North Pacific Fishery Management Council

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Certified:_____
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SCIENTIFIC AND STATISTICAL COMMITTEE
to the
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
December 6-8, 2010

The SSC met during December 6-8, 2010 at the Hilton Hotel, Anchorage, Alaska. Members present were:

Pat Livingston, Chair
NOAA Fisheries—AFSC
Farron Wallace, Vice Chair
Wash. Dept. of Fish and Wildlife
Robert Clark
Alaska Department of Fish and Game
Keith Criddle
University of Alaska Fairbanks
Susan Hilber
Oregon Dept. of Fish and Wildlife
Sue Hills
University of Alaska Fairbanks
Anne Hollowed
NOAA Fisheries—AFSC
George Hunt
University of Washington
Gordon Kruse
University of Alaska Fairbanks
Kathy Kuletz
US Fish and Wildlife Service
Lew Queirolo
NOAA Fisheries—Alaska Region
Terry Quinn
University of Alaska Fairbanks
Doug Woodby
Alaska Department of Fish and Game

Members absent were:

Seth Macinko
University of Rhode Island
Ray Webster
International Halibut Commisson

C-2(c) BSAI crab rationalization 5-year review

Staff presentations were provided by Mark Fina (NPFMC), Mike Downs (AECOM), and Jennifer Lincoln (NIOSH). Public testimony was provided by Simeon Swetzof and Mateo Paz-Soldan (City of St. Paul), Steve Minor (North Pacific Crab Association), and Everette Anderson (APICDA).

The 3-year and 5-year reviews are required in legislation that established the crab rationalization program because the program was highly controversial and contained numerous novel design features. There was a desire to understand the consequences of these design features on the magnitude of net benefits to the Nation, and the distribution of benefits and impacts across communities and between sectors, harvesters, processors, and crew.

The 5-year review document and appendices provide extensive tabulation of aggregated data and a thorough discussion of those data, accompanied by anecdotal observations. It is regrettable that the review and appendices lack formal analysis of specific hypotheses. While the document briefly discusses the potential influence of concomitant changes in crab stock abundance, catch limits, input and output prices,

market processes, and the cost of capital, there is no formal modeling of the relative influence of these changes on revenues to vessels, employment, compensation to crew, the regional distribution of these impacts or net benefits to the Nation.

In October, 2008, in reference to the 3-year review, the SSC remarked (emphasis in the original):

> **"Without quantitative estimates of these changes, it is not possible to determine if implementation of crab rationalization has resulted in improvements or losses of net benefits to the Nation or if it has resulted in changes in the distribution of net benefits that have resulted in unintended harm to particular regions, communities, or segments of the fishery.** Certainly by the time the Council's 5-year program review is prepared, the SSC anticipates that rigorous quantitative estimates of these outcomes will be available. At that time, analyses that compare the impacts predicted in the Crab Rationalization EIS to actual impacts would be very useful."

The SSC notes that the 5-year review does not materially address our criticism of the 3-year review. While we find that the 5-year review document and appendices provide useful information, we view the lack of formal quantitative modeling and statistical analysis as a missed opportunity to better understand the causal effects of design features included in the crab rationalization program. Better understanding of these consequences would help inform the analysis of future catch share programs that might be contemplated by the Council, as well as the likely consequences of possible modifications to the existing crab rationalization program.

In addition, the social impact assessment could benefit from additional discussion of circumstances surrounding the consequences of storm damage to St. George Island's harbor, its effects on processing in St. George, and the associated tax revenue impacts to the community.

C-2(d) Initial Review Pribilof BKC Rebuilding Plan

The EA/RIR/IRFA for the Pribilof Islands Rebuilding Plan was presented by Diana Stram (NPFMC), Bob Foy (NMFS-AFSC), and Scott Miller (NMFS-AKR). Public testimony was provided by Arni Thomson (Alaska Crab Coalition).

The analysts are to be commended for the significant improvements in the document since the SSC's last review in April 2010. Most of the SSC's comments from April have been addressed in the updated document. During the staff presentation, it was indicated that several remaining additions are planned. These include consideration about whether it is better to take a parametric or non-parametric approach to randomly sample recruitment for future projection (to be resolved after a crab modeling workshop in February 2011), as well as standardization of catch units in the tables.

The SSC recommends sending the EA/RIR/IRFA out for public review after the following comments have been addressed.

EA

1. The document should articulate that the challenge to rebuild the Pribilof Islands (PI) blue king crab stock is a difficult one. The fishery has been closed since 1999 and bycatch appears to be very low, yet the stock continues to decline. There is no apparent stock-recruit relationship, but one needs to be assumed to evaluate the alternatives. It is not clear whether the current B_{msy} estimate is a reasonable expectation for future stock status given prevailing environmental conditions. Even for the optimistic recruitment outlook under the Ricker or Beverton-Holt relationships, which do not fit the observed data, stock rebuilding would occur over

approximately a 50-year time frame. In reality, recovery likely depends on chance and fortuitous environmental conditions leading to several strong year classes, which are not predictable. Nevertheless, the Magnuson-Stevens Fishery Conservation and Management Act requires a new rebuilding plan.

2. The document should clarify that the areas covering the distribution of blue king crabs identified under Alternative 4 based on trawl survey catches (Fig. 3) differ from the distributions of blue king crabs observed as bycatch in groundfish fisheries (Fig. 22-24). Also, to help evaluate the tradeoffs between the two area designations under Alternative 4, an estimate of the number of crabs existing in the portion of the area shown in Figure 3A that fall outside of the area shown in Figure 3B should be provided; that is, an estimate of the numbers of crabs falling in the area shown in Figure 3A, minus the number of crabs falling within the area shown in Figure 3B.
3. On p. 7, under options 5a, b, and c, the authors state that "The fisheries to which this closure would apply are listed in Table 1." However, this same statement does not appear under Option 5d. Is this an oversight?
4. In Section 4.4 (p. 17), the document should better clarify how additional observer coverage would be implemented for vessels entering the PI area. When and where would these vessels acquire the observers, especially if they are participating in other fisheries outside the PI area, either beforehand or afterward? Alternatively, the document should specify that such details would need to be resolved, should the Council select this option.
5. In Section 5.3 (p. 19), it was indicated that a detailed analysis of crab fisheries on habitats was provided in the final EIS for EFH identification and so it is not repeated in this analysis. Consider briefly describing similar analyses of the effects of other gear types on habitat. For instance, consider citing the Rose and Fujioka model and gear impact studies by Bob McConnaughey (e.g., RKC Savings Area).
6. In Tables 4 and 5, please clarify that the reported estimates apply only to Area 513. Also, clarify in the table headings that bycatch mortality (not bycatch) is being reported. Finally, the label for the right-most column in Table 5 should have the same heading as in Table 4, namely "Total Mortality."
7. Consider reporting crab bycatch numbers and stock size (numbers) using the same units or at least report the bycatch as a percentage of the estimated stock size, so that the magnitude of the estimated bycatch is more readily apparent to the reader. For instance, some tables report crabs in biomass units. The reader should be able to easily understand what percentage of the crab stock is taken as bycatch. It appears to be a very small percentage.
8. Consider estimating the number of crabs eaten by groundfish predators compared to the number of crabs taken as bycatch. Comparisons between the Pribilof Islands and St. Matthew Island may be informative. The question is whether the proposed closures have a chance to achieve a positive effect on crab stocks, relative to natural processes.
9. On p. 12, third paragraph under 4.1, first sentence, please cite the correct intended figure. Figure 10 is a stock-recruit plot, not a map of the high-density area. Other figures appear to be mis-numbered. Please carefully check all figure numbers.
10. On p. 16, the numbered list of reductions from none to 100% doesn't match the descriptions in the text that follows, which goes from status quo to 80% to 50% to 0%. Also, check for consistency of this labeling in the figures. Should catch reduction scenario #4 read as "100% reduction" in text and in figures?
11. The reference section is not complete. Many references cited in the document are not included in the references (e.g., Chilton 2009, Chilton in press, Zheng and Kruse 2000, Vining and Zheng 2008, NMFS 2005). Also, there are some other useful references that should be cited. These include Somerton and MacIntosh (1983) concerning size of maturity of blue king crab, Otto and Cummiskey (1990) concerning blue king crab growth, and Collie et al. (2005) concerning three-stage CSA modeling of the PI and St. Matthew Island blue king crab stocks, with some discussion on molting probability, molt increment, and size of maturity among the two areas.

