. Chris Lunsford noted the longline survey RPW for sablefish in the WGOA has also declined. This provides additional support for observed decline suggesting that the decline in the WGOA is not simply the result of a sampling artifact. The Team questioned to what extent the fishery catch by area has changed over this time period and recommends further examination next year into the catch by area of this species given that it is a highly valuable incidental catch in other fisheries. The Team notes that proportionally relative to the ABC, the catch in the WGOA is highest. The Team notes that the ABC in the WGOA would be lower than last years catch. Tom Pearson commented that people are topping off on sablefish in the WGOA rockfish fisheries.

The Team approved the author's recommendation to use the most recent survey for both the apportionment and biomass estimation and approved the author's 2008 and 2009 recommended ABCs and OFLs.

Julie Bonney requested additional rationale for use of only one survey for biomass and apportionment. Sandra Lowe answered that CVs are very low for this species and thus averaging over multiple surveys to account for variability is unnecessary. Thornyhead are also considered to be relatively stationary. Age data for thornyhead are unavailable but a study with researchers at Oregon State University has begun to help to develop otolith age-determination methods for shortspine thornyheads.

### **Skates**

Olav Ormseth presented the skate assessment. The 2007 survey biomass estimate was about 6,000 t lower than the 2005 estimate. The most noticeable decline was in longnose skates. There was an increase in the overall biomass of Bathyraja skates. Similar trends have been noticed in the Atlantic coast where large skates declined and smaller skate species increased when skates were targeted by fisheries. The bulk of the skate biomass is in the CGOA for all species. The directed fishery remains closed due to high incidental catch and poor catch data coupled with concerns about underestimating the true bycatch in the halibut fishery.

The Team discussed the estimation for skate bycatch in halibut fishery. The estimate reported in the SAFE was calculated by applying the catch rate of skates in the IPHC halibut survey to the number of hooks fished in the IFQ halibut fishery. The IPHC does not use this approach, as they believe skate bycatch is likely to be less in the directed halibut fishery. Therefore, the authors suggested that the estimate reported in the SAFE report be treated as a potential upper bound for

halibut fishery catch of skates. The authors and the Team agreed that improving the estimation of halibut fishery bycatch is a major concern for GOA skates. An additional problem is the lack of data regarding the species composition of discarded skates.

The Team encourages an EFP with observers or video monitoring be undertaken. Members of the public indicated that a Kodiak-based longline fleet is interested in fishing for skates and most of this fleet holds halibut IFQ. This could provide a means to obtain information on the bycatch of skates in the halibut fishery as well as the halibut bycatch in a directed skate fishery. Ex-vessel value continues to increase for skates thus there may be growing interest in targeting skates.

Area specific OFLs are recommended by the authors in the assessment given the potential for localized depletion. As in previous years, the Team disagreed with area-specific OFLs and instead recommends gulfwide OFLs by species with area-specific ABCs. The Team still expresses concern that the OFLs are less than the estimated bycatch in the halibut fishery.

The Team expressed concerns regarding indication of declining biomass in the two largest species based upon the two most recent surveys. The Team continues to be concerned about the estimated bycatch in the halibut fishery in comparison to the indication of declining biomass.

The author noted that age-data from the Bering Sea may be utilized for an age-structured assessment for big and longnose skates in the GOA next year. New natural mortality rates are anticipated to be included next year. The Team recommended that it would also be useful to track effort by various gear types over time.

Survey length data were discussed, and the Team requests including the sample sizes for each of these and actual number of fish measured (e.g., as in Figure 17-11). Longline survey information may also be available to include in the assessment model. Nick Sagalkin indicated that the State survey may also have information on skate abundance.

The authors also noted that fishery impacts on skate nursery areas have yet to be evaluated. There is limited information available on skate nursery areas in the GOA.

### **Atka mackerel**

Sandra Lowe presented the Atka mackerel assessment. The assessment includes updated data and an expanded ecosystem section. The Team approved the author's recommendation for Tier 6 calculated ABCs and OFLs for 2008 and 2009. The TAC was increased in 2007 to meet increased incidental catch needs. The concerns remain regarding the prevalence of a single year class in the population which is declining and the need for continued conservation. The Team notes that 1,500 t continues to meet incidental catch needs.

The Team noted that catch is currently coming from incidental catch and topping off in the rockfish fisheries. Julie Bonney commented that GOA CPs are the only ones that are interested in retaining Atka mackerel and a decrease in WGOA rockfish quotas will likely lead to declining incidental catch of Atka mackerel.

### **Pacific cod**

The Team received a brief summary of limited GOA Pacific cod model results on Thursday evening. The Team recognized the extenuating circumstances under which the assessment was prepared and appreciates the efforts of the author to provide the Team some limited modeling results. However the Team expressed concern about the time available to review this assessment

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and the lack of a full assessment. As such, the Team requests a protocol be followed for all future assessments:

*The Team is of the opinion that there must be adequate review time allotted for reviewing assessments in advance of specifications discussions at the Plan Team meeting. The timing of this should be such that assessments are provided for review no later than the Friday before the start of the November plan team meeting. The Team does not believe that any assessment should be considered in the Council process that does not include adequate initial review by the Plan Team. Further, any assessment that goes directly to the SSC would set an inappropriate precedent which does not comply with the review process that has been codified and forms the basis of informed decision-making by the North Pacific Fishery Management Council.*

Grant Thompson presented the summary assessment for Pacific cod in the GOA and noted that the approach was to use the preferred model from the BSAI cod assessment for the GOA rather than attempting a broader range of model configurations given timing constraints.

Grant summarized changes to the model and where these differed from the BSAI model. Changes from the BSAI model include the following: fixed  $M$  at 0.38, fixed  $Q$  at 0.92, trawl survey selectivity based on length rather than age and constrained to be asymptotic, all fishery selectivities are unconstrained, and mean length-at-age data are included. The team noted that retaining selectivity based on length not age was similar in structure to last year's GOA assessment. Likewise the fishery selectivities were unconstrained in the previous year's model as well. A major change from the structure of last year is the use of a 6 parameter double logistic selectivity function rather than a four parameter double normal, and the use of annual time varying survey selectivity but no time varying fishery selectivity. The use of time varying survey selectivity is based on the assumption that smaller fish are shifting over time to different areas. The starting year in the model has been moved to begin in 1977 and there were several additional changes to the SS2 model that the Plan Team was unable to fully review. Changes in the assessment are listed by comparison with the preferred BSAI model.

The model-estimated ABC is down 33% from last year and is approximately equal to this year's total catch. The size composition data weighting scheme utilized in the Bering Sea assessment was not utilized in the GOA. Some problems with using this weighting scheme were attributed to the combination of State pot data and port sampling information as compared with federal catches, therefore, for size data a similar methodology to last year was employed and for age data a modified approach to scaling the data was utilized.

The Team questioned the re-estimated weight-at-length in last year's assessment which was not included this year, and requested clarification on why the data are restricted to survey length-weight and do not include the observer length-weight data as well. The author noted that this was due to the objective last year of achieving consistency and an examination of this issue could be recommended for the next assessment. The Team suggested including a table of sample sizes for the next assessment and that other sources of information on length-weight be included, especially for fisheries data that may apply during seasons other than the summer when survey data are collected. The Team discussed what the most appropriate weight-length relationship is for use in the assessment. It was noted that for Bering Sea pollock there is approximately a 10% difference in the length relationship over the year and this could be even more variable for cod. Martin Dorn noted that he did not think that the SS2 model would allow for seasonal length-weight relationship changes. The Team discussed to what extent there may be a strong seasonal relationship. The Plan Team recommends that the author look at variability in length-weight data, specifically intra-annual variability (previously looked at inter-annual variability) for the subsequent assessment. The Team also discussed the selectivity at length and seasonal



differences. The Team requested that error bars be included in the length at age figure to indicate the low number of samples and the impact on results particularly notable at higher ages.

The Team discussed the trends in survey biomass with age 3+ and female spawning biomass. Time series of recruitment indicates that 2005 and 2006 year classes in the GOA may be average and above average respectively (with large error bars as indicated). The 2006 data are from the 2007 survey data. This is in contrast to estimates of recruitment in the Bering Sea which indicates that variability in recruitment in the GOA is much less than the variability in recruitment in the Bering Sea.

The Team discussed the phase plane diagram and the implication of the control rule in 2008 whereby the model biomass is now below the  $B_{40\%}$  target biomass and subject to the kink in the control rule, whereas, in the previous assessments the biomass was well above  $B_{40\%}$ . The Team noted the fact that past year's model results indicated only a slight decrease from peak abundance in 1990 in contrast to a more pronounced decrease indicated in this year's model.

The Team also expressed concerns with use of the model results given the multitude of changes in this year's model as compared to last year, noting that it would be useful to compare against a similar model configuration from last year. The Team expressed concerns about the limited review time period for model changes and the protocol for reviewing extensive changes in model methodology in September prior to adoption in the current assessment year.

Therefore, the Team felt that it was premature to accept the model under these circumstances given the limited review time and lack of a full assessment. The Team notes that extensive review in an open forum has been provided via the various assessment workshops. However, given that these were attended by only a few Plan Team members, these reviews were considered inadequate for the current assessment.

Members of the public expressed concern about the Pacific cod fishery in the GOA. They noted that SSL RPAs have affected a large change on the age and size of cod in the fishery given that a significant area is no longer fished that used to be fished on an annual basis prior to 2000. The fishery has been aggregated into smaller areas and removals are now from site specific spots rather than larger geographic areas. They noted that the survey however still samples across the broad geographic area thus there is a higher potential for localized depletion in the areas remaining to the fishery. The Team notes that previous models have had time-varying changes in fishery selectivity and this has been removed in this model. Previous configurations had a different selectivity from 2000-present to account for the modification to fishery selectivity as a result of SSL RPAs.

***ABC deliberations:***

The Team debated options for establishing ABCs for 2008 and 2009 ranging from accepting that the stock is in Tier 3b for assessment results but applying a Tier 5 calculation for specifications purposes, to a possible Tier 4 estimation, to rolling over last year's ABC and OFL or using results from last year's model for ABC specifications in this year. The Team noted that in last year's assessment, the 2008 max permissible was 71,361 which assumed a catch of 68,859 which is higher than the actual catch in 2007. The team noted that using this projection would ignore the 2007 survey data (which was about 20% below the 2005 value), and the model assumed catchability change (from 1.0 to 0.92).

In considering an ABC recommendation, the Team discussed that the survey biomass estimate declined, and that recruitment is low but with some indication of improvement. Sarah Gaichas

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noted that in the ecosystem model she has unable to reconcile the Pacific cod model estimates of biomass with the mass balance on cod predation and thus to balance the model has had to utilize the survey estimates of biomass. Thus, the fact that the new model results better track the survey is preferable and a possible indication that the current model might better represent the actual biomass.

Grant provided an estimate of last years 2005 estimated spawning biomass scaled to the relative decline in the survey biomass (2005: 2007) in order to give some indication of to what extent there is a true decline in spawning biomass and whether the stock is below  $B_{40\%}$ . The subsequent value for estimated spawning biomass (89,000 t) is still below  $B_{40\%}$ . The team noted that unless there is some indication of projected increase, this should give some indication of stock status.

The Team recommends an ABC and OFL based upon a Tier 5 calculation using the survey biomass estimate and an  $M$  of 0.38 which was noted to be externally estimated utilizing Jensen's rule and Stark's new published maturity schedule information. This calculation leads to a 2008 (and 2009) ABC and OFL of 66,493 t and 88,660 t respectively. The updated apportionment incorporating the 2007 survey biomass information is 39% WGOA, 57% CGOA and EGOA 4%. Apportionment has been based on the unweighted average of the last three surveys. The Team discussed to what extent there should be some weighting involved in recent surveys.

The Team requests that prioritization be given to the GOA assessment next year.

The Team concluded their assessment reviews at 12:15pm and adjourned to the work session portion of the meeting to compile the remaining sections of the SAFE report until 5:00pm.

2007 catches reported through November 3, 2007.

Stock/ Assemblage	Area	2007				2008		2009	
		OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pollock	W (61)		25,012	25,012	18,012		17,602		23,700
	C (62)		20,890	20,890	19,366		19,181		25,821
	C (63)		14,850	14,850	14,315		13,640		18,367
	WYAK		1,398	1,398	86		1,517		2,042
	Subtotal	87,220	62,150	62,150	51,779	72,110	51,940	95,940	69,930
	EYAK/SEO	8,209	6,157	6,157	0	11,040	8,240	11,040	8,240
Total	95,429	68,307	68,307	51,779	83,150	60,180	106,980	78,170	
Pacific Cod	W		26,855	20,141	13,227		25,932		25,932
	C		37,873	28,405	23,404		37,901		37,901
	E		4,131	3,718	65		2,660		2,660
	Total	97,600	68,859	52,264	36,696	88,660	66,493	88,660	66,493
Sablefish	W		2,470	2,470	1,996		1,880		1,718
	C		6,190	6,190	5,536		5,500		5,026
	WYAK		2,280	2,280	1,769		1,950		1,782
	SEO		3,370	3,370	3,238		3,390		3,098
	Total	16,906	14,310	14,310	12,539	15,040	12,720	12,924	11,624
Deep-water Flatfish	W		420	420	8		690		707
	C		4,163	4,163	247		6,721		6,927
	WYAK		2,677	2,677	2		965		995
	EYAK/SEO		1,447	1,447	10		527		543
	Total	10,431	8,707	8,707	267	11,343	8,903	11,583	9,172
Shallow-water flatfish	W		24,720	4,500	281		26,360		26,360
	C		24,258	13,000	7,761		29,873		29,873
	WYAK		628	628	0		3,333		3,333
	EYAK/SEO		1,844	1,844	0		1,423		1,423
	Total	62,418	51,450	19,972	8,042	74,364	60,989	74,364	60,989
Rex sole	W		1,147	1,147	413		1,022		948
	C		5,446	5,446	2,432		6,731		6,241
	WYAK		1,037	1,037	1		520		483
	EYAK/SEO		1,470	1,470	0		859		796
	Total	11,900	9,100	9,100	2,846	11,933	9,132	11,065	8,468
Arrowtooth flounder	W		20,852	8,000	3,134		30,817		31,080
	C		139,582	30,000	21,808		167,936		169,371
	WYAK		16,507	2,500	63		15,245		15,375
	EYAK/SEO		7,067	2,500	68		12,472		12,579
	Total	214,828	184,008	43,000	25,073	266,914	226,470	269,237	228,405
Flathead sole	W		10,908	2,000	696		12,507		13,001
	C		26,054	5,000	2,407		28,174		29,289
	WYAK		2,091	2,091	2		3,420		3,556
	EYAK/SEO		57	57	0		634		659
	Total	48,658	39,110	9,148	3,105	55,787	44,735	57,962	46,505

Table 1. continued...

Stock/ Assemblage	Area	2007				2008		2009	
		OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pacific ocean perch	W	4,976	4,244	4,244	4,428	4,376	3,686	4,397	3,704
	C	8,922	7,612	7,612	7,125	9,717	8,185	9,764	8,225
	WYAK		1,140	1,140	1,242		1,100		1,105
	SEO	3,260	1,640	1,640	0		2,028		2,038
	E(subtotal)	3,260	2,780	2,780	1,242	3714		3732	
	Total	17,158	14,636	14,636	12,795	17,807	14,999	17,893	15,072
Northern rockfish <sup>3</sup>	W		1,439	1,439	1107		2,141		2,047
	C		3,499	3,499	2,982		2,408		2,302
	E		0	0	0		0		0
	Total	5,890	4,938	4,938	4,089	5,430	4,549	5,120	4,349
Rougheye	W		136	136	71		125		124
	C		611	611	175		834		830
	E		241	241	153		327		325
	Total	1,148	988	988	399	1,548	1,286	1,540	1,279
Shortraker	W		153	153	193		120		120
	C		353	353	155		315		315
	E		337	337	244		463		463
	Total	1,124	843	843	592	1,197	898	1,197	898
Other slope <sup>3</sup>	W		577	577	252		357		357
	C		386	386	319		569		569
	WYAK		319	319	49		604		604
	EYAK/SEO		2,872	200	45		2,767		2,767
	Total	5,394	4,154	1,482	665	5,624	4,297	5,624	4,297
Pelagic shelf rockfish	W		1,466	1,466	595		1,003		986
	C		3,325	3,325	2,440		3,626		3,566
	WYAK		307	307	293		251		247
	EYAK/SEO		444	444	1		347		341
	Total	6,458	5,542	5,542	3,329	6,400	5,227	6,294	5,140
Demersal rockfish	Total	650	410		178	611	382	611	382
Thornyhead rockfish	W		513	513	338		267		267
	C		989	989	247		860		860
	E		707	707	184		783		783
	Total	2,945	2,209	2,209	769	2,540	1,910	2,540	1,910
Atka mackerel	Total	6,200	4,700	1,500	1,441	6,200	4,700	6,200	4,700
Big skate	W		695	695	68		632		632
	C		2,250	2,250	1,218		2,065		2,065
	E		599	599	8		633		633
	Total	4,726	3,544	3,544	1,294	4,439	3,330	4,439	3,330
Longnose skate	W		65	65	46		78		78
	C		1,969	1,969	814		2,041		2,041
	E		861	861	240		768		768
	Total	3,860	2,895	2,895	1,100	3,849	2,887	3,849	2,887
Other skates	Total	2,156	1,617	1,617	1,104	2,806	2,104	2,806	2,104
Other Species	Total	NA	NA	4,500	2,695				
Total		611,153	490,327	269,912	170,797	665,642	536,191	690,888	556,174

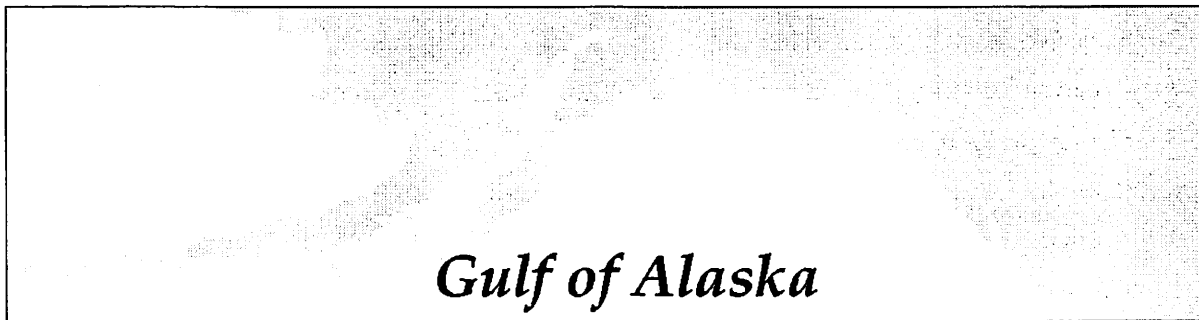
**APPENDIX B**

**STOCK ASSESSMENT AND FISHERY EVALUATION REPORT**

**FOR THE GROUND FISH RESOURCES  
OF THE GULF OF ALASKA**

**Compiled by**

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



with contributions by

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**November 2007**

**North Pacific Fishery Management Council  
605 W 4th Avenue, Suite 306  
Anchorage, AK 99501**

# 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 13-16<sup>th</sup>, 2007 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, Bob Foy, Steven Hare, Sarah Gaichas, Cleo Brylinsky, Tom Pearson, Kathy Kuletz, Nick Sagalkin, and Theresa Tsou.