12. The SSC appreciates the information provided in the consideration of stock separation (Table 15). The SSC has provided some suggestions about references that may help fill some data gaps. Gaps in the table should be considered in future research priorities.
13. The document requires careful editing.
14. The document should include new information from genetics studies in the stock structure table if it becomes available.

RIR/IRFA

1. The RIR clearly suffers (at no fault of the analysts) from the constraints imposed by "confidentiality" rules (i.e., the narrower the focus of an action, the fewer the data that can be reported). While very sparing in its narrative treatment of the implications of the action alternatives, the RIR appears to address each of the requisite elements prescribed by Executive Order 12866.

2. Use of "revenue-at-risk" analysis, while not ideal, offers a crude bounding of the gross operational and revenue effects of competing area closure alternatives. The SSC recommends that the nature and interpretation of these estimates be clearly and carefully described in the draft.

3. The SSC further points out that there is no expectation that the gross "revenues-at-risk" estimates necessarily reflect the expected impacts on catch and revenues. Indeed, one would anticipate that industry would examine all available options to minimize these adverse impacts (e.g., redeployment of effort). It should be explicitly acknowledged in the RIR that reported changes in "gross receipts" may, in fact, reveal no meaningful insights into "net" economic implications of the alternatives.

4. The SSC notes a frequently cited expectation in recent management actions that "… losses of displaced target catches attributable to an action alternative, will be made up in whole or in part by redeploying effort into the remaining open areas of the Bering Sea …" This blanket assertion needs to be considered comprehensively. At some point, one would conclude that target species resources in the "… remaining open areas" will not be a viable option to absorb additional displaced fishing effort.

5. The draft IRFA would benefit from a number of editorial corrections that will be provided to the author. Upon completion of these, the SSC recommends release of the draft. Public review may identify additional information and insights that will strengthen the analysis, as it undergoes revision in the next stage of development.

C-2(e) NOAA/BSFRF survey snow crab selectivity analysis

The SSC received a presentation from Dave Somerton (NMFS-AFSC) and Steve Hughes (BSFRF) on a new study this year to obtain more information on the selectivity of the NMFS survey trawl to snow crab. The study methods and the field portion of the work were summarized and progress on analysis of the results was given. The SSC requests an update following Crab Plan Team review.

C-7 (a,b) BSAI and GOA specifications and SAFE report

General SAFE Comments
Diana Stram (NPFMC) and Jim Ianelli (NMFS-AFSC) presented the GOA Plan Team report and ABC and OFL recommendations for GOA. Grant Thompson (NMFS-AFSC staff) presented the BSAI Plan Team report and ABC and OFL recommendations for BSAI.

For assessments with multiple models, the SSC requests that status determination criteria (Tier, two-year biomass projections, ABC's, and OFL's) be arrayed by stock assessment authors in a table in the assessment chapter so that the Plan Team and SSC can consider choosing alternative models. If the number of models being presented is very large, the authors may use their discretion to select a subset of desirable models for this summary.

For greater consistency in the way the terminal year catch is specified, **the SSC requests that authors incorporate their best estimate of total landings that will occur for the entire year. This information will be used to generate projections and should be incorporated into BSAI and GOA specification tables.**

BSAI and GOA Pacific cod
The SSC commends the authors for their thorough and conscientious responses to public, Plan Team, and SSC recommendations. Kenny Down (Freezer Longliner Coalition) provided public testimony on BSAI Pacific cod. He supports the authors preferred model and model estimates and commented that the process was good and many improvements were made such as constant growth. Julie Bonney (Alaska Groundfish Databank) expressed concerns about an increased ABC this year and then declining thereafter.

The Pacific cod assessments and data that went into the assessment have received a great deal of scrutiny over the last few years. There continues to be concern on the accuracy of age readings. Other issues include the natural mortality rate, the trawl survey catchability coefficient, the modeling of commercial selectivity (variable or not, asymptotic or not, fishery by fishery), modeling of survey selectivity, and the modeling of growth (constant, cohort-specific, year-specific).

Since last year, many changes have been considered or made, based on recommendations from the public, the Plan Teams and the SSC. To streamline the model evaluation process, a set of six models were presented in this year's preliminary assessment, as requested by the Plan Teams in May, and reviewed by the SSC in June of this year. Following Plan Team review in September and SSC review in October a final set of three models were requested to be included for final evaluation. The three candidate models (A, B, and C) were considered in developing the 2011 and 2012 OFL/ABC specifications. Model A is identical to the model accepted for use by the BSAI Plan Team and SSC in 2009 and the only model from the preliminary assessment to be carried forward.

Current Models
Model A was the 2009 preferred model. Main features of model A included: 1) natural mortality M = 0.34 fixed externally, 2) length-specific commercial selectivities, estimated in blocks of years, some forced to be asymptotic, 3) age-specific trawl survey selectivity with annually varying left limb, 4) the average product of catchability and selectivity of 60-80 cm fish required to be 0.47, 5) cohort-specific growth parameters, with the standard deviation of length at age estimated externally, 6) Aging bias of +0.4 years at ages 2+ estimated by profiling, 7) Input standard deviations of a number of parameters estimated iteratively so as to match output standard deviations.

Model B was the same as Model A with some incremental modifications including: 1) smaller length bins (1 cm instead of 3 and 5) to make full use of the length data, 2) five fishery seasons were modeled instead

of 3, 3) a single growth schedule was fitted, 4) the few fishery length-at-age data and age composition data were left out, 5) IPHC survey length data were left out, 6) values estimated iteratively in the 2009 assessment were carried over to Model B.