### Background Information

#### **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.

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

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. 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”, e.g. grenadiers, and catch reporting is not required.

The GOA FMP recognizes single species and species complex management strategies. Single species specifications are set for stocks individually, recognizing that different harvesting sectors catch an array of species. In the Gulf of Alaska these species include Pacific cod, pollock, sablefish, Pacific ocean perch, flathead sole, rex sole, arrowtooth flounder, northern rockfish, roughey rockfish, shortraker rockfish, Atka mackerel, big skates, and longnose skates. Other groundfish species that are usually caught in groups have been managed as complexes (also called assemblages). For example, other slope rockfish, pelagic shelf rockfish, demersal shelf rockfish, thornyhead rockfish, deep water flatfish, shallow water flatfish, other skates, 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. 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.

Groundfish catches are managed against TAC specifications for the EEZ and near coastal waters of the GOA. State of Alaska internal water groundfish populations are typically not covered by NMFS surveys and catches from internal water fisheries generally not counted against the TAC. The Team has recommended that these catches represent fish outside of the assessed region, and should not be counted against an ABC or TAC. Beginning in 2000, the pollock assessment incorporated the ADF&G survey pollock biomass, therefore, the Plan Team acknowledged that it is 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 2008 PWS GHF of 1,650 t 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.

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



### ***New data summary***

Since the Stock Assessment and Fishery Evaluation Report (SAFE) for 2007 was issued (NPFMC 2006), the following new information has been incorporated in the stock assessments:

- 1) **Pollock**: (a) preliminary catch estimates for the 2007 fishery, (b) age composition from the 2006 fishery; (c) biomass and length composition from the 2007 Shelikof Strait echo integration trawl (EIT) survey; (d) biomass and length composition from the 2007 NMFS bottom trawl survey, and e) 2006 age composition and 2007 biomass and length composition from the ADF&G crab/groundfish trawl survey.
- 2) **Pacific cod**: (a) size composition data from the 2006 and preliminary estimates for the 2007 fisheries; (b) age composition and mean length-at-age data from the 1996, 1999, 2001 GOA bottom trawl surveys were incorporated; (c) relative abundance (numeric) from GOA bottom trawl surveys from 1984-2007.
- 3) **Sablefish**: (a) relative abundance and length data from the 2007 longline survey, (b) relative abundance and length data from the 2006 longline and trawl fisheries, (c) age data from the 2006 longline survey and longline fisheries, (d) survey abundance and length data from GOA bottom trawl surveys, (e) older growth data (1981-1993) were updated, and (f) new growth data were added (1996-2004) in the form of new age-length conversion matrices.
- 4) **Flatfish**: Flatfish have been moved to a biennial stock assessment schedule to coincide with new survey data. Last year only executive summaries were presented in the SAFE Report. This year, in conjunction with the 2007 NMFS bottom trawl survey, full assessments are provided for all flatfish categories.
- 5) **Shallow-water flatfish**: (a) biomass and length composition from the 2007 NMFS bottom trawl survey.
- 6) **Deepwater flatfish**: (a) 2006 and partial 2007 fishery catch data, (b) biomass and length composition from the 2007 NMFS bottom trawl survey, and (c) age compositions from the 2003 and 2005 NMFS bottom trawl surveys.
- 7) **Rex sole**: (a) 2006 and partial 2007 fishery catch data, (b) updated 2005 fishery catch and length compositions, (c) biomass and length composition from the 2007 NMFS bottom trawl survey.
- 8) **Arrowtooth flounder**: (a) 2006 and partial 2007 fishery catch data, (b) biomass and length composition from the 2007 NMFS bottom trawl survey, (c) age composition from the 2005 NMFS bottom trawl survey, and (d) the age-length transition matrix was updated with mean length at age data for 1984-2005.
- 9) **Flathead sole**: (a) 2006 and partial 2007 fishery catch data, (b) updated 2005 fishery catch and length compositions, and (c) biomass and length composition from the 2007 NMFS bottom trawl survey.
- 10) **Rockfish**: Rockfish have been moved to a biennial stock assessment schedule to coincide with new survey data. Last year only executive summaries were presented in the SAFE Report (except for northern rockfish). This year, in conjunction with the 2007 NMFS bottom trawl survey, full assessments are provided for all rockfish categories.
- 11) **Pacific ocean perch**: (a) 2006 and estimated 2007 fishery catch data, (b) 2006 fishery age composition, (c) biomass and length composition from the 2007 NMFS bottom trawl survey, d) age composition from the 2005 NMFS bottom trawl survey.
- 12) **Northern rockfish**: (a) 2006 and partial 2007 fishery catch data, (b) 2006 fishery age composition, and (c) biomass from the 2007 NMFS bottom trawl survey.

- 13) Rougheye rockfish: (a) 2006 and partial 2007 fishery catch data, (b) 2002 And 2006 fishery length compositions, (c) biomass from the 2007 NMFS bottom trawl survey, (d) 1984, 1993, 1996, and 2005 trawl survey age compositions, (e) 2006-2007 longline survey relative population weights, and (f) 2006-2007 longline survey size compositions.
- 14) Shorthead and other slope rockfish: (a) biomass from the 2007 NMFS bottom trawl survey, (b) survey age results in Alaska for shorthead, sharpchin, redstripe, harlequin, and silvergray rockfish, (c) new information on age and growth and natural mortality rates for several other slope rockfish species, including a new natural mortality rate for silvergray rockfish, and (d) changes to the methodology used to calculate exploitable biomass.
- 15) Pelagic shelf rockfish: (a) 2006 and estimated 2007 fishery catch data, (b) biomass from the 2007 NMFS bottom trawl survey, (c) age composition from the 2005 NMFS bottom trawl survey, and d) previously, dark rockfish and dusky rockfish were considered one species and treated as a Tier 4 species. Dusky rockfish are now assessed with an age-structured model and are managed as a Tier 3 species. Dark rockfish are now considered a Tier 5 species along with widow and yellowtail rockfish.
- 16) Demersal shelf rockfish: (a) new 2007 ADF&G survey estimates of yelloweye rockfish density for the Central Southeast Outside (CSEO) area, and (b) updated yelloweye rockfish average weight and standard error data from fish captured as bycatch during the 2007 IPHC survey.
- 17) Thornyheads: (a) updated 2005, 2006 and partial 2007 fishery catch data, (b) 2006 longline fishery length composition, (c) biomass and length composition from the 2007 NMFS bottom trawl survey, (d) 2006-2007 longline survey relative population numbers and weights, and (e) 2006-2007 longline survey size compositions.
- 18) Atka mackerel: Atka mackerel has been moved to a biennial stock assessment schedule to coincide with new survey data. Last year only an executive summary was presented in the SAFE Report. This year, in conjunction with the 2007 NMFS bottom trawl survey, a full assessment is provided for Atka mackerel including: (a) updated 2005, 2006 and partial 2007 fishery catch data, (b) age data from the 2006 GOA fisheries, (c) biomass and length composition data from the 2007 NMFS bottom trawl survey, (d) age data from the 2005 NMFS bottom trawl survey, and (e) an expanded and detailed Ecosystems Considerations section.
- 19) Skates: Skates have been moved to a biennial stock assessment schedule to coincide with new survey data. Last year only an executive summary was presented in the SAFE Report. This year, in conjunction with the 2007 NMFS bottom trawl survey, a full assessment is provided for skates including: (a) updated 2005, 2006 and partial 2007 fishery catch data, (b) biomass estimates from the 2007 NMFS bottom trawl survey, and (c) updated life history information from recent research results.
- 20) Groundfish, generally: Updated catch data from the NMFS Observer Program and Regional Office for 2006 and through November 3<sup>rd</sup>, 2007.
- 21) Other species: incidental catch is included for TAC recommendations. Executive summaries are included for a number of species groups for forthcoming break-out Plan Amendment analyses.

### **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

( $F_{P\%}$ ). 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.

Tier	Information available: <i>Reliable point estimates of <math>B</math> and <math>B_{MSY}</math> and reliable pdf of <math>F_{MSY}</math>.</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 <math>B</math>, <math>B_{MSY}</math>, <math>F_{MSY}</math>, <math>F_{35\%}</math>, and <math>F_{40\%}</math>.</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 <math>B</math>, <math>B_{40\%}</math>, <math>F_{35\%}</math>, and <math>F_{40\%}</math>.</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 <math>B</math>, <math>F_{35\%}</math>, and <math>F_{40\%}</math>.</i> $F_{OFL} = F_{35\%}$ $F_{ABC} \leq F_{40\%}$
5)	Information available: <i>Reliable point estimates of <math>B</math> and natural mortality rate <math>M</math>.</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 $ABC \leq 0.75 \times OFL$

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  $\alpha$  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 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  $F=F_{40\%}$ .

Overfished or approaching an overfished condition is determined for all age-structured stock assessments by comparison of the stock level in relation to its MSY level according to the following two harvest scenarios (Note for Tier 3 stocks, the MSY level is defined as  $B_{35\%}$ ):

Overfished (listed in each assessment as scenario 6):

In all future years,  $F$  is set equal to  $F_{OFL}$ . (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2007 or 2) above  $\frac{1}{2}$  of its MSY level in 2008 and above its MSY level in 2020 under this scenario, then the stock is not overfished.)

Approaching an overfished condition (listed in each assessment as scenario 7):

In 2008 and 2009,  $F$  is set equal to  $\max F_{ABC}$ , and in all subsequent years,  $F$  is set equal to  $F_{OFL}$ . (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is expected to be above its MSY level in 2020 under this scenario, then the stock is not approaching an overfished condition.)

For stocks in Tiers 4-6, no determination can be made of overfished status or approaching an overfished condition as information is insufficient to estimate the MSY stock level.

## Overview of Stock Assessments

The current status of individual groundfish stocks managed under the FMP is summarized in this section. The abundances of rex sole, Dover sole, flathead sole, arrowtooth flounder, Pacific ocean perch, rougheye rockfish, northern rockfish, and dusky rockfish are above target stock size. The abundances of pollock and sablefish are below target stock size (Figure 1). The target biomass levels for other deep-water flatfish, shallow-water flatfish, shortraker rockfish, demersal shelf rockfish, other pelagic shelf rockfish, other slope rockfish, thornyhead rockfish, Atka mackerel, and skates are unknown. The status of Pacific cod is unknown based on the present stock assessment. However, in 2006 it was estimated to be above the  $B_{40\%}$  target level.

## Summary and Use of Terms

Tables 1 and 2 provide a summary of the current status of the groundfish stocks, including catch statistics, ABCs, and TACs for 2007, and recommendations for ABCs and overfishing levels (OFLs) for 2008 and 2009. 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 2. 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, 1956-2007.

The sum of the preliminary 2008, 2009 ABCs for target species are 536,191 t (2008), 556,174 t (2009) which are within the FMP-approved optimum yield (OY) of 116,000 - 800,000 t for the Gulf of Alaska. The sum of 2008 and 2009 OFLs are 665,642 t and 690,888 t, respectively. The Team notes that because of halibut bycatch mortality considerations in the high-biomass flatfish fisheries, an overall OY for 2008 will be considerably under this upper limit. For perspective, the sum of the 2007 TACs was 269,912 t, and the sum of the ABCs was 490,327 t.

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 2006 and 2007 ABCs correspond to the values (in metric tons, abbreviated "t") 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 2008 and 2009 correspond to the Plan Team recommendations.
- (4) The exploitable biomass for 2006 and 2007 that are reported in the following summaries were estimated by the assessments in those years. Comparisons of the projected 2008 biomass with previous years' levels should be made with biomass levels from the revised hindcast reported in each assessment.
- (5) The values used for 2008 and 2009 were either rolled over (typically for Tiers 4-6) or based on projections. Note that projection values often assume catches and hence their values are likely to change (as are the Tiers 4-6 numbers when new data become available).

### **Two year OFL and ABC Determinations**

Amendment 48/48 to the GOA and BSAI Groundfish FMPs, implemented in 2005, made two significant changes with respect to the stock assessment process. First, annual assessments are no longer required for rockfishes since new data during years when no groundfish surveys are conducted are limited. For example, since 2006 was an off-year for the NMFS GOA groundfish trawl survey, only summaries for these species were produced.

The second significant change is that the proposed and final specifications are to be specified for a period of up to two years. This requires providing ABC and OFL levels for 2008 and 2009 (Table 1). In the case of stocks managed under Tier 3, 2008 and 2009 ABC and OFL projections are typically based on the output for Scenarios 1 or 2 from the standard projection model using assumed (best estimates) of actual catch levels.

In the case of stocks managed under Tiers 4-6, 2009 projections are set equal to the Plan Team's recommended values for 2008.

The 2009 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2009, for the same reasons that the 2008 projections in this SAFE report differ from those in September.

### **Ecosystem Considerations-Gulf of Alaska**

This overview has been added to emphasize the increased treatment of ecosystem considerations in annual SAFE reports. A summary of the ecosystem considerations chapter highlighting recent GOA trends is provided below. The explicit incorporation of ecosystem assessment data and modeling results in specific stock assessment chapters is also summarized. Additional information is available in individual stock assessment chapters and the ecosystem considerations chapter.

The ecosystem considerations chapter consists of three sections: ecosystem assessment, ecosystem status indicators, and ecosystem-based management indices and information. The ecosystem assessment section, introduced in 2003, combines information from the stock assessment chapters with the two other sections of this chapter to summarize the climate and fishery effects.

New trends highlighted in the 2007 ecosystem considerations chapter include:

- There were weak-moderate El Nino conditions near the end of 2006. Neutral conditions returned by early spring 2007. A cooling trend resumed in summer 2007 and it now appears probable at least a weak La Nina will form by the fall/winter of 2007-08.
- Anomalous southwesterly winds in the winter of 2006-07 caused relatively shallow mixed layer depths in the central Gulf, and deep mixed layer depths close to the coast. During spring 2007, anomalously low sea level pressure (SLP) was present in the central Gulf of Alaska, which promotes anomalous downwelling in the coastal zone, and a relatively strong Alaska Coastal Current.
- Gulf of Alaska bottom trawl survey temperatures indicate cooling of surface waters and warming of deeper waters, supporting the idea that there was anomalous mixing on the GOA shelf.
- Incidental catch for habitat areas of particular concern (HAPC) biota, forage species, and non-specified species was updated this year. The catch of non-specified species in the GOA has been relatively low in the last few years; whereas, the catch of HAPC biota has been variable. Grenadiers comprise the majority of non-specified catch and they are caught primarily in the sablefish fishery. Sea anemones comprise the majority of HAPC biota catch in the GOA and they are caught primarily in the flatfish fishery. The catch of forage species has undergone large variations, peaking in 2005 and decreasing in 2006 and 2007. The main species of forage fish caught are eulachon and they are primarily caught in the pollock fishery.
- Bottom trawl fishing effort continued to decrease in the GOA in 2006. Hook and line and pot fishing effort increased in the GOA.
- Demersal groundfish species in the GOA had above-average recruitments from the mid- or late 1970s to the late 1980s, followed by below-average recruitments during most of the 1990s. There is an indication for above-average recruitment from 1994-2000 (with the exception of 1996). In the Gulf of Alaska, recruitment has been below average across stocks from 2001-2006.
- The overall human population of GOA fishing communities in 2000 was over 21 times larger than its 1920 population, with the majority of that growth occurring in Anchorage.