Model C was the same as Model B but all age composition and length-at-age data were left out, because of concern about aging bias.

Model Evaluation
The authors used four criteria to evaluate and select the final model. The criteria include: 1) does the model make full use of the information in the size composition data, 2) has the seasonal structure of the model been justified statistically, 3) is the model sufficiently parsimonious, and 4) does the model estimate plausible lengths at age?

SSC Comments and Recommendations
There will be a CIE review of Pacific cod models in early 2011 and information from this review will be used to produce another suite of models that will be considered for PT and SSC review in the spring.

The SSC has a number of model suggestions that may be considered through the next assessment cycle by the author as time permits:

- Evaluate reduced catch season and size bin structures that are more parsimonious, but do not diminish the information content.
- Trawl survey catchability used in the assessment and model sensitivity to model estimates or plausible alternatives should be evaluated.
- Simplifying trawl survey selectivity should be investigated and model fit to data components evaluated.
- Re-tune aging bias to try to better match the observed age modes
- Evaluate estimating aging bias within the model.
- Evaluate Richards growth curve alternative

- Continued research that would provide information on age-determination errors and potential biases.
- Given the divergence in population abundance between the AI and BS the SSC recommends that an AI assessment be brought forward for evaluation (only) during the next assessment cycle. Biomass distribution is currently estimated at 91% EBS and 9% AI compared to previous proportions of 84% and 16%, respectively.
- For the GOA, apply a simple Kalman filter approach, as adopted by the SSC in 2004 for BSAI for estimation of current biomass distribution.
- Constant growth should be brought forward in future models (run times reduced back to 2-3 minutes).

The SSC offers the following modeling issues that could be considered during the CIE review:

- The process of iteratively estimating input standard deviations to match output standard deviations.
- Convergence continues to be an issue for most models and this should be examined.
- Ways to reduce the number of parameters that may help address issues of convergence.

BSAI Pacific cod
There were a number of data changes and updates in this year's assessment that included; 1) catch data for 2004-2009 were updated, and preliminary catch data for 2010 were incorporated, 2) commercial fishery size composition data for 2009 and 2010 were updated, 3) age and mean length at age data from the 2009, size composition and numeric abundance information from the 2010 EBS shelf bottom trawl

survey were incorporated, 4) seasonal catch per unit effort (CPUE) data for the trawl, longline, and pot fisheries from 2009 were updated, as was the 2010 preliminary catch.

The numeric abundance estimate from the 2010 EBS bottom trawl survey was up 24% from 2009. The IPHC survey 2009 estimate was down 35% from 2008 and was the second lowest point in the time series. The 2010 AI biomass estimate, used to compute the current ratio of BSAI biomass to EBS biomass, was down 26% from the 2006 estimate and was the low point of the time series. Applying a simple Kalman filter approach, adopted by the SSC in 2004, the current biomass distribution is 91% EBS and 9% AI compared to previous proportions of 84% and 16%, respectively.

All model fits to EBS survey abundance were good and produced similar estimates of EBS trawl survey selectivity at age, although the estimates from Model C appeared to be shifted by one year relative to Models A and B. Model A produced the most plausible lengths. Model C matched the modes very closely, but at ages that were higher by a year because the fitted growth schedule was unconstrained.

Model B is thought to have a better defined bin and season structure and was more parsimonious than model A. Model C was disqualified partly due to anomalous length-at-age in the EBS. **The SSC agrees with author's and Plan Team's rationale, choice of Model B and Tier 3b designation for calculating the ABC and OFL recommendations, shown below in metric tons.** The 2006 and 2008 year classes appear to be strong, and stock abundance is expected to increase substantially in the near term.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Pacific cod	BSAI	272,000	235,000	329,000	281,000

GOA Pacific cod

There were a number of data changes and updates that included; 1) catch data for 2004-2009 were updated, and preliminary catch data for 2010 were incorporated, 2) commercial fishery size composition data for 2009 were updated, and preliminary size composition data from the 2010 commercial fisheries were incorporated, 3) age composition and mean-length-at-age data from the 2009 bottom trawl survey were incorporated into models A and B, 4) age composition and mean length at age data from the 2008 January-May longline fishery were removed from models B and C, 5) seasonal catch per unit effort (CPUE) data for the trawl, longline, and pot fisheries from 2009 were updated, and preliminary catch rates for the trawl, longline, and pot fisheries from 2010 were incorporated, and 6) size composition data from the State-managed Pacific cod fishery for 1997-2009 were updated and 2010 incorporated.

In terms of population numbers and biomass, a record high of 752,651 t was observed by the 2009 bottom trawl survey, when the population was estimated to include over 573 million fish. This followed the lowest observed survey biomass in 2007 of 233,310 t and a 2005 model estimate that was the low point at 140 million fish. The 2009 biomass estimate represented a 223% increase over the 2007 estimate.

All three models fit the GOA survey abundance time series relatively well throughout the time series, with the exception of 2009. In 2009 all model estimates were well below the highest survey abundance in the time series. Models A and B produced similar historical abundance time series; whereas Model C produced a very high historical abundance, implying that spawning biomass was five times B35% for the better part of the first decade. The latter was deemed implausible by the authors. There is little difference in fishery selectivity as estimated by all three models. In general, selectivities that are not forced to be asymptotic tend to show decreasing selectivity at large size.

Model A produces the best fit between observed and expected values for size at age, although the root-mean-squared-errors are about the same for all three models. Model B estimates for age 1 size appears to be about 2 cm high on average (which may be the result of the assumed aging bias) and Model C estimates an age 1 size that is very close to the observed average. Model B is thought to have a better defined bin and season structure and was more parsimonious than model A. Model C was disqualified partly due to impossibly high abundance estimates generated in the GOA model.

Based on Model B results, there is a slight decline in the estimated 2011 spawning biomass of 124,100 t, or 48% of unfished spawning biomass compared to the last assessment. Model B results also indicate a slight decline in subsequent years. This is in contrast to last year's assessment which projected an increase in biomass. Recent year classes (2006 – 2008) are also estimated to be substantially lower than in last year's assessment.

The SSC accepts the Plan Team's and the author's preferred model (Model B), Tier 3a designation, and the 2011/12 ABC and OFLs shown in metric tons below. The probability of the stock being below *B20%* was estimated to be less than 1% in 2011 and subsequent years.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Pacific Cod	W		30,380		27,370
	C		53,816		48,484
	E		2,604		2,346
	Total	102,600	86,800	92,300	78,200

GOA – BSAI Sablefish

Relative to last year's assessment, the stock assessment authors added new data and explored different model configurations. The new assessment included: relative abundance and length data from 2010 longline surveys, relative abundance and length from the 2009 longline and trawl fisheries, age data from the 2009 longline survey and 2009 longline fishery, updated 2009 catch and estimate 2010 catch. As recommended by the CIE reviewers, the authors explored the implications of eliminating the relative population weight (RPW) indices from the model. Given that the RPWs were eliminated from the assessment, the authors rebalanced data weights. They used the standard deviation of the normalized residuals (SDNR) as a criterion to reweight the compositional likelihoods. The authors recommend that this reweighting scheme remain in place for the next few years. **The SSC agrees with the authors and the BSAI and GOA Plan Teams that the assessment should use the updated data, and approves the use of the revised model configuration.**

Results of the revised stock assessment show that the stock is expected to decline slightly in 2011 and 2012. The 1997 and 2000 year classes are entering into the spawning population.

Projected female spawning biomass was 102,139 t, which is 37% of $B_{100\%}$. The stock is slightly below the estimate of $B_{40\%}$ (110,108 t), placing this stock in Tier 3b. The authors' recommended ABC and OFL are set at the maximum permissible levels under the NPFMC harvest strategy. **The SSC agrees that this stock falls in Tier 3b and accepts the Plan Team recommendations for ABC and OFL in 2011 and 2012.** The GOA and BSAI Plan Teams accepted the author's recommendation for 2011 area apportionments based on a 5-year exponential weighting of the survey and fishery abundance indices. **The SSC also agrees with this approach and recommends the following area apportionments expressed in metric tons below.**

Sablefish GOA

Stock/ Assemblage	Area	OFL	2011 ABC	OFL	2012 ABC
Sablefish	W		1,620		1,484
	C		4,740		4,343
	WYAK		1,990		1,818
	SEO		2,940		2,700
	Total	13,340	11,290	12,232	10,345

Sablefish BSAI

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Sablefish	BS	3,360	2,850	3,080	2,610
	AI	2,250	1,900	2,060	1,740
	Total	5,600	4,800	5,140	4,350

The SSC appreciates the responsiveness of the author to our recommendations. The SSC notes that two issues remain a concern. First, while the author initiated the development of a statistical model for estimation of sperm whale and killer whale predation, they did not finalize this model. The SSC requests that the author continues to explore methods to model whale depredation. Second, the author acknowledges that work is underway to develop a migration model for use in apportioning the ABC and OFL by region. We encourage the author to continue to work on this type of model.

GOA SAFE and Harvest Specifications for 2011/12

The SSC reviewed the information presented below in Table 1 and determined that none of these stocks/assemblages were subjected to overfishing in 2009. Also, in reviewing the status of stocks with reliable biomass reference points (all Tier 3 and above stocks and rex sole) and the 2010/2011 ABC/OFL recommendations for these stocks, SSC determined that these stocks are not considered overfished or approaching an overfished condition.

Table 1. GOA Groundfish Catch and OFL amounts (t) for 2009 for overfishing determinations.

		2009		% of OFL
Stock/Assemblage	**Area/District**	**OFL**	**Catch**	**Caught**
Pollock	W/C/WYK	58,590	42,770	73%
	SEO (650)	11,040	0	0%
	Total	69,630	42,770	61%
Pacific cod	GOA	66,600	52,751	79%
Flatfish (deep-water)	GOA	11,578	467	4%
Rex sole	GOA	11,756	4,753	40%
Flathead sole	GOA	57,911	3,663	6%
Flatfish (shallow-water)	GOA	74,364	8,484	11%
Arrowtooth flounder	GOA	261,022	25,057	10%
Sablefish	GOA	13,190	11,105	84%
Pacific ocean perch	Western	4,409	3,806	86%
	Central	9,790	8,032	82%
	Eastern	3,741	1,149	31%
	Total	17,940	12,987	72%
Shortraker rockfish	GOA	1,197	588	49%
Rougheye rockfish	GOA	1,545	282	18%
Other rockfish	GOA	5,624	895	16%
Northern rockfish	GOA	5,204	3,952	76%
Pelagic shelf rockfish	GOA	5,803	3,067	53%
Thornyhead rockfish	GOA	2,540	659	26%
Big skates	GOA	4,439	1,970	44%
Longnose skates	GOA	3,849	1,316	34%
Other skates	GOA	2,806	1,321	47%
Demersal shelf rockfish	SEO	580	138	24%
Atka mackerel	GOA	6,200	2,223	36%
Other species	GOA	8,720	2,804	32%
Total		632,498	181,252	29%

Table 2. SSC recommendations for GOA Groundfish 2011- 2012 OFLs and ABCs shown with the 2010 OFL, ABC, TAC, and Catch amounts (catches reported through November 6th, 2009 from AKR Catch accounting). Bold numbers indicates where SSC recommendations differ from the Plan Team recommendations.

Stock/ Assemblage	Area	OFL	ABC	TAC	2010 Catch	OFL	2011 ABC	OFL	2012 ABC
Pollock	W (61)		26,256	26,256	26,047		27,031		34,932
	C (62)		28,095	28,095	28,269		37,365		48,293
	C (63)		19,118	19,118	19,236		20,235		26,155
	WYAK		2,031	2,031	1,637		2,339		3,024
	Subtotal	103,210	75,500	75,500	75,189	118,030	86,970	151,030	112,404
	EYAK/SEO	12,326	9,245	9,245		12,326	9,245	12,326	9,245
	Total	115,536	84,745	84,745	75,189	130,356	96,215	163,356	121,649
Pacific Cod	W		27,685	20,764	20,971		30,380		27,370
	C		49,042	36,782	36,808		53,816		48,484
	E		2,373	2,017	881		2,604		2,346
	Total	94,100	79,100	59,563	58,660	102,600	86,800	92,300	78,200
Sablefish	W		1,660	1,660	1,329		1,620		1,484
	C		4,510	4,510	4,434		4,740		4,343
	WYAK		1,620	1,620	1,561		1,990		1,818
	SEO		2,580	2,580	2,674		2,940		2,700
	Total	12,270	10,370	10,370	9,998	13,340	11,290	12,232	10,345
Shallow-water flatfish	W		23,681	4,500	75		23,681		23,681
	C		29,999	13,000	5,333		29,999		29,999
	WYAK		1,228	1,228	1		1,228		1,228
	EYAK/SEO		1,334	1,334	1		1,334		1,334
	Total	67,768	56,242	20,062	5,410	67,768	56,242	67,768	56,242
Deep-water Flatfish	W		521	521	2		529		541
	C		2,865	2,865	490		2,919		3,004
	WYAK		2,044	2,044	7		2,083		2,144
	EYAK/SEO		760	760	3		774		797
	Total	7,680	6,190	6,190	502	7,823	6,305	8,046	6,486
Rex sole	W		1,543	1,543	101		1,517		1,490
	C		6,403	6,403	3,284		6,294		6,184
	WYAK		883	883	2		868		853
	EYAK/SEO		900	900			886		869
	Total	12,714	9,729	9,729	3,387	12,499	9,565	12,279	9,396
Arrowtooth Flounder	W		34,773	8,000	2,270		34,317		33,975
	C		146,407	30,000	20,532		144,559		143,119
	WYAK		22,835	2,500	140		22,551		22,327
	EYAK/SEO		11,867	2,500	73		11,723		11,606
	Total	254,271	215,882	43,000	23,015	251,068	213,150	248,576	211,027
Flathead Sole	W		16,857	2,000	317		17,442		17,960
	C		27,124	5,000	3,141		28,104		28,938
	WYAK		1,990	1,990			2,064		2,125
	EYAK/SEO		1,451	1,451			1,523		1,568
	Total	59,295	47,422	10,441	3,458	61,412	49,133	63,202	50,591