Seven stock assessments incorporated information from the GOA ECOPATH model (Aydin et al. in press): walleye pollock, thornyhead rockfish, and skates have since 2005, and this year rex sole, flathead sole, Dover sole, and arrowtooth flounder assessments incorporated model results. All seven assessments

reported diet composition and total consumption on prey species. The sablefish assessment incorporated recent diet data.

The pollock assessment further evaluated the impacts of perturbation in pollock abundance and pollock fishery on other species in the Gulf of Alaska ecosystem. In general, pollock abundance is positively correlated to abundances of Steller sea lions, arrowtooth flounder, halibut, and Pacific cod. Although arrowtooth flounder is responsible for more than one third of pollock mortality, this positive relationship between arrowtooth and pollock is not as strong as that between Steller sea lions and pollock. It was noted that Steller sea lion abundance is negatively correlated to arrowtooth flounder and halibut.

The following table summarizes the ecosystem considerations data documented within each species or complex assessment. Data were assessed as being “briefly” described, “evaluated” with an ecosystem indicators table, and/or quantified using a “model” to describe trophic interactions and environmental interactions. The abbreviation, “spp. comp”, is used to indicate that bycatch levels by species were reported.

Species/Assemblage	Ecosystem Effects on Stock						Fishery Effects on Ecosystem					
	Prey		Predator		Abiota		Bycatch		Discard		Abiota	
	Desc.	Quant.	Desc.	Quant.	Desc.	Quant.	Desc.	Quant.	Desc.	Quant.	Desc.	Quant.
Walleye pollock		model		model				spp comp				model
Pacific cod												
Sablefish	eval.		eval.		briefly		eval.	spp comp	eval.		briefly	
Deep water flatfish complex		model		model		planned	eval.	spp comp	eval.			
Shallow water flatfish complex	briefly		briefly				briefly		briefly			
Rex sole		model		model		planned	eval.	spp comp	eval.			
Arrowtooth flounder		model		model			briefly		briefly			
Flathead sole		model		model		planned	eval.	spp comp	eval.			
Pacific ocean perch	eval.		eval.		briefly		eval.	spp comp	eval.		briefly	
Northern rockfish	briefly		briefly				eval.	spp comp				
Shortraker and Other slope	eval.		eval.				eval.	spp comp			briefly	
Roughye rockfish	eval.		eval.		briefly		eval.	spp comp	eval.		briefly	
Pelagic shelf rockfish	eval.		eval.		briefly		eval.	spp comp	eval.		briefly	
Dusky rockfish	eval.		eval.		eval.		eval.	spp comp	eval.		eval.	
Dermersal shelf rockfish	eval.		eval.		briefly		eval.		eval.		briefly	
Thornyhead rockfish		model		model	briefly		eval.		eval.		briefly	
Atka mackerel	eval.		eval.		eval.		eval.		eval.		briefly	
Skates		model		model	briefly		eval.		eval.		briefly	
Forage fish	model											

## Stock status summaries

### 1. Walleye Pollock

Status and catch specifications (t) of pollock and projections for 2008 and 2009. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through November 3, 2007. Note that the projections for 2009 are subject to change in 2008. The 2008 and 2009 ABCs are reduced by 1,650 t to accommodate the anticipated Prince William Sound GHL.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
GOA	2006	635,732	118,309	86,547	86,547	70,522
	2007	861,072	95,429	68,307	68,307	51,779
	2008	741,819	83,150	60,180		
	2009		106,980	78,170		
W/C/WYK	2006	608,370	110,100	80,390	79,650	70,522
	2007	833,710	87,220	62,150	62,150	51,779
	2008	705,020	72,110	51,940		
	2009		95,940	69,930		
EYK/SEO	2006	27,362	8,209	6,157	6,157	0
	2007	27,362	8,209	6,157	6,157	0
	2008	36,799	11,040	8,280		
	2009		11,040	8,280		

#### *Changes from previous assessment*

The age-structured model developed using AD Model Builder and used for GOA pollock assessments in 1999-2006 is fundamentally unchanged. This year's pollock chapter features the following new data: (1) 2006 catch at age estimates, (2) preliminary catch estimates for 2007, (3) age composition from the 2006 fishery; (4) biomass and age composition from the 2007 Shelikof Strait echo integration trawl (EIT) survey; (5) biomass and length composition from the 2007 ADF&G crab/groundfish trawl survey, (6) age composition from the 2006 ADF&G crab/groundfish trawl survey, and (7) biomass estimates and length composition data from the 2007 NMFS bottom trawl survey.

#### *Spawning biomass and stock status trends*

The 2007 Shelikof Strait EIT total survey biomass estimate was 38% less than the 2006 estimate and is the lowest biomass estimated in Shelikof Strait. Biomass estimates of Shelikof Strait fish  $\geq 43$  cm (a proxy for spawning biomass) decreased by 47% from the 2006 estimate, primarily due to ageing of the relatively strong 1999 and 2000 year classes without significant recruitment of later year classes to the spawning population. The 2007 ADF&G crab/groundfish survey biomass estimate increased 11% from 2006. The 2007 NMFS bottom trawl survey estimate was 20% lower than the 2005 estimate.

The Plan Team concurred with the author's choice to use the same model as last year to provide assessment advice. This model fixed trawl survey catchability ( $q$ ) at 1.0 and estimated other survey catchabilities. Although the likelihood is higher for models with  $q$  closer to 0.75, the change in likelihood is small (less than 1.5) between models with  $q$  fixed at 1.0 or estimated. Fixing  $q$  at 1.0 results in a more precautionary estimate of spawning biomass. The model results produced an estimated 2008 spawning biomass of 145,100 t, or 26% of unfished spawning biomass. The  $B_{40\%}$  estimate is 221,000 t. Spawning biomass is projected to be at a minimum in 2008 and will increase in subsequent years in part because of the estimated near or above average 2004 - 2006 classes. The extent of the rate of increase depends on the magnitude of these year classes that are highly uncertain.



*Status determination*

Pollock are not overfished nor are they approaching an overfished condition.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Because model estimated 2007 female spawning biomass is below  $B_{40\%}$ , Gulf of Alaska pollock are in Tier 3b. Identical to last year, the Plan Team accepted the author's recommendation to reduce  $F_{ABC}$  from the maximum permissible using the "constant buffer" approach (first accepted in the 2001 GOA pollock assessment). The projected 2008 age-3+ biomass estimate is 705,020 t. Markov Chain Monte Carlo analysis indicated the probability of the stock being below  $B_{20\%}$  to be less than 1% in 2008 and subsequent years. **Therefore, the ABC for 2008 based on this precautionary model configuration and adjusted harvest control rule is 53,590 t ( $F_{ABC}=0.13$ ) for GOA waters west of 140 degrees W. longitude** (Note that this ABC recommendation is not reduced by 1,650 t to account for the Prince William Sound GHL). The 2008 OFL under Tier 3b is 72,110 t ( $F_{OFL}=0.17$ ).

Southeast Alaska pollock are in Tier 5 and the ABC and OFL recommendations are based on natural mortality (0.30) and the biomass from the 2007 survey. The 2007 NMFS bottom trawl survey increased 37% since 2005. This results in a **2008 ABC of 8,280 t**, and a **2008 OFL of 11,040 t**.

*Ecosystem Considerations*

There were no major additions to the pollock stock assessment ecosystem considerations section this year. Previous results suggested that high predation mortality plus conservative fishing mortality might exceed GOA pollock production at present, and that this condition may have been in place since the late 1980's or early 1990s. The Plan Team felt that this provides additional support for continued precautionary management of GOA pollock.

*Area apportionment*

The assessment was updated to include the most recent data available for area apportionments within each season (Appendix C of the GOA pollock chapter). The Team concurred with these updates since they are more likely to represent the current distribution. Area apportionments, reduced by 1,650 t for the State managed pollock fishery in Prince William Sound, are tabulated below:

Year	610		620		630		640		650	
	W	Central	Central	W. Yakutat	E. Yak/SE	Total				
2008	17,602	19,181	13,640	1,517	8,240	61,870				
2009	23,700	25,821	18,367	2,042	8,240	79,860				

**2. Pacific cod**

Status and catch specifications (t) of Pacific cod and projections for 2008 and 2009. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year, \*except that 2008 biomass is the trawl survey biomass from 2007. ABC and OFL for 2009 are set to the 2008 levels. Catch includes the federally reported catch (parallel and catch outside 3 miles; excludes state fishery inside 3-miles) and is current through 11/03/2007.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
GOA	2006	453,000	95,500	68,859	52,264	37,792
	2007	375,000	97,600	68,859	52,264	36,696
	2008	233,310*	88,660	66,493		
	2009		88,660	66,493		

Extensive BSAI cod modeling efforts precluded work on the GOA cod assessment model again this year. The impact on the GOA assessment was more extreme this year than last year, and resulted in the delivery

of a partial assessment on the evening prior to Plan Team adjournment. The Plan Team appreciates the lead author's efforts, especially considering the additional requests for the BSAI assessment model developments in 2007. However, the GOA cod assessment is extremely important to sustainable management of one of the most economically valuable resources in this FMP area. Last year, the Team requested that the author be given adequate time to incorporate longline survey data and explore alternative model parameterizations in future assessments. The GOA Plan Team now makes a more specific request that the AFSC give priority to improving the GOA Pacific cod assessment in 2008, as the GOA assessment has been negatively impacted by BSAI issues for the past two years.

#### *Changes from previous assessment*

A single model was presented this year.

There were several changes in the input data:

- 1) Catch data for 2006 were updated, and preliminary catch data for 2007 were incorporated.
- 2) Size composition data from the 2006 commercial fisheries were updated, and preliminary size composition data from the 2007 commercial fisheries were incorporated.
- 3) Relative abundance in numbers from the GOA bottom trawl surveys from 1984-2007 was incorporated. In the past, relative abundance in biomass was used in the model.
- 4) Age composition data from the 1996, 1999, and 2001 GOA bottom trawl survey were incorporated. Now five years of age data, including 2003 and 2005.

The model was implemented in new software, Stock Synthesis 2.0c. There were many changes in model assumptions, which are detailed in the BSAI cod assessment under Model 1. The model used in the GOA was similar, except that

- 1)  $M$  was fixed at 0.38 (based on age at maturity; former GOA value was 0.37),
- 2)  $Q$  was fixed at 0.98 (based on archival tag data, former GOA value was 1.00),
- 3) trawl survey selectivity is length-based and constrained to be asymptotic (same as previous years for GOA),
- 4) fishery selectivities are unconstrained (same as previous years for GOA),
- 5) mean length-at-age data are included (same as previous years for GOA),
- 6) fishery selectivities applied to the entire time series, rather than in "eras" as in previous assessments,
- 7) survey selectivity now has time varying selectivity for ascending limb parameters,
- 8) fisheries defined for each of three gears for each of three seasons (for a total of 9 fisheries instead of the previous 4), and
- 9) the model starts in 1977 (rather than 1976).

#### *Spawning biomass and stock status trends*

The numeric abundance estimate from the 2007 survey was up 37% from the 2005 estimate. However, the biomass estimate from the 2007 survey was 233,310 t, down 24% from the 2005 estimate. The reason for the difference in trend between the two measures of abundance was the occurrence of large numbers of very small fish in the 2007 survey. Hence, the model is estimating above average recruitment for the 2006 year class, but this estimate is uncertain as it has been observed only from the survey. Based on the model, the projected 2008 female spawning biomass for the GOA stock is 108,000 mt, down about 15% from last year's estimate for 2007 and below the  $B_{40\%}$  value of 121,000 mt. The projected 2008 age 3+ biomass is 295,000 t, down about 21% from last year's projection for 2007. Compared to the 2006 assessment, this model predicted higher historic biomass levels and lower current biomass levels.

#### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

The Plan Team determined that the model presented was significantly different from past models, and therefore required a full stock assessment and more extensive review than was possible given the timing. As such, the Team felt that it was unprepared for specifying harvest recommendations at this time, especially since its results could not be compared with a previously accepted model structure. The

decrease in GOA trawl survey biomass from 2005 to 2007 was considered important to reflect in harvest recommendations. After much discussion of Tier options, which focused on the uncertainty in the stock's status relative to  $B_{40\%}$ , the Plan Team settled on a Tier 5 calculation based on 2007 survey biomass of 233,310 t and the updated  $M$  of 0.38 (which was estimated outside the model based on published estimated age at maturity for GOA Pacific cod). Therefore,  $F_{ABC}$  is equal to 75% of  $M$ , or  $0.38 * 0.75 = 0.285$ , and  $F_{OFL}$  is equal to  $M$  (0.38). The resulting ABC for 2008 and 2009 is 66,493 t, and the OFL for 2008 and 2009 is 88,658, rounded to 88,660 t.

*Status determination*

Based on the recommended specifications and catch in recent years, catch is unlikely to exceed OFL so the stock is not subject to overfishing. It is not possible to determine the status of Tier 5 stocks with respect to overfished conditions.

*Additional Plan Team recommendations*

The Team recommends that the current model be treated as any new model and be reviewed at next September's Plan Team meeting, alongside previously accepted models for comparison.

*Ecosystem Considerations*

There was no information presented for ecosystem considerations in this year's assessment.

*Area apportionment*

The Team concurred with the author's recommendation to apportion the 2008 and 2009 ABC according to the average of biomass distribution in the three most recent surveys. For the Team's recommended ABC level, this gives:

	Apportionment	2008	2009
West	39%	25,932	25,932
Central	57%	37,901	37,901
East	4%	2,660	2,660
Total		66,493	66,493

**3. Sablefish**

Status and catch specifications (t) of sablefish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/03/07						
Area	Year	Age 4+ Biomass	OFL	ABC	TAC	Catch
GOA	2006	152,000	17,880	14,840	14,840	13,367
	2007	158,000	16,906	14,310	14,310	12,539
	2008	167,000	15,040	12,720		
	2009		12,924	11,624		

*Changes from previous assessment*

As in previous assessments, sablefish are treated as a single Alaska-wide stock covering the BSAI and GOA using a split sex age structured model. The only major model changes were the inclusion of informative priors on catchability for all abundance indices. The split sex model approach was fully implemented beginning in 2006 and was deemed appropriate given differences in growth between males and females. The assessment model incorporates the following new data into the model: relative abundance and length data from the 2007 longline survey, relative abundance and length data from the 2006 longline fishery, length data from the 2006 trawl fishery, and age data from the 2006 longline survey and longline fishery. In addition, relative abundance and length data from the 2007 Gulf of

Alaska trawl survey were included with the expectation of improving estimates of recruitment. New growth data were added (1996-2004) in the form of revised age-length transition matrices, and older growth data (1981-1993) were updated. Fishery CPUE data from observer data and logbooks were used in the catch rate analysis.

#### *Spawning biomass and stock status trends*

The survey abundance index decreased 14% between 2006 and 2007, a change which follows the 13% increase between 2005 and 2006. The fishery abundance index was down 8% from 2005 to 2006 (2007 data not yet available).

The Plan Team concurred with the assessment authors recommended model (Model 3). The preferred model differed from the two others in that it incorporated the updated growth data and age-length conversion matrices as well as the informative priors on catchability coefficients. The spawning biomass is projected to be similar from 2007 to 2008, but is expected to decline through 2012. The projected 2008 female spawning biomass is 37% of unfished biomass compared with about 29% of unfished biomass estimated during the 1998 to 2001 period. The 2000 year class now appears to be larger than the 1997 year class and is expected to comprise 18% of the spawning biomass in 2008.

#### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

This stock qualifies for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from this assessment are 122,250 t (**combined across the EBS, AI, and GOA**), 0.093, and 0.111, respectively. Projected spawning biomass (combined areas) for 2008 is 111,607 t (91% of  $B_{40\%}$ ), placing sablefish in sub-tier "b" of Tier 3. The maximum permissible value of  $F_{ABC}$  under Tier 3b is 0.084, which translates into a 2008 catch (combined areas) of 18,030 t and is the Plan Team's recommended combined 2008 ABC. The recommended 2008 ABC is approximately 10% lower than the 2007 ABC of 21,000 t. The OFL fishing mortality rate under Tier 3b is 0.101. This fishing mortality rate translates into a 2008 OFL (combined areas) of 21,310 t.

#### *Status determination*

Alaska sablefish are not overfished nor are they approaching an overfished condition.

#### *Additional Plan Team recommendations*

The combined ABC has been apportioned to regions using a weighted moving average method since 1993. Since 2000, both survey and fishery data have been used to apportion ABC. The current method is to compute a 5-year exponential weighting for each index which are then combined, with the survey data weighted twice as heavily as the fishery data. The original rationale for this was that the variance for the fishery data was twice that of the survey data. Recent improvements to the sample size of observer and logbook collections have reduced the variance on the fishery source and led to industry requests to weight the two data sets equally. The Plan Team has no preference for one weighting scheme over the other and for this year has simply continued the recent method of double weighting the survey data, which is reflected in the recommended area apportionments below. The Plan Team notes that the increase in fishery data has largely occurred due to voluntary submission of logbooks as well as the availability of soft money funds to hire the IPHC to collect and process the fishery data. If equal weighting of the two data sets is to be considered for future apportionments, it is paramount that a more stable or permanent source of funding be found to ensure continued collection of logbooks. The Plan Team notes that for 2007 the difference in apportionment between the two methods is relatively minor.