Table 2. continued

Stock/ Assemblage	Area	2010 OFL	2010 ABC	2010 TAC	2010 Catch	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Pacific ocean perch	W	3,332	2,895	2,895	3,133	3,221	2,798	3,068	2,665
	C	12,361	10,737	10,737	10,461	11,948	10,379	11,379	9,884
	WYAK		2,004	2,004	1,926		1,937		1,845
	SEO		1,948	1,948			1,883		1,793
	E(subtotal)	4,550	3,952	3,952	1,926	4,397	3,820	4,188	3,638
	Total	20,243	17,584	17,584	15,520	19,566	16,997	18,635	16,187
Northern rockfish[3]	W		2,703	2,703	2,033		2,573		2,446
	C		2,395	2,395	1,838		2,281		2,168
	E								
	Total	6,070	5,098	5,098	3,871	5,784	4,854	5,498	4,614
Shortraker	W		134	134	64		134		134
	C		325	325	136		325		325
	E		455	455	257		455		455
	Total	1,219	914	914	457	1,219	914	1,219	914
Other slope[3]	W		212	212	362		212		212
	C		507	507	275		507		507
	WYAK		273	273	128		273		273
	EYAK/SEO		2,757	200	33		2,757		2,757
	Total	4,881	3,749	1,192	798	4,881	3,749	4,881	3,749
Pelagic Shelf rockfish	W		650	650	530		611		570
	C		3,249	3,249	2,481		3,052		2,850
	WYAK		434	434	75		407		380
	EYAK/SEO		726	726	11		684		638
	Total	6,142	5,059	5,059	3,097	5,570	4,754	5,387	4,438
Rougheye and blackspotted rockfish	W		80	80	91		81		81
	C		862	862	217		868		868
	E		360	360	139		363		363
	Total	1,568	1,302	1,302	447	1,579	1,312	1,579	1,312
Demersal rockfish	Total	472	295	295	127	479	300	479	300
Thornyhead Rockfish	W		425	425	129		425		425
	C		637	637	275		637		637
	E		708	708	149		708		708
	Total	2,360	1,770	1,770	553	2,360	1,770	2,360	1,770
Atka mackerel	Total	6,200	4,700	2,000	2,409	6,200	4,700	6,200	4,700
Big Skate	W		598	598	140		598		598
	C		2,049	2,049	2,155		2,049		2,049
	E		681	681	142		681		681
	Total	4,438	3,328	3,328	2,437	4,438	3,328	4,438	3,328
Longnose Skate	W		81	81	103		81		81
	C		2,009	2,009	816		2,009		2,009
	E		762	762	124		762		762
	Total	3,803	2,852	2,852	1,043	3,803	2,852	3,803	2,852
Other skates	Total	2,791	2,093	2,093	1,464	2,791	2,093	2,791	2,093
Squid	GOA-wide				131	1,530	1,148	1,530	1,148
Sharks	GOA-wide				603	8,262	**6,197**	8,262	**6,197**
Octopus	GOA-wide				324	1,272	954	1,272	954
Sculpins	GOA-wide				735	7,328	5,496	7,328	5,496
Other spp total	Total	9,432	7,075	4,500	1,793	18,393	11,205	18,393	11,205
Grand Total		693,253	565,499	292,087	213,635	723,929	587,528	743,422	601,398

GOA Pollock

The authors responded to four SSC comments from December 2009. The first two (evaluate data input sample sizes, include age 1 in the model) could not be accomplished this year but remain on their list of potential model enhancements. The authors acknowledged that the third comment (reexamine the setting of catchability to 1 for precaution) was important but thought that this should be accomplished within the context of future actions to formally incorporate uncertainty into harvest recommendations. The authors addressed the fourth comment (examine temporal changes in average weight at age) directly. Their examination showed that average weights at age increased, particularly for older ages; for ages 6 and greater, they have doubled. Further work is needed to determine if this is a density-dependent or environmental effect.

This assessment is a straightforward update of last year's assessment with new fisheries and survey data from 2009 and 2010. Recent bottom trawl and EIT survey biomasses have increased and the ADF&G survey has decreased, but all three are near their long-term averages. The same model from last year's assessment was updated with the new data. Results from the model indicate that estimated and projected biomass is increasing from 2009 to 2011, with 2011 spawning biomass at about 29% of unfished spawning biomass.

The SSC continues to believe that the model provides an appropriate basis for determining reference points for management. As in previous assessments, catchability for the NMFS bottom trawl survey was fixed at 1 as a precautionary measure. For added precaution, the SSC has previously endorsed the constant buffer approach recommended by the authors and Plan Team, which reduces ABC from the maximum permissible.

Because spawning biomass is below $B_{40\%}$, the SSC places the stock in Tier 3b. Therefore the SSC agrees with the projected ABC and OFL levels in metric tons by area as summarized below (after subtracting 1,650t pollock GHL in Prince William Sound). This results in a 16% increase in the 2011 ABC compared to last year. For area EYAK/SEO, the calculations are done using Tier 5 methodology using natural mortality and survey biomass from the last available bottom trawl survey in 2009.

Stock/ Assemblage	Area	OFL	2011 ABC	OFL	2012 ABC
Pollock	W (61)		27,031		34,932
	C (62)		37,365		48,293
	C (63)		20,235		26,155
	WYAK		2,339		3,024
	Subtotal	118,030	86,970	151,030	112,404
	EYAK/SEO	12,326	9,245	12,326	9,245
	Total	130,356	96,215	163,356	121,649

GOA Atka mackerel

Atka mackerel are largely taken incidentally in the GOA, with most of the catch occurring in the rockfish trawl fisheries. While some of the catch is retained, the majority of the catch is discarded. The Council has set TAC so as to allow for bycatch needs of the Gulf fisheries; however, catches have exceeded TAC (but not ABC) since 2008.