#### *Ecosystem Considerations*

The ecosystem considerations section of the assessment was not significantly changed from the previous assessment, however the section on fishery-specific effects on EFH non-living substrate was updated through 2007.

*Area apportionment*

A 5-year exponential weighting of longline survey and fishery relative abundance indices (the survey index is weighted double the fishery index) may be used to apportion the combined 2008 ABC among regions, resulting in the following values: 2,860 t for EBS, 2,440 t for AI, and 12,720 t for GOA. Relative to 2006, apportionments to the EBS, AI and GOA all decreased.

Using the survey/fishery based apportionment scheme described above, 2008 OFL also may be apportioned among regions and results in the following values: 3,380 t for EBS, 2,890 t for AI, and 15,040 t for GOA. These values also represent a decrease from 2007 OFL levels for all three regions.

GOA area apportionments of sablefish ABC's for 2008 and 2009					
Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	1,880	5,500	1,950	3,390	12,720
2009	1,718	5,026	1,782	3,098	11,624

**4. Deep water flatfish (Dover sole and others)**

Status and catch specifications (t) of the deep water flatfish complex in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
GOA	2006	132,460	11,008	8,665	8,665	405
	2007	134,196	10,431	8,707	8,707	267
	2008	132,625	11,343	8,903		
	2009		11,583	9,172		

*Changes from previous assessment*

The deep water flatfish complex is comprised of Dover sole, Greenland turbot, and deep sea sole. Dover Sole are in Tier 3a while both Greenland turbot and deep sea sole are in Tier 6. Dover sole are managed as a part of the deep water flatfish complex and an age-structured model is used for ABC recommendations.

No changes were made to the model structure for Dover sole this year. New data for deep water flatfish (*excluding Dover sole*) and the Dover sole age-structured model included the 2006 catch and 2007 catch. In addition, the survey biomass and length composition data for Dover sole from the 2007 GOA groundfish trawl survey were added to the model. Survey age compositions for Dover sole from 2003 and 2005 were also added to the model.

*Spawning biomass and stock status trends*

Dover sole female spawning biomass peaked in 1991 and declined to 2005. The 2008 projection of spawning biomass is 43,284 t which is slightly higher than in the last 3 years.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

The Tier 6 calculation (based on average catch from 1978-1995) for the deep water flatfish complex (*excluding Dover sole*) ABC is 183 t and the OFL is 244 t. These values apply for 2008 and 2009 ABC and OFLs.

For the Dover sole Tier 3a assessment the 2008 ABC using  $F_{40\%}=0.137$  is 8,720 which is 196 t greater than the 2007 ABC. The 2008 OFL using  $F_{35\%}=0.176$  is 10,999 t.

The GOA Plan Team agrees with the authors' recommended ABC for the deep water flatfish complex which was equivalent to the maximum permissible ABC.

#### *Status determination*

Catch levels for this complex remain below the TAC. The complex is not approaching a level where overfishing would be a concern.

#### *Ecosystem Considerations summary*

Model results for Dover sole were added to the ecosystem considerations section of the assessment. Dover sole are benthic feeders and little is known about prey species abundance trends. Little is known about the ecological role of Greenland turbot and deepsea sole in the GOA.

#### *Area apportionment*

Area apportionments of deep water flatfish (*excluding Dover sole*) are based on proportions of historical catch. Area apportionments of Dover sole (using  $F_{40\%}$ ) are based on the fraction of the 2007 survey biomass in each area.

Area apportionments of deep water flatfish ( <i>Dover sole and others</i> ) ABC's for 2008 and 2009					
Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	690	6,721	965	527	8,903
2009	707	6,927	995	543	9,172

## 5. Shallow water flatfish

Status and catch specifications (t) of shallow water flatfish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Survey Biomass	OFL	ABC	TAC	Catch
GOA	2006	365,766	62,418	51,450	19,972	7,641
	2007	365,766	62,418	51,450	19,972	8,042
	2008	436,590	74,364	60,989		
	2009		74,364	60,989		

#### *Changes from previous assessment*

The shallow water flatfish complex is made up of northern rock sole, southern rock sole, yellowfin sole, butter sole, starry flounder, English sole, sand sole, and Alaska plaice. New data for the shallow water flatfish projections from last years assessment model included the 2007 bottom trawl survey biomass, 2006 and 2007 catches.

#### *Spawning biomass and stock status trends*

Condition of shallow water flatfish stocks is based on the bottom trawl survey from 1984 to 2007. Survey abundance estimates for the shallow-water complex were higher in 2007 compared to 2005 for northern rock sole, southern rock sole, sand sole, starry flounder, butter sole and Alaska plaice. The 2007 survey abundance estimates were lower than the 2005 for yellowfin sole and English sole. The overall survey abundance increased by 70,824 t in 2007 over 2005.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Northern and southern rock sole are managed in Tier 4 while other shallow water flatfish are in Tier 5. The  $F_{ABC}$  and  $F_{OFL}$  values for southern rock sole were estimated as:  $F_{40\%}=0.162$  and  $F_{35\%}=0.192$ , respectively. For northern rock sole the values are:  $F_{40\%}=0.204$  and  $F_{35\%}=0.245$ . Other flatfish ABCs were estimated with  $F_{ABC}=0.75 M$  and  $F_{OFL}=M$ .

The 2008 ABC for shallow-water flatfish increased due to increases in survey biomass from 51,450 t in 2005 to 60,989 t in 2007.

The GOA Plan Team agrees with authors recommended ABC for the shallow water flatfish complex which was equivalent to maximum permissible ABC.

*Status determination*

Catch levels for this complex remain below the TAC. The complex is not approaching a level where overfishing would be a concern.

*Ecosystem Considerations summary*

No ecosystem consideration section is included in this year's assessment.

*Area apportionment*

Area apportionments of shallow water flatfish ABC's for 2008 and 2009 are based on the fraction of the 2007 survey biomass in each area.

Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	26,360	29,873	3,333	1,423	60,989
2009	26,360	29,873	3,333	1,423	60,989

**6. Rex Sole**

Status and catch specifications (t) of rex sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Adult Biomass	OFL	ABC	TAC	Catch
GOA	2006	83,475	12,000	9,200	9,200	3,294
	2007	82,403	11,900	9,100	9,100	2,846
	2008	82,801	11,933	9,132		
	2009		11,065	8,468		

*Changes from previous assessment*

Similar to previous years, rex sole are assessed using an age-structured model first presented in 2004. Slope and age at 50% selectivity were estimated as parameters to characterize survey selectivity in the current model, rather than ages at 50% and 95% selectivity as in the previous assessment (Turnock et al., 2005).

New data in the rex sole projections included 2006 catch and 2007 catch. The 2007 GOA groundfish survey biomass estimate and length composition data were added to the model and the 2005 fishery catch and length compositions were updated.

*Spawning biomass and stock status trends*

Survey biomass increased slightly from 101,255 t in 2005 to 103,776 t in 2007. The model estimate of 2008 adult biomass is 82,801 t. Spawning biomass increased in 2008 and is projected to decrease in 2009.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

In 2005, the Plan Team adopted a Tier 5 approach (using model estimated adult biomass) for rex sole ABC recommendations due to unreliable estimates of  $F_{40\%}$  and  $F_{35\%}$ . The 2008 ABC using  $F_{ABC} = 0.75M = 0.128$  is **9,132 t** which is 32 t greater than the 2007 ABC. The 2008 OFL using  $F_{OFL} = M = 0.17$  is **11,933 t**. The 2009 ABC and OFL were projected by setting 2008 catches equivalent to 2007 catches.

The GOA Plan Team agrees with authors recommended ABC for rex sole which was equivalent to maximum permissible ABC.

*Status determination*

Catch levels for this complex remain below the TAC. The complex is not approaching a level where overfishing would be a concern.

*Ecosystem Considerations summary*

An ecosystem consideration section was added to the assessment with updated model results and PSC bycatch information through 2006. Rex sole are benthic feeders and little is known about prey species abundance trends. Major predators are longnose skates and arrowtooth flounder.

*Area apportionment*

Area apportionments of rex sole ABC's for 2008 and 2009 are based on the fraction of the 2007 survey biomass in each area.

Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	1,022	6,731	520	859	9,132
2009	948	6,241	483	796	8,468

**7. Arrowtooth flounder**

Status and catch specifications (t) of arrowtooth flounder in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
GOA	2006	2,138,660	207,678	177,844	38,000	27,653
	2007	2,146,360	214,828	184,008	43,000	25,073
	2008	2,244,870	266,914	226,470		
	2009		269,237	228,405		

*Changes from previous assessment*

The 2007 survey biomass and length data were added to the model. Catch and fishery length data for 2006 and 2007 were added to the model. Age data from the 2005 survey were added. The age-length transition matrix was updated with mean length at age data for 1984 to 2005.



*Spawning biomass and stock status trends*

The estimated age 3+ biomass from the model decreased from 2,258,230 t in 2006 to 2,256,030 t in 2007. Female spawning biomass in 2007 was estimated at 1,208,120 t, a 4% decline from the projected 2007 biomass of 1,254,030 t from the 2005 assessment.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Arrowtooth flounder has been determined to fall under Tier 3a. The 2008 ABC using  $F_{40\%}=0.186$  is 226,470 t, which is 42,462 t greater than the 2007 ABC. The 2008 OFL using  $F_{35\%}=0.222$  is 266,914 t. The 2009 ABC and OFL were projected by setting 2008 catches equivalent to 2007 catches. The increase in ABC is partially due to a change in age-length transition matrix (revised growth) resulting in a higher  $F_{40\%}$ , as well as an increase in biomass from 2006 to 2008.

The GOA Plan Team agrees with authors recommended ABC for arrowtooth flounder which was equivalent to maximum permissible ABC.

*Status determination*

The stock is not overfished nor approaching an overfished condition. Catch levels for this complex remain below the TAC. The complex is not approaching a level where overfishing would be a concern.

*Ecosystem Considerations summary*

The ecosystem considerations chapter was updated to include an expanded appendix of trends and model-based information on the role of arrowtooth flounder in the GOA ecosystem. Arrowtooth flounder play an important role in the Gulf of Alaska ecosystem as a predator.

*Area apportionment*

Area apportionments of arrowtooth flounder ABC's for 2008 and 2009 are based on the fraction of the 2007 survey biomass in each area.

Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	30,817	167,936	15,245	12,472	226,470
2009	31,080	169,371	15,375	12,579	228,405

**8. Flathead Sole**

Status and catch specifications (t) of flathead sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
GOA	2006	295,676	47,003	37,820	9,077	3,134
	2007	297,353	48,658	39,110	9,148	3,105
	2008	324,197	55,787	44,735		
	2009		57,962	46,505		

*Changes from previous assessment*

Flathead sole are assessed with an age-structured model as presented in the 2005 assessment. The fishery catch and length compositions for 2006 and 2007 were incorporated in the model. The 2005 fishery catch and length compositions were updated. The 2007 GOA groundfish survey biomass estimate and length composition data were added to the model. Survey biomass estimates and length compositions were recalculated for all survey years.

*Spawning biomass and stock status trends*

Survey biomass increased from 213,221 t in 2005 to 280,990 t in 2007. Projected female spawning biomass is estimated at 106,566 t for 2008.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Flathead sole are determined to be in Tier 3a based on the age-structured model. The 2008 ABC using  $F_{40\%} = 0.380$  is 44,735 t which is 5,625 mt higher than the 2007 ABC. The 2008 OFL using  $F_{35\%} = 0.494$  is 55,787 t. The 2009 ABC and OFL were calculated with 2008 catches equivalent to 2007 catches.

The GOA Plan Team agrees with authors recommended ABC for flathead sole which is equivalent to the maximum permissible ABC.

*Status determination*

The stock is not overfished nor approaching an overfished condition. Catch levels for this complex remain below the TAC. The complex is not approaching a level where overfishing would be a concern.

*Ecosystem Considerations summary*

Flathead sole model results were added this year. They are benthic feeders and little is known about prey species abundance trends. Major predators are arrowtooth flounder and other groundfish. Ecosystem models have found that the largest component of mortality on adult flathead sole is unexplained.

*Area apportionment*

Area apportionments of flathead sole ABC's for 2008 and 2009 are based on the fraction of the 2007 survey biomass in each area.

Area apportionments of flathead sole ABC's for 2008 and 2009					
Year	Western	Central	West Yakutat	East Yakutat/SE	Total
2008	12,507	28,174	3,420	634	44,735
2009	13,001	29,289	3,556	659	46,505

**Slope rockfish**

Status and catch specifications (t) of slope rockfish management category and projections for 2008 and 2009. Projections are made using authors' estimate of 2006 and 2007 catch. Catch data in table below are current through 11/03/2007.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Pacific ocean perch	2006	312,968	16,927	14,261	14,261	13,590
	2007	315,507	17,157	14,636	14,635	12,795
	2008	317,511	17,807	14,999		
	2009		17,893	15,072		
Northern rockfish	2006	83,485	7,673	5,091	5,091	4,956
	2007	94,271	5,890	4,938	4,938	4,089
	2008	93,391	5,430	4,550		
	2009		5,120	4,350		
Shortraker rockfish	2006	37,461	1,124	843	843	664
	2007	37,461	1,124	843	843	592
	2008	39,905	1,197	898		
	2009		1,197	898		
Rougheye rockfish	2006	37,449	1,180	983	983	351
	2007	39,506	1,148	988	988	399
	2008	46,121	1,548	1,286		
	2009		1,540	1,279		
Other slope rockfish	2006	93,552	5,394	4,154	1,480	931
	2007	93,552	5,394	4,154	1,482	665
	2008	90,283	5,624	4,297		
	2009		5,624	4,297		

**Area apportionments of ABC for slope rockfish for 2008.**

Species	Western	Central	Eastern	West Yakutat	East Yak./SE	Total
Pacific ocean perch	3,686	8,185		1,100	2,028	14,999
Northern rockfish <sup>1</sup>	<b>2,141</b>	<b>2,408</b>				<b>4,549</b>
Shortraker rockfish	120	315	463	-	-	898
Rougheye rockfish	125	834	327	-	-	1286
Other slope rockfish <sup>1</sup>	357	569	-	604	2,767	4,297

<sup>1</sup> Other slope rockfish in West Yakutat includes 1 t of northern rockfish from the Eastern Gulf of Alaska.

GOA slope rockfish are on a biennial stock assessment schedule to coincide with new survey data. This year's SAFE chapters consist of updated stock assessments

Previously, exploitable biomass for shortraker rockfish and "other slope rockfish" was estimated by excluding the biomass in the 1-100 m depth stratum. The exclusion of the 1-100 m stratum from the estimate was a holdover from when the assessment included Pacific ocean perch; the rationale was that small-sized Pacific ocean perch predominated in this stratum, and these fish should be considered unexploitable. However, information presented in the current assessment shows that the northern rockfish in this strata are adult sized and should be included in the exploitable biomass. Biomass of shortraker rockfish and "other slope rockfish" in this stratum is negligible; hence, the exclusion of the 1-100 m stratum from the exploitable biomass computations for these groups appears unnecessary. Effects of this change are negligible except in the case of area apportioning of northern rockfish ABC.

Area apportionments for rockfish ABC are a weighted average of previous years' percent exploitable biomass distributions. The Plan Team discussed the merit of exploring the difference that weighting the

apportionments by biomass rather than percentages could have on the resultant apportionments. Assessment authors agreed to compare the approaches under different scenarios of biomass distribution.

Industry expressed the need for a method to assess the effect of rockfish in the water column on the accuracy of the stock assessments. It was noted the need for more accurate assessments as the industry becomes more capable of taking specific target species TACs and avoiding bycatch constraints under the Rockfish Pilot Program. The use of hydroacoustics or other methods was discussed as a method to evaluate the effect of midwater fish concentrations, as well as trawlable and untrawlable survey habitat on survey accuracy.

## 9. Pacific ocean perch

Status and catch specifications (t) of Pacific ocean perch and projections for 2008 and 2009. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. ABC and OFL for 2008 and 2009 are projected using author's estimate of 2007 and 2008 catch. Catch data are current through 11/03/2007.

Species	Year	Biomass <sup>1</sup>	OFL	ABC	TAC	Catch
Pacific ocean perch	2006	312,968	16,927	14,261	14,261	13,590
	2007	315,507	17,158	14,636	14,635	12,795
	2008	317,511	17,807	14,999		
	2009		17,893	15,072		

<sup>1</sup>Total biomass from the age-structured model

### *Changes from previous assessment*

The generic rockfish model continues to be the primary assessment tool for this species and is developed with AD model builder software. New data in the model include the 2005 survey age composition, 2006 fishery age composition, 2006 and estimated 2007 fishery catch and 2007 survey biomass estimates.

### *Spawning biomass and stock status trends*

The 2005 and 2007 survey biomass estimates are relatively large and have greater precision than the estimates in the early 1990s, and have begun to influence the model estimates upward.

### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Pacific ocean perch are determined to be in Tier 3a. The Plan Team concurred with the determinations of ABC and OFL by the authors. The projected ABC for 2008 is 14,999 t which is 3% higher than last year's ABC of 14,636 t. The OFL is 17,807 t for 2008.

### *Status determination*

The stock is not overfished, nor is it approaching an overfished condition.

### *Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

### *Area apportionment*

The Plan Team concurred with the method of apportionment of ABC and OFL by the authors. This results in weighting of 4:6:9 for the regional distribution biomass in the 2003, 2005, and 2007 surveys, respectively, and area apportionments of 25% for the Western area, 55% for the Central area, and 20% for the Eastern area.

Area apportionment of 2008 and 2009 ABC and OFL for POP in the Gulf of Alaska:

Year		Western	Central	Eastern	WYAK	SEO	Total
2008	ABC	3,686	8,185		1,100	2,028	14,999
2009		3,704	8,225		1,105	2,038	15,072
2008	OFL	4,376	9,717	3,714			17,807
2009		4,397	9,764	3,732			17,893

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 could be taken in the area between 140° and 147° W longitude, that remains open to trawling. Thus, as was done last three years, the Team recommends that a separate ABC be set for Pacific ocean perch in WYAK. This weighted average is based on of the upper 95% confidence interval of the proportion of EG exploitable biomass that occurs in WYAK (0.41). The interval is computed using the weighted average from the 2003, 2005 and 2007 surveys. Using the upper 95% confidence interval is an effort to balance uncertainty with associated costs to industry. This corresponds to an ABC of 1,100 t for WYAK. Under this apportionment strategy, very little of the 2,028 t assigned to the remaining Eastern area (East Yakutat/Southeast Outside area) will be harvested.

## 10. Northern Rockfish

Status and catch specifications (t) of northern rockfish and projections for 2008 and 2009. Projections are made using author's best estimate of 2007 and 2008 catch. Catch data in table are current through 11/03/2007. 2006 and 2007 biomass estimates are for age 6+, for 2008 total biomass is presented.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Northern rockfish	2006	83,485	7,673	5,091	5,091	4,956
	2007	94,271	5,890	4,938	4,938	4,089
	2008	93,391	5,430	4,549		
	2009		5,120	4,349		

### *Changes from previous assessment*

Unlike other GOA rockfish a complete assessment was performed last year for northern rockfish. The reference age-structured model from last year (Model 1) is used this year with updated data. The data was updated to include the 2007 trawl survey biomass estimate, updated catch for 2006, preliminary catch for 2007, and fishery age compositions from 2006. The only major change to the model configuration relative to last year was that the CV for the prior on survey catchability  $q$  was changed from 15% to 45 % which is identical to that used in the GOA Pacific ocean perch, and dusky rockfish assessments. The outcome from this change did not substantially change stock assessment results relative to last year.

### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Northern rockfish are determined to be in Tier 3a. The recommended ABC for 2008 is 4,550 t. The corresponding reference values for northern rockfish recommended for this year and projected one additional year are summarized below:

<b>Summary</b>	<b>2008</b>	<b>2009</b>
Total Biomass (t)	93,391	90,672
$B_{40\%}$ (t)	22,300	22,300
Female spawning biomass (t)	29,170	28,180
$F_{ABC}$ ( $=F_{40\%}$ )	0.061	0.061
$F_{OFL}$ ( $=F_{35\%}$ )	0.073	0.073
ABC	<b>4,549</b>	<b>4,349</b>
OFL	5,430	5,120

The recommended Tier 3 ABC is similar to results from earlier assessments but down 8% from 2006.

#### *Status determination*

The stock is not overfished, nor is it approaching an overfished condition.

#### *Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

#### *Area apportionment*

Apportioning the 2008 and 2009 ABC is based on the same method used for Pacific ocean perch where the biomass in the 1-100 m strata is included this year. Northern rockfish ABC apportionments (with 1 t from the Eastern Gulf included in Other Slope Rockfish in West Yakutat):

	<b>Western</b>	<b>Central</b>	<b>Eastern</b>	<b>West Yakutat</b>	<b>East Yak./SE</b>	<b>Total</b>
2008	2,141	2,408				4,549
2009	2,047	2,302				4,349

## **11. Roughey rockfish**

Status and catch specifications (t) of roughey rockfish and projections for 2007 and 2008. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. Projections to 2007 and 2008 use author's estimate of 2006 and 2007 catch. Catch data are current through 11/03/2007.

<b>Species</b>	<b>Year</b>	<b>Biomass</b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch</b>
Roughey rockfish	2006	37,449	1,180	983	983	351
	2007	39,506	1,148	988	988	399
	2008	46,121	1,548	1,286		
	2009		1,540	1,279		

#### *Changes from previous assessment*

The assessment methodology is the same as the author recommended model in 2005.

New data added to this model were the updated estimates of 2006 and 2007 fishery catch, 2002 and 2006 fishery length compositions, 2007 trawl survey biomass estimate, 1984, 1993, 1996, and 2005 trawl survey age compositions, 2006-2007 longline survey relative population weights, and 2006-2007 longline survey size compositions. Since the longline survey does not sample in proportion to area, the authors used the newly available area weighted longline survey size compositions instead of raw size compositions. The assessment provided results from the 2005 model and the updated 2007 model.

*Spawning biomass and stock status trends*

The trawl survey estimate increased by 25% from 2005, while the longline survey relative population weight increased by 15% in 2006 and another 50% in 2007. Female spawning biomass is projected to be 13,882 t in 2008.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Rougeye rockfish are determined to be in Tier 3a. The projected ABC derived from the recommended model for 2008 is 1,286 t which is about 30% higher than last year's ABC of 988 t. Reference values for rougeye rockfish are summarized below. Female spawning biomass is well above  $B_{40\%}$ , with projected biomass stable.

	2008	2009*
$B_{40\%}$ (t) (female spawning biomass)	9,935	-
Female Spawning Biomass (t)	13,882	13,980
$F_{40\%}$	0.039	0.039
$F_{ABC}$ (maximum permissible)	0.039	0.039
ABC (mt; maximum permissible)	1,286	1,279
$F_{OFL}$	0.047	0.047
OFL (t)	1,548	1,540

\*Projected ABCs and OFLs for 2009 are derived using an expected catch value of 517 t for 2008 based on recent ratios of catch to ABC. This calculation is in response to management requests to obtain a more accurate one-year projection. Results of this method are listed under the Author's F alternative in Table 11-10 in the rougeye rockfish assessment.

*Status determination*

The stock is not overfished, nor is it approaching an overfished condition.

*Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

*Area apportionment*

Area apportionments (calculated using the same method as for POP) of the 2008 and 2009 ABC for rougeye rockfish in the Gulf of Alaska:

	Western	Central	Eastern	Total
2008	125	834	327	1,286
2009	124	830	325	1,279

*Additional Plan Team recommendations*

An attachment to the SAFE report presents sensitivity of stock assessment results to trawl and longline surveys. The sensitivity analysis found that artificially increasing the precision of the longline survey results in lower biomass whereas reduced precision in the longline survey results in minimal change to biomass estimates.

The Plan Team recommended that research on the potential for disproportionate harvests between the two species that are currently managed within this group (*S. aleutianus* and *S. melanostictus*). The authors reported that work is underway to update the maturity schedule for rougeye and will be ready for inclusion in the next assessment.

## 12. Shortraker and other slope rockfish

### Shortraker rockfish

Status and catch specifications (t) of shortraker slope rockfish and projections for 2008 and 2009. Catch data are current through 11/03/2007. Biomass based on 3 most recent trawl surveys.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Shortraker rockfish	2006	37,461	1,124	843	843	664
	2007	37,461	1,124	843	843	592
	2008	39,905	1,197	898		
	2009		1,197	898		

### Other slope rockfish

Status and catch specifications (t) of the Other Slope rockfish management category and projections for 2008 and 2009. Catch data are current through 11/03/2007. Biomass based on 3 most recent trawl surveys.

Species	Year	Biomass	OFL	ABC	TAC	Catch
Other Slope rockfish	2006	93,552	5,394	4,154	1,480	931
	2007	93,552	5,394	4,154	1,482	665
	2008	90,283	5,624	4,297		
	2009		5,624	4,297		

#### *Changes from previous assessment*

Major new information in this assessment includes biomass estimates from the 2007 trawl survey, and survey age results in Alaska for shortraker, sharpchin, redstripe, harlequin, and silvergray rockfish, and new information on age-and-growth and natural mortality rates for several "other slope rockfish" species.

Assessment methodology in this report is generally similar to that used in past assessments for shortraker rockfish and "other slope rockfish", but changes were made to the way that exploitable biomass is calculated and to the natural mortality rate used for silvergray rockfish.

#### *Spawning biomass and stock status trends*

Averaging the biomass from the last three Gulf of Alaska trawl surveys (2003, 2005, and 2007), and including the shallow stratum (0-100 m discussed above), results in an exploitable biomass of 39,905 t for shortraker rockfish and 90,283 t for "other slope rockfish".

#### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

The ABC computations for silvergray rockfish include an updated estimate of natural mortality  $M$ . Previously, an  $M$  of 0.04 was used for silvergray rockfish based on the midpoint of the range of instantaneous mortality  $Z$  (0.01-0.07) for British Columbia stocks. For the present assessment, two new estimates are available that are direct measures of  $M$  for silvergray rockfish: a range of  $M$  values for the Gulf of Alaska of 0.041-0.057, and an  $M$  of 0.06 for British Columbia. Thus, both new values indicate that  $M$  is likely higher than 0.04. Consequently, an  $M$  of 0.05, which is the approximate midpoint of the 0.041-0.057 range, was used as a new value of  $M$  for the ABC computations of silvergray rockfish in this assessment.

Shortraker rockfish and the various "other slope rockfish" species have always been classified into Tier 5 in the NPFMC's ABC and OFL definitions, except for sharpchin rockfish which have been in Tier 4 for several years. Now that age results are available for shortraker, redstripe, harlequin, and silvergray rockfish, these species could also potentially be moved into Tier 4. However, for the present assessment the authors recommended keeping these species in Tier 5 until better verification of the new ages is available, along with additional age results. The Plan Team discussed this and agreed that a priority



should be placed on doing additional research to facilitate the move from Tier 5 to Tier 4 or 3. The Tier 5 definitions state that the maximum permissible  $F_{ABC} \leq 0.75M$ . Applying this definition to the exploitable biomass of shortraker rockfish results in a recommended maximum permissible 2008 ABC of 898 t ( $F_{ABC} = 0.0225$ ). For “other slope rockfish”, applying an  $F_{ABC} = F_{40\%} = 0.53$  rate to the exploitable biomass of sharpchin rockfish (Tier 4) and an  $F_{ABC} = 0.75M$  rate to the other species (Tier 5) results in ABC’s of 836 t and 3,461 t, respectively, or a combined recommended ABC of 4,297 t for the “other slope rockfish” management group in 2008.

Overfishing for Tier 5 species such as shortraker rockfish is defined to occur at a harvest rate of  $F=M$ . Therefore, applying the estimate of  $M$  for shortraker rockfish (0.03) to the estimate of current exploitable biomass (39,905 t) yields an overfishing level of 1,197 t for 2008. Overfishing is defined to occur at the  $F_{35\%}$  (in terms of exploitable biomass per recruit) value of 0.064 for sharpchin rockfish, a Tier 4 species. For the remaining species of “other slope rockfish”, all of which are in Tier 5, overfishing is defined to occur at the  $F=M$  rate. Applying these  $F$ ’s results in an overfishing level of 5,624 t for the “other slope rockfish” group in 2008.

#### *Status determination*

The catches have been below the TACs in recent years and thus are not expected to approach the OFL therefore overfishing is not occurring on this stock.

#### *Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

#### *Area apportionment*

Geographic apportionment of the ABCs amongst management areas of the Gulf of Alaska is based on a weighted average of the percent exploitable biomass distribution for each area from the three most recent trawl surveys (2003, 2005, and 2007). In these computations, each successive survey is given a progressively heavier weighting using factors of 4, 6, and 9, respectively.

The new apportionment values for shortraker rockfish are: Western area, 13.37%; Central area, 35.07%; and Eastern area, 51.56%. Applying these percentages to the recommended ABC of 898 t yields the following apportionments for the Gulf in 2008:

Area apportionment of 2008 and 2009 ABC for shortraker rockfish in the Gulf of Alaska:

Western	Central	Eastern	Total
120	315	463	898

Apportionment values for “other slope rockfish” are: Western area, 8.31%; Central area, 13.24%; and Eastern area, 78.46%. The Eastern area for “other slope rockfish” is further divided into the West Yakutat area and the East Yakutat/Southeast Outside area. Based on a procedure identical to the other apportionment calculations (a 4:6:9 weighted average percent biomass of the three most recent trawl surveys), the Eastern area apportionment is subdivided as follows: West Yakutat, 17.93%; and East Yakutat/Southeast Outside, 82.07%. Applying these percentages to the recommended ABC of 4,297 t yields the following apportionments for the Gulf in 2008

Area apportionment of 2008 and 2009 ABC for Other Slope rockfish in the Gulf of Alaska:

	Western	Central	WYAK	SEO	Total
ABC	357	569	604	2,767	4,297

These significant drops in the apportionments to the western area has to do with the drop in the weighting to the 2003 trawl survey which was a particularly high year for the western area. It was pointed out that last year 191 t of shortraker rockfish was landed in that area and that for 2008, 120 t may result in

shortraker rockfish being placed on PSC status. Discussion continued on the merit of revisiting the rationale for this weighting scheme, however for this year the Plan Team used the currently accepted weighting scheme.

### 13. Pelagic shelf rockfish

Status and catch specifications (t) of pelagic shelf rockfish and projections for 2008 and 2009. ABC and OFL are projected using author's estimates of catch for 2007 and 2008 for dusky rockfish. Catch data in this table are current through 11/03/2007. Biomass based on trawl survey estimates and the age structured model for dusky rockfish.

Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2006	97,386	6,662	5,436	5,436	2,446
	2007	99,829	6,458	5,542	5,542	3,329
	2008	70,823	6,400	5,227		
	2009		6,294	5,140		

#### *Changes from previous assessment*

New data for 2007 includes updated 2006 fishery catch, estimated 2007 fishery catch, 2005 survey ages, and 2007 survey biomass estimates.

Previously, dark rockfish and dusky rockfish were considered one species and treated as a Tier 4 species because of the information available for dusky rockfish. Since dusky rockfish now have an age-structured model and are managed as a Tier 3 species, we now consider dark rockfish a Tier 5 species along with widow and yellowtail rockfish.

In March, 2007, the North Pacific Fishery Management Council took final action to remove dark rockfish from both the GOA FMP (PSR Complex) and BSAI FMP (other rockfish complex). Removing the species from the Federal FMP serves to turn full management authority of the stock over to the State of Alaska in both regions. At this time, the rules to implement these FMP amendments have not yet been finalized. Thus it is unlikely the effective date for Amendments 77/73 will occur before January, 2009. Therefore, it would not be until 2009 that dark rockfish would be removed from Federal management (including the associated contribution to OFLs and ABCs under the respective complexes in both regions) and full management authority would be turned over to the State. The 2008 ABC's and OFLs presented in this assessment are for the PSR complex including dark rockfish but point estimates for individual species are included for comparative purposes.

For dusky rockfish, the model used is the same as last year's author recommended 2005 model with updated fishery and survey data. This model incorporates a variety of changes from previous recommended models, such as: using an updated size-age matrix, removing fishery size compositions from 1990 (experimental year for Observer program), full estimation of the recruitment standard deviation and survey catchability, and modifying the natural mortality to be more in line with other similarly aged rockfish.

#### *Spawning biomass and stock status trends*

The authors continue to recommend using the average of exploitable biomass from the three most recent trawl surveys to determine the ABC's for dark, widow, and yellowtail rockfishes. For the three species, the average exploitable biomass from the 2003, 2005, and 2007 surveys was 9,682 t (8,576 t for dark rockfish, 132 t for widow rockfish, and 974 t for yellowtail rockfish).

The exploitable biomass was substantially higher from 2005-2007 for dark rockfish because of an unusually high biomass estimate from the 2005 trawl survey. Conversely, yellowtail biomass estimates were much lower in 2005 and again in 2007 because the 1999 and 2001 survey estimates were exceptionally high and have been left out of the exploitable biomass calculations.

For dusky rockfish, the projected 2008 age 4+ biomass from the model is 68,253 t and projected 2008 female spawning biomass is 23,486 t.

*Tier determination/Plan Team discussion and resulting ABCs and OFLs*

The 2008 recommended ABC for dark, widow, and yellowtail rockfish combined is 508 t based on Tier 5 calculations ( $F_{ABC}=0.75M=0.0525$ ). The 2008 OFL ( $F=M=0.07$  applied to average biomass) for dark, widow, and yellowtail rockfish is 678 t.

The Plan Team concurs with the use of the model for determining dusky rockfish ABC because it uses a more realistic estimate of natural mortality and has a better fit to available data including a reasonable fit to survey biomass estimates. The maximum allowable ABC for 2008 is 4,719 t based on Tier 3a and derived from the recommended model. This ABC is 5% less than last year's ABC of 4,991 t. The decrease in ABC is likely due to a 2.5 fold increase in survey biomass from 2003 to 2005 which inflated the 2006 and 2007 ABC's, followed by a decrease in survey biomass in 2007. The biomass for 2007 was similar to the 2003 survey biomass. The 2008 OFL for dusky rockfish is 5,722 t

*Status determination*

The Dusky rockfish stock is not overfished, nor is it approaching an overfished condition. The catch of remaining stocks in the complex are below the complex level OFL thus overfishing is not occurring on this complex.

*Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

*Area apportionment*

Recommended area apportionments of ABC for dark, widow, and yellowtail rockfish are 98 t for the Western area, 353 t for the Central area, 24 t for the West Yakutat area, and 34 t for the Southeast/Outside area.