The SSC agrees with the Plan Team and stock assessment authors to continue managing GOA Atka mackerel in Tier 6 with OFL and ABC for both 2011 and 2012, as shown below in metric tons.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Atka mackerel	Total	6,200	4,700	6,200	4,700

GOA Flatfish

All of these stocks are on a biennial cycle in which an assessment is conducted in survey (odd) years and a routine projection (accounting for commercial catches, growth, natural mortality, etc.) is done in off (even) years. The current assessment represents a simple projection from the 2009 assessment. **The SSC concurs with the authors' and Plan Team's recommended 2011/2012 ABCs, OFLs, and area apportionments (in metric tons) in the table below. The SSC also supports the following Tier designations: Tiers 4 and 5 for shallow water flatfish, Tiers 3a and 5 for deep water flatfish, Tier 5 for rex sole, Tier 3a for arrowtooth flounder, and Tier 3a for flathead sole.**

SSC recommendations for GOA flatfish ABC and OFL for 2011 and 2012 (t)

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Shallow-water flatfish	W		23,681		23,681
	C		29,999		29,999
	WYAK		1,228		1,228
	EYAK/SEO		1,334		1,334
	Total	67,768	56,242	67,768	56,242
Deep-water Flatfish	W		529		541
	C		2,919		3,004
	WYAK		2,083		2,144
	EYAK/SEO		774		797
	Total	7,823	6,305	8,046	6,486
Rex sole	W		1,517		1,490
	C		6,294		6,184
	WYAK		868		853
	EYAK/SEO		886		869
	Total	12,499	9,565	12,279	9,396
Arrowtooth Flounder	W		34,317		33,975
	C		144,559		143,119
	WYAK		22,551		22,327
	EYAK/SEO		11,723		11,606
	Total	251,068	213,150	248,576	211,027
Flathead Sole	W		17,442		17,960
	C		28,104		28,938
	WYAK		2,064		2,125
	EYAK/SEO		1,523		1,568
	Total	61,412	49,133	63,202	50,591

As in past assessments of rex sole, the Plan Team and SSC note that a reliable estimate of biomass is available from the assessment model, but reliable estimates of $F_{40\%}$ and $F_{35\%}$ are not. The calculations for OFL and ABC for rex sole use the Tier 5 formulae applied to the estimate of biomass from the assessment model. Stock assessment authors developed a draft split stock assessment for northern and southern rock sole. The SSC commented on this model in October and anticipates that this model will be considered for use in setting ABC and OFL next year.

GOA Pacific ocean perch

Gulf of Alaska Pacific ocean perch are on a biennial survey schedule, with no survey data collected this year. Given this, the assessment authors projected biomass for 2011 and 2012 using updated (2009) and best available (2010) catch information.

The SSC supports continued management under Tier 3a. We agree with the recommendations for ABC and OFL, the area apportionments of ABC and OFL for both years to the western, central, and eastern areas, as well as the eastern GOA split of the ABCs to the West Yakutat and Southeast Outside areas as given in the table below (amounts are metric tons).

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Pacific ocean perch	W	3,221	2,798	3,068	2,665
	C	11,948	10,379	11,379	9,884
	WYAK		1,937		1,845
	SEO		1,883		1,793
	E(subtotal)	4,397	3,820	4,188	3,638
	Total	19,566	16,997	18,635	16,187

GOA Northern Rockfish

Northern rockfish in the Gulf of Alaska are on a biennial survey schedule with surveys conducted in odd-numbered years. Lacking new survey information this year, no new assessment was conducted. Updated catch information for 2009 and the best available catch estimate for 2010 were used to project population levels for 2009 and 2010.

The SSC agrees with continued management under Tier 3a. We agree with the recommendations for OFL and ABC for 2011 and 2012 (expressed in metric tons below), as well as the geographic apportionment of the ABC levels to the Central and Western Gulf areas for those years, as well as the small Eastern Gulf apportionment, which is to be combined with the ABC for other slope rockfish in both years (so does not appear in the table below).

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Northern rockfish	W		2,573		2,446
	C		2,281		2,168
	E				
	Total	5,784	4,854	5,498	4,614

GOA – Shortraker and other slope rockfish

Rockfish are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. For this off-cycle year, the 2009 catch data was updated and a new catch estimate for 2010 was added to the other slope rockfish species assessments. The SSC agrees with the author and the GOA Plan Team that the assessment should use the updated data. Shortraker rockfish are managed as a Tier 5 species. The remaining other slope rockfish are managed as a complex comprised of sharpchin rockfish, redstripe rockfish, harlequin rockfish, silvergrey rockfish, redbanded rockfish and other minor rockfish. While managed as a complex, the information content for the individual members of the other slope complex allows estimation of biological reference points for sharpchin rockfish as a Tier 4 species while all other estimates are based on Tier 5 criteria. The individual estimates are summed for the other slope complex. **SSC agrees with the author and the Plan Team on this approach to estimating biological reference points. SSC accepts the Plan Team recommendations for ABC and OFL in 2011 and 2012, expressed below in metric tons.**

GOA Shortraker

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Shortraker	W		134		134
	C		325		325
	E		455		455
	Total	1,219	914	1,219	914

GOA Other Slope Rockfish

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Other slope[3]	W		212		212
	C		507		507
	WYAK		273		273
	EYAK/SEO		2,757		2,757
	Total	4,881	3,749	4,881	3,749

The SSC appreciates the responsiveness of the author to our comments and suggestions. The SSC agrees with the Plan Team that the author should explore an option for breaking shortraker out of the other slope species chapter and adding yellowtail and widow rockfish to the remaining "other slope" species.

GOA – Pelagic shelf rockfish

The pelagic shelf rockfish (PSR) complex consists of two Tier 5 species, widow and yellowtail rockfish, and one Tier 3a species, dusky rockfish. Rockfish are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. For this off-cycle year, there is no new survey information for widow and yellowtail rockfish; therefore, the recommended ABC and OFL are identical to those presented in the 2009 assessment. For dusky rockfish, the 2009 projection model was updated with revised catch data from 2009 and a new catch estimate for 2010. The SSC agrees with the author and the GOA Plan Team that the dusky rockfish assessment model should use the updated data. The projected female spawning biomass in 2011 is 25,099 t which is above B40% (19,159 t) and would place this stock in Tier 3a if it was managed as a single stock. **SSC agrees with the Plan Team and the author regarding the tier designations described above and recommendations for ABC and OFL in 2011 and 2012, shown below in metric tons.**

GOA Pelagic Shelf Rockfish

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Pelagic Shelf rockfish	W		611		570
	C		3,052		2,850
	WYAK		407		380
	EYAK/SEO		684		638
	Total	5,570	4,754	5,387	4,438

The SSC appreciates the responsiveness of the author to our comments and suggestions. In particular, the work of the author to address unobserved incidental catch in the IFQ halibut fishery will improve the assessment. The SSC looks forward to hearing more about the activities of the non-target catch estimation working group.

The SSC notes that the author plans to address our request for options regarding reorganization of the PSR assessment and management. The GOA Plan Team minutes described a suggestion to break dusky

rockfish from the pelagic shelf rockfish complex. The SSC agrees that this alternative should be explored.

GOA Rougheye and Blackspotted Rockfish

Rockfish are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. For this off-cycle year, the assessment authors updated the 2009 projection model estimates with revised catch data for 2009 and a new catch estimate for 2010. The SSC agrees with the author and the GOA Plan Team that the assessment should use the updated data.

Rougheye and blackspotted rockfish are modeled as a complex because of difficulties in at-sea field identification between the two species. The projected female spawning biomass in 2011 is 13,720 t, which is above $B_{40\%}$ (10,185 t), which places this stock in Tier 3a. **SSC agrees that this stock falls in Tier 3a and accepts the Plan Team recommendations for ABC and OFL in 2011 and 2012 shown below in metric tons.**

Stock/ Assemblage		2011		2012	
	Area	OFL	ABC	OFL	ABC
Rougheye and blackspotted rockfish	W		81		81
	C		868		868
	E		363		363
	Total	1,579	1,312	1,579	1,312

The SSC appreciates the responsiveness of the author to our comments and suggestions. In particular the SSC appreciates the work of the authors to fill out the stock structure template and to initiate special projects to improve species identification. The SSC agrees that this should continue to be a high priority activity for this species.