Recommended area apportionments of ABC for dusky rockfish are 905 t for the Western area, 3,274 t for the Central area, 227 t for the West Yakutat area, and 313 t for the Southeast/Outside area. For the combined pelagic shelf rockfish assemblage, ABC and OFL for dusky rockfish are combined with ABC and OFL for dark, widow, and yellowtail rockfish. The 2008 OFL for pelagic shelf rockfish is 6,400 t and the 2009 OFL is 6,294 t.

The 2008 recommended ABC for pelagic shelf rockfish is 5,227 t with the following area apportionments:

Area apportionments of ABC for pelagic shelf rockfish in 2008 and 2009					
	Western	Central	W. Yakutat	E. Yakutat/SE	Total
2008	1,003	3,626	251	347	5,227
2009	986	3,566	247	341	5,140

*Additional Plan Team recommendations*

The Team agrees with the authors that should the opportunity arise to obtain age and maturity samples from port sampling (possibly in Kodiak in conjunction with the Rockfish Pilot Project) some level of priority should be given to this undertaking. As with other species in this section, attention needs to be given to the impact that untrawlable areas have on the biomass estimates and noted the difficulty in assessing dusky rockfish in particular with trawl gear.

#### 14. Demersal shelf rockfish

Status and catch specifications (t) of demersal shelf rockfish and projections for 2007 and 2008. Biomass for each year corresponds to the survey biomass estimates given in the SAFE report issued in the preceding year(s). 2007 catch data are current through 11/03/2007 but reflect landed catch only.

Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2006	19,558	650	410	410	199
	2007	19,558	650	410	410	178
	2008	18,329	611	382		
	2009		611	382		

##### *Changes from previous assessment*

This year's demersal shelf rockfish (DSR) assessment features new data from the 2007 line transect survey of yelloweye rockfish for the Central Southeast Outside area (CSEO) management area and new average weight data from SEO using fish sampled during the 2007 IPHC survey. No new age data were available.

##### *Spawning biomass and stock status trends*

Density and biomass estimates for this complex are based on yelloweye rockfish only. Yelloweye rockfish biomass for stock status evaluations are based on the most recent estimate by management area. The SSEO was last surveyed in 2005, EYKT was surveyed in 2003, and NSEO was surveyed in 2001. Density estimates by area range from 1,420 to 3,557 adult yelloweye per km<sup>2</sup>. The density estimate for CSEO in 2007 was 1,068 adult yelloweye/km<sup>2</sup> (CV=17%). This is lower than the previous estimate obtained in 2003 of 1,865 adult yelloweye/km<sup>2</sup> (CV=11%). As in previous assessments, biomass is estimated using the lower 90% confidence limit of the point estimate by management area. This results in a biomass estimate of 18,329 t for adult yelloweye rockfish. Overall, the trend is uncertain.

##### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

There are reliable point estimates of  $B$ ,  $F_{35\%}$ , and  $F_{40\%}$  for yelloweye rockfish, therefore the species complex is managed under Tier 4. Maximum allowable ABC under Tier 4 is based on  $F_{40\%}$  which is equal to 0.026. Demersal shelf rockfish are particularly vulnerable to overfishing given their longevity, late maturation, and sedentary and habitat-specific residency. As in previous assessments, the Plan Team concurred with the authors' recommendation to establish a harvest rate lower than the maximum allowed under Tier 4 by applying  $F=M=0.02$  to the biomass estimate and adjusting for other DSR species. This results in a recommended **2008 ABC of 382 t for DSR**. The OFL fishing mortality rate under Tier 4 is  $F_{35\%}=0.032$ . Adjusting for the DSR species other than yelloweye results in an **OFL for 2008 of 611 t for DSR**.

##### *Ecosystem Considerations summary*

No major changes were made to the ecosystem considerations section of the assessment this year.

##### *Area apportionment*

The ABC and OFL for DSR are for the SEO Subdistrict. DSR management is deferred to the State of Alaska and any further apportionment within the SEO Subdistrict is at the discretion of the State.

## 15. Thornyheads

Status and catch specifications (t) of thornyheads in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.						
Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2006	98,158	2,945	2,209	2,209	779
	2007	98,158	2,945	2,209	2,209	769
	2008	84,774	2,540	1,910		
	2009		2,540	1,910		

### *Changes from previous assessment*

Thornyheads are assessed on a biennial schedule to coincide with the timing of survey data. The last complete assessment was presented in 2005. An executive summary was presented in 2006 with projections for 2007 and 2008. This year, a full assessment is presented which includes the 2007 GOA trawl survey information. Other new data include updated total catch weight for 2005, 2006, and partial 2007 data, and relative population numbers and weights for GOA thornyheads from ABL longline surveys for 2006 and 2007.

In the past, the average of the 2 most recent complete surveys was used to compute biomass for Tier 5 calculations. This was done to accommodate the lack of survey coverage in certain depth and area strata in past years. However, the 2005 and 2007 surveys covered all depths and areas, so this is not an issue at this time. A point of concern for the 2007 survey is that while there was a 10% decrease Gulfwide, the majority of this decrease was observed in the western GOA. Because thornyheads have very low *CVs* associated with the trawl surveys (4 and 5% in 2005 and 2007, respectively), and to appropriately account for the area specific decrease, the authors recommend using the most recent survey (2007) to compute biomass and for the ABC apportionment.

### *Spawning biomass and stock status trends*

Estimates of spawning biomass are not available for thornyheads which are assessed under Tier 5. Thornyhead biomass from the 2007 GOA trawl survey declined 10% in the 2007 GOA trawl survey compared with the 2005 trawl survey. However, most of this decrease was observed in the western GOA. The 2007 trawl survey biomass declined 45% and 11% in the Western and Central Gulf areas, while the Eastern Gulf biomass increased 15%. Previous to this, survey biomass from the 2005 survey declined about 7% relative to the 2003 survey.

### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Thornyheads are assessed using the Tier 5 approach given the lack of age and growth information to support age or length-based modeling. The updated method described above with 2007 survey data is used to calculate ABC and OFL under Tier 5. The most recent (and complete) 2007 GOA trawl survey biomass estimate of 84,774 t, was multiplied by the maximum permissible  $F_{ABC} = 0.75M = 0.0225$ , for an **ABC recommendation of 1,910 t** and  $F_{OFL} = M = 0.03$  for an **OFL recommendation of 2,540 t**. This compares with values estimated in the 2005 assessment (for 2006 and 2007) based on the 2003 and 2005 survey estimates, which gave an average biomass of 98,158 t, an ABC of 2,209 t, and an OFL of 2,945 t. The 2008 ABC recommendation represents a 13% decrease from the Council's 2007 ABC. This is due to a 10% decrease in biomass and the use of only the most recent survey estimate.

### *Status determination*

The catches have been below the TACs in recent years and thus are not expected to approach the OFL therefore overfishing is not occurring on this stock. It is not possible to determine the status of stocks in Tier 5 with respect to overfished status.

*Additional Plan Team recommendations*

The Plan Team supports and encourages the age and growth research being conducted cooperatively with AFSC and Oregon State University.

The Plan Team reiterates their recommendation that the Gulf trawl surveys continue to sample the deeper depths and for full area coverage.

*Ecosystem Considerations summary*

Examining the trophic relationships of shortspine thornyheads suggests that the direct effects of fishing on the population are likely to be the major ecosystem factors to monitor for this species, because fishing is the dominant source of mortality for shortspine thornyheads in the Gulf of Alaska, and there are currently no major fisheries affecting their primary prey. However, if fisheries on the major prey of thornyheads—shrimp and to a lesser extent deepwater crabs—were to be re-established in the Gulf of Alaska, any potential indirect effects on thornyheads should be considered.

*Area apportionment*

Based on the 2007 survey biomass distribution, the authors computed the following apportionment of shortspine thornyheads ABC broken out by management areas. The Plan Team supports the authors' recommendation to use the most recent survey biomass for the apportionment for three reasons: first, the GOA Plan Team and NPFMC SSC have approved of using the most recent survey biomass estimate for ABC apportionment since the 2003 assessment; second, this would appropriately account for the decrease in trawl survey biomass in the western Gulf; and third, this seems the most reasonable survey distribution to use considering the apportionment will be applied in both 2008 and 2009.

GOA Area (NPFMC Area)	2007 Biomass	Percent of Total Biomass	2008 and 2009 ABC Apportionment
Western (610)	12,152	14%	267
Central (620 and 630)	37,607	45%	860
Eastern (640 and 650)	35,016	41%	783
Gulfwide Total	84,775	100%	1,910

**16. Atka mackerel**

Status and catch specifications (t) of Atka mackerel in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 11/3/07.

Area	Year	Biomass	OFL	ABC	TAC	Catch
GOA	2006		6,200	4,700	1,500	876
	2007		6,200	4,700	1,500	1,441
	2008		6,200	4,700		
	2009		6,200	4,700		

*Changes from previous assessment*

Atka mackerel are assessed on a biennial schedule to coincide with the timing of survey data. The last complete assessment was presented in 2005. An executive summary was presented in 2006 with rollover values for 2007 and 2008. This year, a full assessment is presented which includes the 2007 GOA trawl survey information. Other new data include updated total catch weight for 2005, 2006, and partial 2007 data, length data from the 2005, 2006 and preliminary 2007 GOA fisheries, age data from the 2006 GOA

fisheries, age data from the 2005 GOA bottom trawl survey, and an expanded and detailed Ecosystems Considerations section has been provided.

#### *Spawning biomass and stock status trends*

Gulf of Alaska Atka mackerel have been managed under Tier 6 specifications since 1996 due to lack of reliable estimates of current biomass. In the 2005 assessment, Tier 5 calculations of ABC and OFL (based on 2005 survey biomass estimates) were presented for consideration. The Plan Team, SSC, and Council agreed with the authors that there is no reliable estimate of Atka mackerel biomass and recommended continuing management under Tier 6. This year, Tier 5 calculations of ABC and OFL (based on 2007 survey biomass estimates) are again presented for consideration but were not recommended.

#### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Since 1996, the maximum permissible ABC has been 4,700 t under Tier 6. However, ABC has been set lower than 4,700 t (1,000 t in 1997 and 600 t for 1998-2005) for conservation reasons to allow for bycatch needs of other trawl fisheries and minimize targeting. The 2006 and 2007 ABCs (under Tier 6), were increased to the maximum allowable of 4,700 t and the TACs were set at 1,500 t to accommodate an increase in GOA Atka mackerel, and still allow for bycatch in other directed fisheries and minimize targeting. Given the very patchy distribution of GOA Atka mackerel which results in highly variable estimates of abundance, the Plan Team continues to recommend that GOA Atka mackerel be managed under Tier 6. **The Plan Team recommends a 2008 ABC for GOA Atka mackerel equal to the maximum permissible value of 4,700 t. The 2008 OFL is 6,200 t under Tier 6.**

#### *Status determination*

The catches have been below the TACs in recent years and thus are not expected to approach the OFL therefore overfishing is not occurring on this stock. It is not possible to determine the status of stocks in Tier 6 with respect to overfished status.

#### *Additional Plan Team recommendations*

The maximum permissible ABC (18,120 t) and the OFL (24,160 t) under Tier 5 are presented for consideration, but are not recommended because they are based on highly variable survey biomass estimates (Gulfwide CV of 46%), and catches of GOA Atka mackerel have been mainly comprised of a single cohort (1999 year class) which appears to be declining. Prudent management of GOA Atka mackerel is still warranted and the rationale as given in the past for a TAC to provide for anticipated bycatch needs of other fisheries, principally for Pacific cod, rockfish and pollock, and to only allow for minimal targeting should still be considered. The 2006 and 2007 TACs for GOA Atka mackerel were 1,500 t which the Plan Team feels would be sufficient to meet bycatch needs for 2008.

#### *Ecosystem Considerations summary*

Steller sea lion food habits data from the western Gulf of Alaska are relatively sparse, so it is not known how important Atka mackerel is to sea lions in this area. However, the close proximity of fishery locations to sea lion rookeries in the western Gulf suggests that Atka mackerel could be a prey item at least during the summer. Overall, while Steller sea lions, Pacific cod, and arrowtooth flounder are all sources of significant mortality of Atka mackerel in the Aleutian Islands, predatory groundfish play a far larger numerical role than Steller sea lions in the Gulf of Alaska as even occasional predation events by these groundfish may add to a large degree of predator control due to the large and increasing size of their populations. Analyses of historic fishery CPUE revealed that the fishery may create temporary localized depletions of Atka mackerel and that these depletions may last for weeks after the vessels have left the area. Bottom contact fisheries could have direct negative impacts on Atka mackerel by destroying egg nests and/or removing the males that are guarding nests, however, this has not been examined quantitatively. Indirect effects of bottom contact fishing gear, such as effects on fish habitat, may also have implications for Atka mackerel. Several types of living substrate have been found to be susceptible to fishing gear, and Atka mackerel sampled in the NMFS bottom trawl survey are primarily associated

with emergent epifauna such as sponges and corals. Effects of fishing gear on these living substrates could, in turn, affect fish species that are associated with them. The cumulative and long term effects from historic Atka mackerel fisheries are unknown.

## 17. Skates

Status and catch specifications (t) of skates and projections for 2008 and 2009. Average biomass for each group and area, corresponds to the value given in this year's (2007) SAFE report. Catch data are current through 11/03/2007.								
Species group	Area	Average			2007	2008 and 2009		
		Biomass	OFL	ABC		TAC	Catch	ABC
Big skate	W	8,422		695	695	68	632	
	C	27,536		2,250	2,250	1,218	2,065	
	E	8,434		599	599	8	633	
	<b>Total</b>	<b>44,392</b>	<b>4,726</b>	<b>3,544</b>	<b>3,544</b>	<b>1,294</b>	<b>3,330</b>	<b>4,439</b>
Longnose skate	W	1,043		65	65	46	78	
	C	27,209		1,969	1,969	814	2,041	
	E	10,239		861	861	240	768	
	<b>Total</b>	<b>38,491</b>	<b>3,860</b>	<b>2,895</b>	<b>2,895</b>	<b>1,100</b>	<b>3,849</b>	<b>3,849</b>
Bathyrja skates	GOA wide	28,057	2,156	1,617	1,617	1,104	2,104	2,806

### *Changes from previous assessment*

Skates are on a biennial stock assessment schedule to coincide with new survey data. This year, a full assessment is presented with key assessment parameters and projections for 2008 and 2009.

### *Changes from previous assessment*

Biomass and length data from the 2007 GOA trawl survey were incorporated. Catch data for 2006 and 2007 were updated. This year's stock assessment ABC recommendations are based on the average of 2003, 2005, and 2007 bottom trawl surveys. Length data from fisheries have not been collected since 2005.

### *Spawning biomass and stock status trends*

GOA bottom trawl survey biomass for both big and longnose skates decreased from 2005 to 2007, with longnose skates experiencing the largest decline. GOA other skate survey biomass increased slightly over the same period, primarily due to an increase in Aleutian skate biomass. Information is presently insufficient for population dynamics modeling for GOA skates, although the authors suggested that age structured models might be possible for big and longnose skates in the near future. The Plan Team encourages this development as data improve.

### *Tier determination/Plan Team discussion and resulting ABCs and OFLs*

Skates are managed in Tier 5. A single value of  $M=0.10$  is applied to area-specific average biomass from the most recent three GOA trawl surveys to estimate the ABCs listed above using  $F_{ABC}=0.075$ , and the OFLs using  $F_{OFL}=0.10$ . A wider range of  $M$  estimates is now available, and may be used in upcoming assessments. While the assessment authors continued to recommend area-specific OFLs for big and longnose skates due to concerns about localized depletion and unknown stock structure, the Plan Team maintained that Gulfwide OFLs combined with the bycatch-only nature of the current catch provide adequate protection. This is the identical Plan Team recommendation for previous years.



### *Status determination*

The catches have been below the TACs in recent years and thus are not expected to approach the OFL therefore overfishing is not occurring on this stock. Catch as currently estimated does not exceed any Gulfwide OFLs established for skates, but given the potentially high unaccounted catch in the IFQ halibut fishery, we cannot definitively state that the stocks are not subject to overfishing. It is not possible to determine the status of stocks in Tier 5 with respect to overfished status.

### *Additional Plan Team recommendations*

The Plan Team concurs with the authors' recommendation that no directed fishing for skates be permitted in the GOA because the ABCs are likely to be taken (or exceeded) incidentally in groundfish and IFQ halibut fisheries. The Plan Team recommends continued inclusion of IPHC survey-based estimates of skate bycatch in IFQ halibut fisheries, recognizing that this likely represents an upper limit on actual skate catch in those fisheries. The Plan Team suggests exploring both ADF&G trawl surveys and NMFS longline surveys to determine whether they might provide additional time series of relative skate abundance and/or biological samples. Given the report from the public that interest in targeting and retaining skates is likely to increase, we are concerned that no fishery length data were available to determine if the disproportionate harvest of large female big skates observed in 2003-2005 has continued. Investigations of skate nursery areas in the GOA are encouraged, given that EBS skates were found to have discrete nursery areas which may be vulnerable to disturbance by bottom-tending fishing gear or other human activities.

### *Ecosystem Considerations summary*

Ecosystem considerations based on the early 1990's Gulf of Alaska food web model were presented. The Plan Team encourages updating this information with diet data being collected by Moss Landing Marine Lab researchers as it becomes available.