GOA Demersal Shelf Rockfish (DSR)

Demersal shelf rockfish biomass is estimated from a habitat-based stock assessment focused on yelloweye rockfish densities derived from visual line transects conducted from submersibles. New information for the biomass projections are average weights and catches from the Southeast Outside Subdistrict (SEO). Exploitable biomass for 2011 (14,395 mt) increased slightly from 2010 (14,321 mt).

As in previous assessments, the SSC agrees with the authors and Plan Team to apply precautionary measures in establishing allowable harvests, including: 1) using the 90% lower confidence bound, and 2) using a harvest rate lower than maximum under Tier 4 by applying F=M=0.02 to survey biomass. The SSC agrees with the resulting OFL and ABC for 2011 and 2012, expressed in metric tons in the table below.

Stock/ Assemblage		2011		2012	
	Area	OFL	ABC	OFL	ABC
Demersal rockfish	Total	479	300	479	300

The SSC wishes to thank the stock assessment authors for the additional information provided in this year's SAFE regarding the bootstrap estimates of precision for catches in the recreational fisheries, and looks forward to estimates of confidence intervals in the next assessment.

Although a density survey may not be funded in 2011, the SSC is encouraged to hear that a new survey is planned in 2012, and expresses its concern that adequate resources be devoted to assessing the stock on an ongoing basis so as to maintain a consistent stream of revised densities in future years. We also look forward to reviewing the age structured assessment model in the next assessment cycle.

SSC recommendations to stock assessment authors

We recommend exploring the use of alternative survey indices (e.g., IPHC longline survey) in the age structured assessment model.

GOA Thornyhead Rockfish

The SSC supports the rollover of last year's Tier 5 calculations for thornyheads in the Gulf of Alaska, using the most recent trawl survey biomass estimate from 2009, as well as longline survey data from 2010. The SSC agrees with the Plan Team's recommendation for the Gulf-wide OFL and ABC for 2011 and 2012, and the area apportionments of the ABC for both years, expressed in metric tons in the table below.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Thornyhead Rockfish	W		425		425
	C		637		637
	E		708		708
	Total	2,360	1,770	2,360	1,770

GOA Sharks

The Gulf of Alaska shark assessment has been updated for total catch from 2003-2010 (slight changes in the catch accounting system, plus updated catches through October 10, 2010) and recent NMFS longline and IPHC longline survey data. Owing to changes in the Catch Accounting System, there have been slight downward adjustments to shark catches over 1997-2007. The assessment also includes an examination of spatial distribution of incidental catches and survey catches and an examination of alternatives to average catch history for Tier 6 determinations. The assessment authors have provided thoughtful responses to SSC comments from the December 2009 Council meeting.

The Plan Team and assessment authors disagreed on the approach to estimate ABC and OFL. The assessment authors recommended leaving sharks in Tier 6, with OFL based on average catch between 1997 and 2007, and ABC set to 75% of OFL. The authors noted that Tier 6 estimates based on historical catch, may underestimate total catch because the current assessment does not include shark bycatch in the IFQ halibut fishery, nor bycatch in the state-managed fisheries for salmon (gillnet and seine), longline cod and sablefish, which are thought to be substantial.

The authors considered two alternative biomass estimates. The first was an estimate in Rice's (2007) Master's thesis, which was nearly 2 million metric tons, comparable to arrowtooth flounder biomass. This estimate was based on longline data only. The authors thought that this estimate was unreasonably high. The authors also considered the use of biomass from the biennial NMFS trawl survey. However, they did not recommend use of these estimates, because the estimates are highly variable and likely greatly underestimate shark biomass. They were concerned that the trawl survey gear may be inappropriate for some species, as salmon sharks are pelagic, with major differences in distribution by sex from the Northeast to Northwest Pacific, and because sleeper sharks may avoid trawl gear. For spiny dogfish, the efficiency of trawl gear is, at best, unknown. Spiny dogfish can be found throughout the water column, and undergo offshore-inshore seasonal migrations, and are sometimes found in high abundance nearshore.

The Plan Team recommended a pseudo Tier 5 approach using the three-year running average of survey biomass estimates for spiny dogfish as a representative "minimum" estimate as the best use of available information, and a Tier 6 approach for other shark species. For spiny dogfish, the Plan Team recommended calculating OFL as M * Biomass, where M = 0.097 and ABC as F * Biomass, where F =

0.04. The value M = 0.097 was estimated by Tribuzio and Kruse (in review); it compares favorably to an estimate of 0.094 developed for British Columbia. The value of F that is derived from Tribuzio and Kruse (in review), who developed an age-based demographic model to examine intrinsic rebound potential *(r)*. It was estimated that F = 0.04 resulted in $r = 0$, such that F > 0.04 is not sustainable. Further, because of the increase in ABC and OFL, the Plan Team recommended that all sharks should be placed on bycatch only status to acknowledge uncertainty in total bycatch from unobserved fisheries.

The SSC discussed these issues and concluded that the use of Tier 6 calculations for GOA shark management is problematic, because of the quality of catch data. Catch estimates are certainly underestimated, because of high at-sea discards in unobserved fisheries and bycatch in the IFQ halibut fishery and several state-managed fisheries. For instance, the assessment authors expect that estimated dogfish catch could increase by ~50%, based on the IFQ halibut fishery alone. Until these sources of uncertainty are addressed, the SSC does not recommended using average catch for GOA shark management.

The SSC agrees with the Plan Team's recommendation that the bottom trawl survey provides reasonable minimum biomass estimates of spiny dogfish in the GOA. The CVs are similar to those for rockfish and interannual variability in biomass estimates is similar to rockfish. However, the SSC wishes to emphasize that these bottom trawl estimates represent minimum biomass, because dogfish are known to be off bottom during summer. To address variability in the survey estimates of this long-lived species, the SSC agrees with the Plan Team's recommendation to use an average of the 3 most recent survey biomass estimates, as more reasonable than annual estimates.

For spiny dogfish, the SSC agrees with the Plan Team's recommendation to calculate OFL as M * Biomass, where M = 0.097. However, the SSC disagrees with the Plan Team's recommendation to use $F_{abc} = 0.04$ for two reasons. First, this estimate is based on a paper in pre-publication review, which has not been reviewed by either the Plan Team or the SSC. Second, Tribuzio and Kruse found that an F greater than 0.04 was not sustainable; this suggests that F = 0.04 might be interpreted as a limit reference point instead of a target reference point. **So, for purposes of this year's assessment, the SSC recommends ABC = 0.75 M * Biomass.**

For other sharks, the SSC agrees with the authors' and Plan Teams recommendations to set ABC and OFL using Tier 6 criteria.