### *Area apportionment*

The Plan Team concurred with the authors recommended area-specific ABCs based on the average of the three most recent GOA bottom trawl surveys (shown above).

## **Other Species**

The other species complex in the GOA contains the following species: squids, sculpins, sharks and octopus. Assessments for these species in the GOA are done irregularly since ABCs and OFLs are not specified. Updated executive summaries of assessments for other species in the GOA are provided as appendices to this SAFE report (**Appendix 1**). These assessments together with the full assessments from 2006 will be used for the forthcoming FMP amendment analysis to evaluate the impact of establishing separate harvest specifications for the complex by species or in aggregate. The assessments were reviewed by the Plan Team and any associated OFLs and ABCs were recommended for analytical purposes only. No specifications will be established based on these assessments until the FMP amendment is finalized.

As an interim measure, the Council took final action in June 2005 to implement a calculation change to the TAC calculation for other species (previously  $TAC=5\%$  of the sum of target TACs). The 5% TAC calculation was modified such that the Council may recommend a TAC at or below 5% of the sum of the target species TACs during the annual specifications process. The Council's intent was to establish a TAC level which would meet incidental catch needs in other directed fisheries with the potential to establish this TAC at a higher level which could allow for directed fishing on the complex but be placed low enough to prevent excessive harvest of a single targeted species or on the complex as a whole. This interim measure is intended to provide additional flexibility in responding to potential conservation concerns as they arise until more comprehensive management changes can be made to the other species complex (i.e., analysis of individual species level assessments).

In order to provide the Council information to establish a TAC for the other species complex, the Plan Team discussed the incidental catch needs for directed fisheries.

Other species catch in 2007 as of November 3 was 2,695 t. The catch is comprised of sculpins (905 t), sharks (1,161 t), octopus (216 t) and squid (413 t). Sculpin catch occurred by both trawl and pot gear fisheries, octopus was primarily taken by pot gear while catch of sharks and squid occurred primarily in trawl fisheries. The Team reiterates previous comments regarding continued problems with estimating incidental catch of other species from the halibut fishery, which may constitute a significant portion of the total catch of other species in the GOA.

The Plan Team continues to be concerned about the ability for directed fishing on a single species within the other species complex up to the complex-level TAC. Similar to 2006, the Plan Team strongly encourages a TAC be established which would meet incidental catch needs (so as not to constrain directed fisheries) while providing in-season management the ability to control rapid development of directed fishing on a single member of the complex. After reviewing incidental catch needs in directed fisheries together with discussion of the potential for developing fisheries on members of the other species complex, the Plan Team believes that 4,000 t for the complex would meet incidental catch needs and allow for exploratory fishing under the existing MRAs. Any amount set above this level would allow for additional directed fishing on the complex, and the Plan Team reiterates their concerns about the unknown impact this may impose on single species within the larger complex.

## Overview of Appendices

### **Other Species Assessments**

Five preliminary stock assessments were reviewed by the Plan Team in conjunction with the forthcoming amendment analysis to establish separate harvest specifications for individual members of the other species complex by species or in aggregate. The Plan Team requested updated executive summaries of the full assessments that were provided to the Team in 2006. Recommended harvest specifications as noted below are provided for analytical purposes only. The Team did not deliberate on specifications but rather received updated information as applicable on their recommendations from the previous year. No separate specifications will be established for these species until the amendment is finalized.

See the Council website for more information on the status of the GOA other species amendment: [http://www.fakr.noaa.gov/npfmc/current\\_issues/non\\_target/non\\_target.htm](http://www.fakr.noaa.gov/npfmc/current_issues/non_target/non_target.htm)

### **Sculpins**

An executive summary of an assessment of sculpin species in the Gulf of Alaska (GOA) is provided in **Appendix 1a**. There is no directed fishery for sculpins in the GOA at this time; however, they are caught incidentally in a wide variety of fisheries, comprising approximately 16-36% of "other" species catch (2005-2007). Total sculpin catch in 2007 was the third highest on record, and the highest percent of the "other" species catch since skates were removed from the complex (2005). The purpose of this assessment was to compile the available data for sculpins in the GOA and to assess future assessment needs. No specific surveys are conducted for sampling sculpins species, and severe data gaps exist in sculpin life history characteristics, spatial distribution, and abundance. There are 46 listed species, and they are broadly distributed throughout all benthic habitats from shallow to deep, over all substrate types in the GOA.

Natural mortality was estimated from the literature ( $M=0.19$ ). Unlike other taxa in the "Other" species complex, there are reliable biomass estimates for the sculpin complex. Average biomass for the sculpin complex was estimated at 30,836 t using the six most recent surveys.

The Plan Team encourages the authors to continue collaborative work with ADF&G to collect age structures and other pertinent life history data.

The Plan Team concurs with the authors recommendation of using a Tier 5 approach applied to the sculpin complex as long as the catch remains incidental and no target fishery develops. This results in a 2008 ABC of 4,394 t, and a 2008 OFL of 5,859 t for purposes of the forthcoming analysis.

### **Squid**

An executive summary of an assessment of squid species in the Gulf of Alaska (GOA) is provided in **Appendix 1b**. There is no directed fishery for squid in the GOA at this time. No specific surveys are conducted for sampling squid species, and there is limited information available for GOA squid life history characteristics, spatial distribution, and abundance.

Incidental catch of squid increased dramatically in 2006 but returned to lower levels in 2007. Squid catch in 2006 increased from 625mt in 2005 to 1,527 t in 2006. Squid catch in 2006 comprised 42% of the total other species catch, an increase from 27% of the catch in 2005. This occurred primarily in a localized area (Shelikof Strait) over a discrete time period in the pollock fishery. The survey biomass estimate in 2007 increased dramatically from the 2005 estimate. The biomass estimates included in the assessment represent raw survey biomass estimates and as such should be considered a minimum biomass estimates. Multiple options are presented for establishing ABCs and OFLs under Tier 5 and Tier 6 formulations. The Plan Team discussed the inherent problems with each formulation for this species and noted that as an option to breaking them out for separate specifications in the other species category, squid should also be considered for incorporation in the forage fish category.

### **Octopus**

An assessment of octopus species in the Gulf of Alaska (GOA) is provided in **Appendix 1c**. The purpose of this assessment was to compile the available data for octopuses in the GOA and to assess future assessment needs. Directed fishing for octopuses has been limited. They are caught incidentally throughout the GOA in both state and federally-managed bottom trawl, longline, and pot fisheries. While some species composition, and size data are available from the NMFS bottom trawl, biomass estimates are unreliable. It is likely that the most common commercially caught species is *Enteroctopus dofleini*. Life history data for all species are lacking, and at least one species is currently being described.

The Plan Team concurs with the authors regarding the difficulty of placing octopus within the existing tier system for setting regulatory catch limits. For purposes of the forthcoming analysis the authors included a range of ABC and OFL recommendations based upon Tier 5 and two Tier 6 modified options. The authors note problems with each approach and that specifically an OFL based upon the average catch under Tier 6 would have led to fishery closures in 2007. The Plan Team notes that additional information is necessary for adequately managing this fishery and concurs with the authors recommendation for an experimental fishery to allow for greater data collection.

### **Sharks**

An executive summary of an assessment of shark species in the Gulf of Alaska (GOA) is provided in **Appendix 1d**. The shark species complex in Alaska consists of 10 species; however, spiny dogfish (*Squalus acanthias*), Pacific sleeper shark (*Somniosus pacificus*) and salmon sharks (*Lamna ditropis*) are by far the three most common species in the GOA. There is no directed fishery for sharks in the GOA at this time. However spiny dogfish and Pacific sleeper sharks are taken in bottom trawl and longline fisheries, but most incidentally captured sharks are not retained.

The authors presented three alternative assessments: Tier 5, Tier 6 using the standard average catch calculation, and a modified Tier 6 approach (option 1 as described in the "Modified Tier 6 Approach" previously). There have always been problems with applying Tier 5 and Tier 6 options to sharks in the GOA. Tier 5 criteria for establishing ABC and OFL require reliable point estimates for biomass, which do not exist for sharks in the GOA, as the efficiency of bottom trawl gear is questionable for assessing these

species. Tier 5 also requires estimates of natural mortality. For the two most abundant species in the author's data sets; spiny dogfish in GOA waters have been lacking estimates of M and are currently being addressed, and estimates of M for Pacific sleeper sharks do not exist. Tier 6 criteria require a reliable catch history from 1978-1995, which does not exist for sharks in the GOA. The modified Tier 6 approach presented is based on the premise that estimated incidental catch can be considered a known safe level of fishing. Based on this premise the maximum incidental catch can be used to set OFL for the shark complex, and the ABC would represent 75% of the OFL.

The Plan Team concurs with the author's general recommendation that using the modified Tier 6 approach (option 1, using the maximum incidental catch for the OFL) may be the most appropriate way to proceed at this point, as long as a directed fishery does not develop. While sharks are known to be long lived and low fecund, maximum catch is recommended because directed fishing has not occurred, and using average catch would limit other fisheries in some years. This would set the ABC for GOA sharks at 1,792 t, and the OFL at 2,390 t. The Plan Team recommends that dogfish be considered a candidate for separate analysis from the complex. These values are suggested for analytical purposes only.

### **Forage fish**

An updated summary for Forage Fish is included as **Appendix 2**. Forage fish are included as a separate category under the GOA FMP, however a directed fishery for forage fish is prohibited and other limitations are placed on the bycatch, sale, barter, trade, or processing of any species in this group by amendment 39 to the GOA Groundfish FMP. Thus specifications for these species are not established. Forage fish were first included as an assessment in 2003 with the intention to review current information on these species and identify future assessment needs. No specific surveys are conducted for sampling forage fish species, thus data collection is notably problematic for these species. However, available surveys and catch data do provide some information for assessing the status of these species.

This assessment update focuses upon two main species of importance in the forage fish category: capelin and eulachon. New information for these species includes recent biomass estimates from the GOA trawl survey in 2007, incidental catch through 2007 from NMFS catch accounting for both species, and eulachon harvest in state waters of Alaska. The Plan Team discussed the recent increase in eulachon catches in conjunction with both the pollock survey and pollock fishery and requested additional exploration of this in a subsequent assessment understanding that some additional stock identification information on eulachon may be available for inclusion at that time. The Plan Team continues to recommend maintaining the Forage Fish chapter as an intermittent SAFE appendix to be updated as new information becomes available, noting that forage fish are essential ecosystem components, important to marine mammals and commercially important groundfish. An expanded assessment of Forage Fish is requested for the 2008 SAFE report.

### **Grenadier**

An executive summary assessment of grenadier species is provided in **Appendix 3**. This assessment is an update of a full assessment that was provided in the 2006 SAFE report. The grenadier assessment covers both the BSAI and GOA management areas. Seven species of grenadiers are known to occur in Alaska. The giant grenadier is the most abundant and has the shallowest depth distribution on the continental slope. The assessment focused on the giant grenadier as it is the most common grenadier caught in both the commercial fishery and trawl surveys.

Grenadier species are considered "non-specified" under both BSAI and GOA FMPs. As such there are no management measures implemented for this species and no official catch statistics exist. However, catches have been estimated for 1997-2007 based upon data from the North Pacific Groundfish Observer Program. Average catches in the EBS have been 2,924 t, in the AI 2,275 t and in the GOA 10,791 t. A

new biomass estimate was included for the GOA (487,987 t) which was very similar to the previous estimate of 488,627 t used to compute the OFLs and ABC values.

Only one age and growth study is available for giant grenadiers in the GOA and estimated a maximum age of 56 years, however the assessment author recommended that a proxy natural mortality rate be estimated based on information for Pacific grenadier instead. A subset of trawl survey biomass estimates and longline survey biomass estimates were utilized in the assessment. The Plan Team concurred with the assessment author's recommended Tier 5 approach for this species utilizing the proxy natural mortality rate ( $M = 0.057$ ). This results in a suggested GOA ABC of 20,889 t and an OFL of 27,852 t for purposes of the forthcoming analysis.

## Tables

Table 1. Gulf of Alaska groundfish 2007 - 2009 OFLs and ABCs, 2007 TACs, and 2007 catches reported through November 3, 2007.

Stock/ Assemblage	Area	2007				2008		2009	
		OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pollock	W (61)		25,012	25,012	18,012		17,602		23,700
	C (62)		20,890	20,890	19,366		19,181		25,821
	C (63)		14,850	14,850	14,315		13,640		18,367
	WYAK		1,398	1,398	86		1,517		2,042
	Subtotal	87,220	62,150	62,150	51,779	72,110	51,940	95,940	69,930
	EYAK/SEO	8,209	6,157	6,157	0	11,040	8,240	11,040	8,240
<b>Total</b>	<b>95,429</b>	<b>68,307</b>	<b>68,307</b>	<b>51,779</b>	<b>83,150</b>	<b>60,180</b>	<b>106,980</b>	<b>78,170</b>	
Pacific Cod	W		26,855	20,141	13,227		25,932		25,932
	C		37,873	28,405	23,404		37,901		37,901
	E		4,131	3,718	65		2,660		2,660
	<b>Total</b>	<b>97,600</b>	<b>68,859</b>	<b>52,264</b>	<b>36,696</b>	<b>88,660</b>	<b>66,493</b>	<b>88,660</b>	<b>66,493</b>
Sablefish	W		2,470	2,470	1,996		1,880		1,718
	C		6,190	6,190	5,536		5,500		5,026
	WYAK		2,280	2,280	1,769		1,950		1,782
	SEO		3,370	3,370	3,238		3,390		3,098
	<b>Total</b>	<b>16,906</b>	<b>14,310</b>	<b>14,310</b>	<b>12,539</b>	<b>15,040</b>	<b>12,720</b>	<b>12,924</b>	<b>11,624</b>
Deep-water Flatfish	W		420	420	8		690		707
	C		4,163	4,163	247		6,721		6,927
	WYAK		2,677	2,677	2		965		995
	EYAK/SEO		1,447	1,447	10		527		543
	<b>Total</b>	<b>10,431</b>	<b>8,707</b>	<b>8,707</b>	<b>267</b>	<b>11,343</b>	<b>8,903</b>	<b>11,583</b>	<b>9,172</b>
Shallow-water flatfish	W		24,720	4,500	281		26,360		26,360
	C		24,258	13,000	7,761		29,873		29,873
	WYAK		628	628	0		3,333		3,333
	EYAK/SEO		1,844	1,844	0		1,423		1,423
	<b>Total</b>	<b>62,418</b>	<b>51,450</b>	<b>19,972</b>	<b>8,042</b>	<b>74,364</b>	<b>60,989</b>	<b>74,364</b>	<b>60,989</b>
Rex sole	W		1,147	1,147	413		1,022		948
	C		5,446	5,446	2,432		6,731		6,241
	WYAK		1,037	1,037	1		520		483
	EYAK/SEO		1,470	1,470	0		859		796
	<b>Total</b>	<b>11,900</b>	<b>9,100</b>	<b>9,100</b>	<b>2,846</b>	<b>11,933</b>	<b>9,132</b>	<b>11,065</b>	<b>8,468</b>
Arrowtooth flounder	W		20,852	8,000	3,134		30,817		31,080
	C		139,582	30,000	21,808		167,936		169,371
	WYAK		16,507	2,500	63		15,245		15,375
	EYAK/SEO		7,067	2,500	68		12,472		12,579
	<b>Total</b>	<b>214,828</b>	<b>184,008</b>	<b>43,000</b>	<b>25,073</b>	<b>266,914</b>	<b>226,470</b>	<b>269,237</b>	<b>228,405</b>
Flathead sole	W		10,908	2,000	696		12,507		13,001
	C		26,054	5,000	2,407		28,174		29,289
	WYAK		2,091	2,091	2		3,420		3,556
	EYAK/SEO		57	57	0		634		659
	<b>Total</b>	<b>48,658</b>	<b>39,110</b>	<b>9,148</b>	<b>3,105</b>	<b>55,787</b>	<b>44,735</b>	<b>57,962</b>	<b>46,505</b>

Table I. continued...

Stock/ Assemblage	Area	2007				2008		2009	
		OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pacific ocean perch	W	4,976	4,244	4,244	4,428	4,376	3,686	4,397	3,704
	C	8,922	7,612	7,612	7,125	9,717	8,185	9,764	8,225
	WYAK		1,140	1,140	1,242		1,100		1,105
	SEO	3,260	1,640	1,640	0		2,028		2,038
	E(subtotal)	3,260	2,780	2,780	1,242	3714		3732	
	Total	17,158	14,636	14,636	12,795	17,807	14,999	17,893	15,072
Northern rockfish <sup>3</sup>	W		1,439	1,439	1107		2,141		2,047
	C		3,499	3,499	2,982		2,408		2,302
	E		0	0	0		0		0
	Total	5,890	4,938	4,938	4,089	5,430	4,549	5,120	4,349
Rougheye	W		136	136	71		125		124
	C		611	611	175		834		830
	E		241	241	153		327		325
	Total	1,148	988	988	399	1,548	1,286	1,540	1,279
Shortraker	W		153	153	193		120		120
	C		353	353	155		315		315
	E		337	337	244		463		463
	Total	1,124	843	843	592	1,197	898	1,197	898
Other slope <sup>3</sup>	W		577	577	252		357		357
	C		386	386	319		569		569
	WYAK		319	319	49		604		604
	EYAK/SEO		2,872	200	45		2,767		2,767
	Total	5,394	4,154	1,482	665	5,624	4,297	5,624	4,297
Pelagic shelf rockfish	W		1,466	1,466	595		1,003		986
	C		3,325	3,325	2,440		3,626		3,566
	WYAK		307	307	293		251		247
	EYAK/SEO		444	444	1		347		341
	Total	6,458	5,542	5,542	3,329	6,400	5,227	6,294	5,140
Demersal rockfish	Total	650	410	410	178	611	382	611	382
Thornyhead rockfish	W		513	513	338		267		267
	C		989	989	247		860		860
	E		707	707	184		783		783
	Total	2,945	2,209	2,209	769	2,540	1,910	2,540	1,910
Atka mackerel	Total	6,200	4,700	1,500	1,441	6,200	4,700	6,200	4,700
Big skate	W		695	695	68		632		632
	C		2,250	2,250	1,218		2,065		2,065
	E		599	599	8		633		633
	Total	4,726	3,544	3,544	1,294	4,439	3,330	4,439	3,330
Longnose skate	W		65	65	46		78		78
	C		1,969	1,969	814		2,041		2,041
	E		861	861	240		768		768
	Total	3,860	2,895	2,895	1,100	3,849	2,887	3,849	2,887
Other skates	Total	2,156	1,617	1,617	1,104	2,806	2,104	2,806	2,104
Other Species	Total	NA	NA	4,500	2,695				
Total		611,153	490,327	269,912	170,797	665,642	536,191	690,888	556,174

Table 2. Gulf of Alaska 2007 ABCs, biomass, and overfishing levels (t) for Western, Central, Eastern, Gulfwide, West Yakutat, and Southeast Outside regulatory areas.

Species/Assemblage	Area	2008		
		ABC	Biomass	OFL
Pollock	W (61)	17,602		
	C (62)	19,181		
	C (63)	13,640		
	WYAK	1,517		
	Subtotal	51,940	705,020	72,110
	EYAK/SEO	8,240	36,799	11,040
	Total	60,180	741,819	83,150
Pacific Cod	W	25,932		
	C	37,901		
	E	2,660		
	Total	66,493	233,310*	88,660
Sablefish	W	1,880		
	C	5,500		
	WYAK	1,950		
	EY/SEO	3,390		
	Total	12,720	167,000	15,040
Deep water flatfish	W	690		
	C	6,721		
	WYAK	965		
	EYAK/SEO	527		
	Total	8,903	132,625 <sup>4</sup>	11,343
Shallow water flatfish	W	26,360		
	C	29,873		
	WYAK	3,333		
	EYAK/SEO	1,423		
	Total	60,989	436,590 <sup>5</sup>	74,364
Rex sole	W	1,022		
	C	6,731		
	WYAK	520		
	EYAK/SEO	859		
	Total	9,132	82,801 <sup>5</sup>	11,933
Arrowtooth flounder	W	30,817		
	C	167,936		
	WYAK	15,245		
	EYAK/SEO	12,472		
	Total	226,470	2,244,870 <sup>5</sup>	266,914
Flathead sole	W	12,507		
	C	28,174		
	WYAK	3,420		
	EYAK/SEO	634		
	Total	44,735	324,197 <sup>5</sup>	55,787



Table 2. continued.

Species/Assemblage	Area	2008		OFL
		ABC	Biomass	
Pacific ocean perch	W	3,686		4,376
	C	8,185		9,717
	WYAK	1,100		0
	EY/SEO	2,028		0
	EGOA	0		3,714
	Total	14,999	317,511	17,807
Northern rockfish	W	2,141		
	C	2,408		
	E	0 <sup>1</sup>		
	Total	4,549	93,391	5,430
Rougheye	W	125		
	C	834		
	E	327		
	Total	1,286	46,121	1,548
Shorttraker	W	120		0
	C	315		0
	E	463		0
	Total	898	39,905	1,197
Other Slope rockfish	W	357		
	C	569		
	WYAK	604 <sup>1</sup>		
	EYAK/SEO	2,767		
	Total	4,297	90,283 <sup>5</sup>	5,624
Pelagic shelf rockfish	W	1,003		
	C	3,626		
	WYAK	251		
	EY/SEO	347		
Total	5,227	70,823	6,400	
Demersal shelf rockfish	Total	382	18,329	611
Thornyhead rockfish	Western	267		
	Central	860		
	Eastern	783		
	Total	1,910	84,774 <sup>5</sup>	2,540
Atka mackerel	Total	4,700	Unknown	6,200
Big skates	W	632	8,422	
	C	2,065	27,536	
	E	633	8,434	
	Total	3,330	44,392	4,439
Longnose skates	W	78	1,043	
	C	2,041	27,209	
	E	768	10,239	
	Total	2,887	38,491	3,849
Other skates	Total	2,104	28,057	2,806
Other species		0		
All species	Total	536,191		665,642

1/ The EGOA ABC of 2 t 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: Overfishing is defined Gulf-wide, except for pollock and POP.

Table 3. Summary of fishing mortality rates and overfishing levels for the Gulf of Alaska, 2008.

Species	Tier	F <sub>ABC</sub> <sup>1</sup>	Strategy	FOFL <sup>2</sup>	Strategy
Pollock	3b	0.13	$F_{ABC}$	0.17	$F_{35\% \text{ adjusted}}$
Pacific cod	5	0.285	$F=.75M$	0.38	$F=M$
Sablefish	3b	0.084	$F_{40\% \text{ adjusted}}$	0.101	$F_{35\% \text{ adjusted}}$
Deepwater flatfish	3a,6 <sup>3</sup>	0.137	$F_{40\%}, F_{ABC}^3$	0.176	$F_{35\%}, F_{OFL}^4$
Rex sole	5	0.128	$F=.75M$	0.17	$F=M$
Flathead sole	3a	0.38	$F_{40\%}$	0.494	$F_{35\%}$
Shallow water flatfish	4,5 <sup>5</sup>	0.150-0.204	$F_{40\%}, F=.75M^5$	0.192-0.245	$F_{35\%}, F=M^6$
Arrowtooth	3a	0.186	$F_{40\%}$	0.222	$F_{35\%}$
Pacific ocean perch	3a	0.061	$F_{40\%}$	0.073	$F_{35\%}$
Roughey rockfish	3a	0.039	$F_{40\%}$	0.047	$F_{35\%}$
Shortraker rockfish	5	0.023	$F=.75M$	0.03	$F=M$
Other slope rockfish	4, 5 <sup>7</sup>	0.053, 0.038-0.075	$F_{40\%}, F=.75M^7$	0.064, 0.05-0.10	$F_{35\%}, F=M^8$
Northern rockfish	3a	0.061	$F_{40\%}$	0.073	$F_{35\%}$
Pelagic Shelf Rockfish	3a, 5 <sup>9</sup>	0.087, 0.0525	$F_{40\%}, F=.75M^9$	0.107, 0.07	$F_{35\%}, F=M^{10}$
Demersal Shelf rockfish	4	0.02	$F=M$	0.032	$F_{35\%}$
Thornyhead rockfish	5	0.0225	$F=.75M$	0.03	$F=M$
Atka mackerel	6	NA	$F_{ABC}^{11}$	NA	$F_{OFL}^{12}$
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),  $ABC=.75 \times$  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/  $F_{40\%}$  for sharpchin rockfish (Tier 4),  $F=.75M$  for other species (Tier 5).

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

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

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

11/ ABC for Atka mackerel is equal to 0.75 x average catch from 1978 to 1995. This maximum permissible ABC is intended for bycatch in other target fisheries and minimize targeting.

12/ 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 2008 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum. Relative to last year, Pacific cod were removed from this table.

Species	Tier	2008			2008
		Max $F_{ABC}$	Max ABC	$F_{ABC}$	ABC
Pollock <sup>1</sup>	3b	0.15	62,610	0.13	51,940
Demersal shelf rockfish	4	0.026	496	0.02	382

1/ The Plan Team recommended 2008 W/C pollock ABC of 51,940 mt is reduced by 1,650 mt to accommodate the Prince William Sound GHL. For comparisons in this table, the maximum permissible ABC of 62,610 mt should be compared with the full ABC 53,590 mt.

Table 5. Groundfish landings (metric tons) in the Gulf of Alaska, 1956-2007.

Year	Pollock	Pacific Cod	Sable Fish	Flat Fish	Arrowtooth Flounder	Slope Rock Fish <sup>a</sup>
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 <sup>1</sup>	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 <sup>1</sup>	52,270	12,246	12,520	21,230	17,128
2003	49,300	52,500	14,345	10,750	23,320	18,678
2004	62,826	43,104	15,630	7,634	15,304	18,194
2005	80,086	35,205	13,997	9,890	19,770	17,306
2006	70b,522	37,792	13,367	14,474	27,653	20,492
2007 <sup>H</sup>	51,779	36,696	12,539	14,260	25,073	18,540

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, 1956-2007.

Year	Pelagic Shelf Rockfish	Demersal Shelf Rockfish <sup>b</sup>	Thorny Heads <sup>c</sup>	Atka Mackerel <sup>e</sup>	Skates <sup>k</sup>	Other Species <sup>d</sup>	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 <sup>f</sup>	540	1,320	3,538		2,752	232,578
1995	2,891	219 <sup>g</sup>	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	2,674	260	818	819	2,912	1,559	171,734
2005	2,235	187	719	799	2,710	2,294	185,211
2006	2,446	166	779	876	3,501	3,526	195,594
2007 <sup>h</sup>	3,329	178	769	1,441	3,498	2,695	170,797

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 3rd, 2007.

i/ Includes all species except arrowtooth.

j/ Does not include state fisheries

k/ Includes all managed skates species

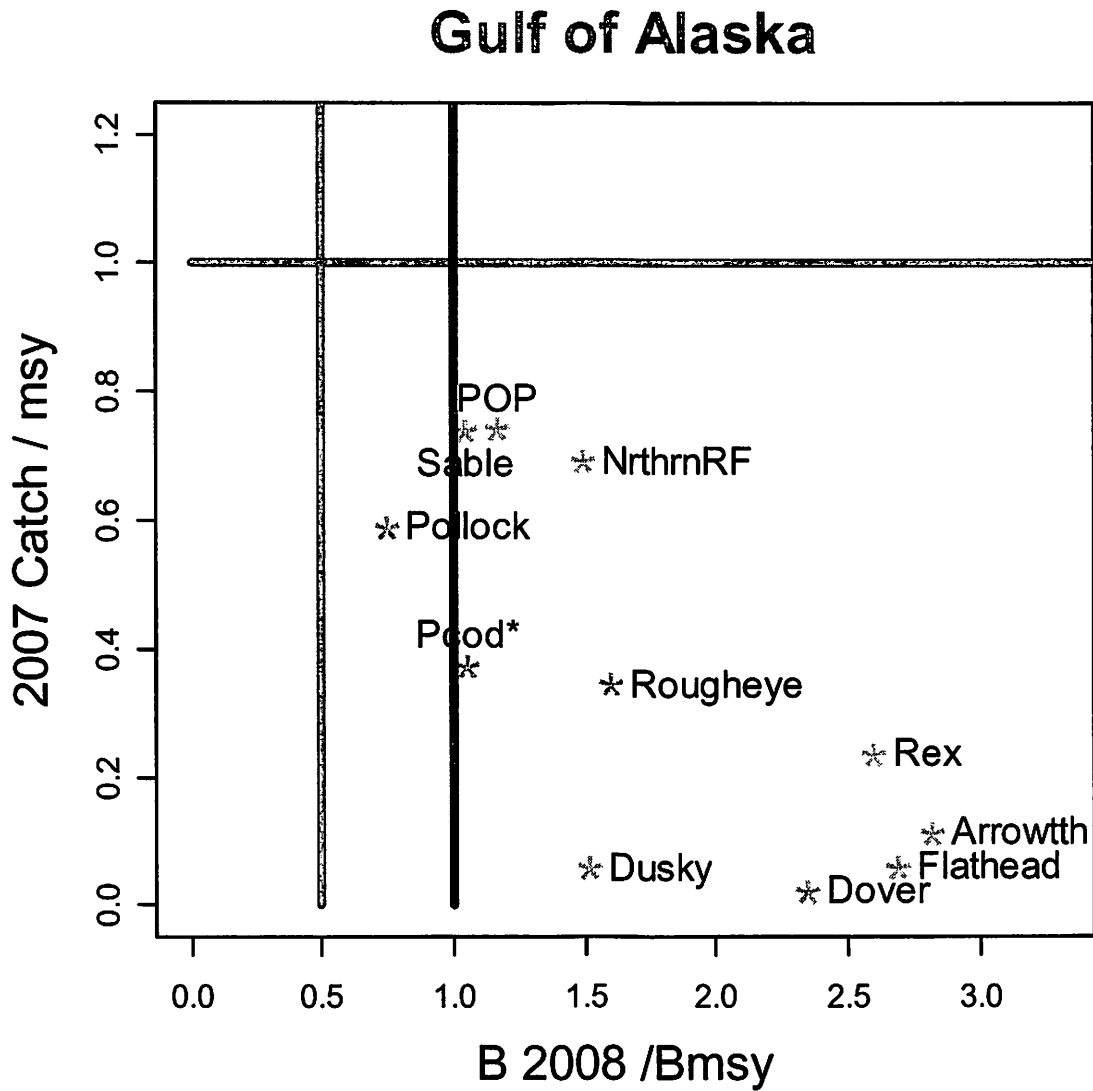


Figure 1. Summary status of age-structured GOA species relative to 2007 catch levels (vertical axis) and projected 2008 spawning biomass relative to  $B_{msy}$  levels. Note that the 2007 MSY level is taken as the 2007 OFL (which is defined as the catch at  $F_{msy}$ ). Also, Pacific cod is based on last year's assessment.

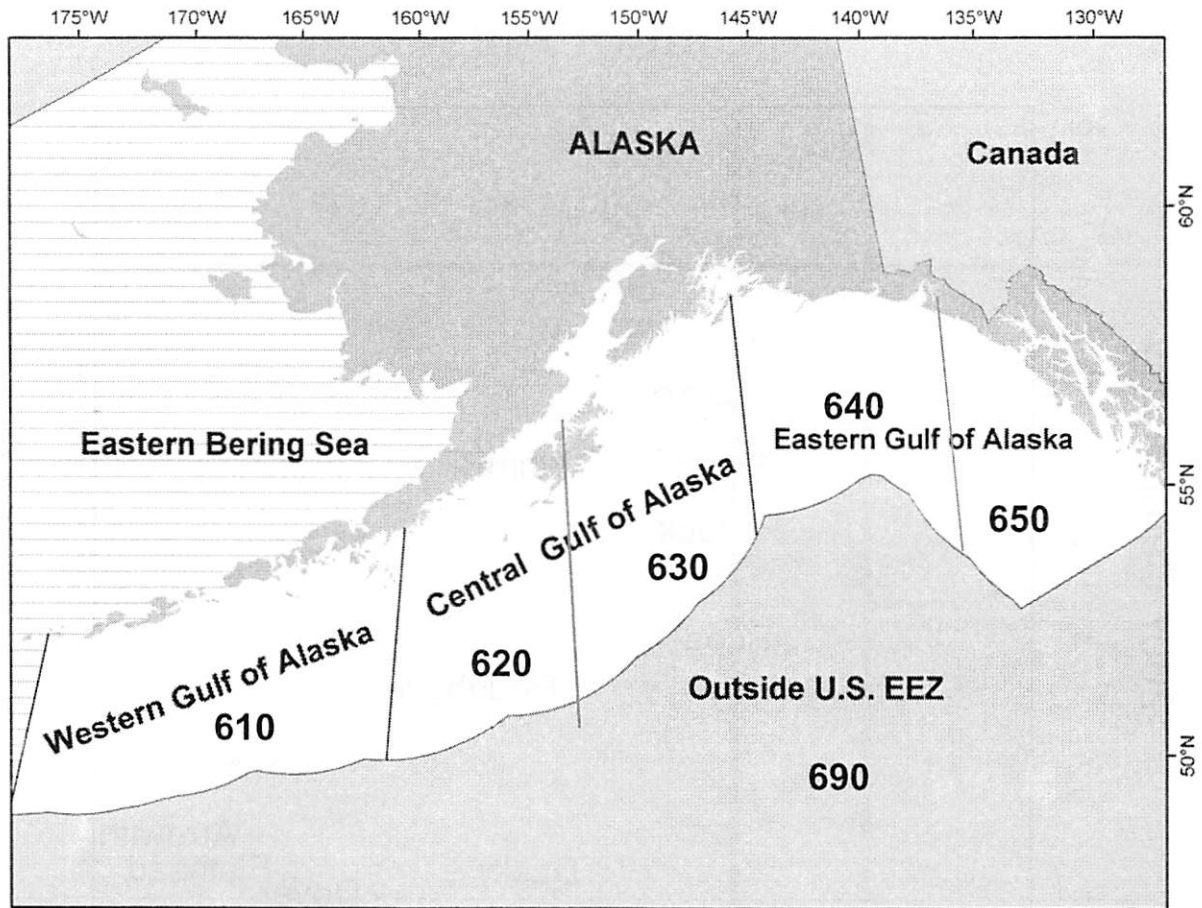


Figure 2. Gulf of Alaska statistical and reporting areas.