SSC recommended 2011 and 2012 ABC and OFL for sharks (tons)

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Sharks	GOA-wide	8,262	6,197	8,262	6,197

The SSC offers the following advice to the assessment authors. The SSC regards this year's catch specification procedures as provisional, pending further analysis. For the next assessment, the choice and use of reference points (M, F) should be carefully reconsidered and evaluated to determine the most appropriate rate for use in setting OFL and ABC. The demographic modeling approach and its implications on F_{ofl} and F_{abc} should be fully described in the assessment, along with the basis for the authors' recommendation. The SSC also encourages the authors to continue to make progress toward estimating and incorporating shark bycatch from IFQ halibut and state-managed salmon, sablefish and cod fisheries. Clearly, a more complete accounting of total fishing mortality is a central problem with the current assessment. By making this request, the SSC acknowledges the difficulty in doing so, given lack of observer data. Creative use of ADF&G longline survey data, fishermen interviews or logbooks, or other novel approaches may be needed to make progress. While the SSC believes that this year's use of trawl survey data to develop minimum biomass estimates is a step forward for spiny dogfish, methods to

estimate the off bottom fraction of the population should be explored and evaluated. Finally, gaps in knowledge needed to improve the shark stock assessment should be developed and incorporated into lists of future research needs. Areas in need of research include evaluation of net efficiency for spiny dogfish, shark distribution, seasonal movements, and estimation of natural mortality for sleeper sharks, and other species.

GOA Skates

Catches of skates in the Gulf of Alaska have been relatively stable in recent years, averaging slightly less than 4,000 t since 2003, taken mainly in target fishery for Pacific cod, rex sole, arrowtooth flounder, and shallow flatfish. Catches in the halibut fisheries are not accounted for. The skate biomass in the Gulf is comprised mostly of two species in the genus *Raja*, big skates and longnose skates. Retention rates for these two species were estimated as 74% and 62%, respectively, for 2010, indicating that there continue to be markets for these large species. Retention rates for the smaller species (mostly genus *Bathyraja*) were considerably less, averaging 11% in 2010.

The SSC agrees that the biomass estimates are sufficiently reliable to support continued management of GOA skates in Tier 5, and concurs with using the average of the most recent 4 surveys. We concur with the Plan Team determinations of separate Gulf-wide OFLs for big skates, longnose skates, and other skates based on an estimate of natural mortality equal to 0.10 for all skates. The SSC agrees with ABC determinations equal to 75% of the OFL, and with the area apportionments of ABCs to the western, central, and eastern Gulf areas for big and longnose skates. These OFLs and ABCs are presented in the table below expressed in metric tons.

The SSC supports the Plan Team recommendation for future development of stock assessment models for big and longnose skates, and we recommend that research be initiated on identifying the location of skate nurseries in the Gulf, recognizing the value that resulted from the identification of nursery locations in the Bering Sea.

The SSC notes that the estimate of M is a precautionary estimate, taken as the minimum of a variety of estimates based on life history data from the Bering Sea and elsewhere, and we look forward to hearing plans by the Plan Team for implementing risk neutral estimates, as appropriate, for determinations of OFL.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Big Skate	W		598		598
	C		2,049		2,049
	E		681		681
	Total	4,438	3,328	4,438	3,328
Longnose Skate	W		81		81
	C		2,009		2,009
	E		762		762
	Total	3,803	2,852	3,803	2,852
Other skates	Grand Total	2,791	2,093	2,791	2,093

GOA Squid

With passage of Amendment 87 to the GOA FMP this year, which separated the "other species" complex into constituent groups, the Plan Team presented recommendations to the SSC for OFLs and ABCs specific to GOA squids. The team recommended a Tier 6 approach, noting that there is not a reliable biomass estimate. The team also recommended basing the OFL on maximum catch, rather than average catch, with a rationale that fishing pressure on squids is low and that average catch may not be a good indicator of squid productivity.

The SSC agrees with the recommendation for a Tier 6 approach, with OFL for 2011 and 2012 based on maximum catch in the time period 1997-2007, and with ABC = 75% of the OFLs in each year, as shown in the table below in metric tons.

In the Ecosystem considerations section, the authors note that squid are important prey for some birds, particularly Procellarids, but seabirds are not included in the table summarizing fishery effects on the ecosystem via squid bycatch (p.670).

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Squid	GOA-wide	1,530	1,148	1,530	1,148

GOA Octopus

With passage of Amendment 87 to the GOA FMP this year, which separated the "other species" complex into constituent groups, the Plan Team presented recommendations to the SSC for OFLs and ABCs specific to GOA octopus. The Plan Team recommended management under Tier 6, but with an approach similar to Tier 5, using the average of the three most recent survey estimates of biomass as a minimum estimate, and applying a conservative natural mortality rate of 0.53. This approach recognizes that the catch history is not appropriate for tier 6 management, and that the biomass estimates and M estimates are not sufficient for a Tier 5 approach.

The SSC accepts the Plan Team recommendation for a modified Tier 6 approach with OFL in both 2011 and 2012, and ABC = 75% of that value, applied Gulf-wide as shown in the table below in metric tons.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Octopus	GOA-wide	1,272	954	1,272	954

GOA Sculpins

Following passage of Amendment 87 to the GOA FMP this year, which separated the "other species" complex into constituent groups, the Plan Team presented recommendations to the SSC for OFLs and ABCs specific to GOA sculpins. **The SSC agrees with the Plan Team that reliable biomass estimates are available for the GOA sculpin complex, and supports the recommendation for Tier 5 management. The SSC agrees with the use of the 4 most recent survey biomass estimates, and the calculation of a weighted average M (= 0.22) based on the 4 most abundant sculpin species captured in the NMFS bottom trawl survey, for which M estimates are borrowed estimates for those 4 species in the BSAI. As a result, the SSC supports the OFL and ABC recommendations for 2011 and 2012, applied Gulf-wide for sculpins, as given in the table below in metric tons.**

The SSC recommends that natural mortality estimates for sculpins be derived from GOA specific studies when possible.

Stock/ Assemblage	Area	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Sculpins	GOA-wide	7,328	5,496	7,328	5,496

The SSC reviewed the information presented in Table 3 and determined that none of these species were subjected to overfishing in 2009. Also, in reviewing the status of stocks with reliable biomass reference points (all Tier 3 and above stocks) and the 2010/2011 ABC and OFL recommendations for those stocks, the SSC determined that these stocks are not considered overfished and are not approaching an overfished condition.

Table 3. BSAI Groundfish Catch and OFL amounts (t) for 2009 for overfishing determinations (includes State managed Pacific cod fisheries).

		2009		% of OFL
Stock/Assemblage	**Area/District**	**OFL**	**Catch**	**Caught**
Pollock	BS	977,000	810,743	83%
	AI	32,600	1,779	5%
	Bogoslof	58,400	73	0%
	Total	1,068,000	812,595	76%
Pacific cod	BSAI	212,000	175,746	83%
Sablefish	BS	3,210	891	28%
	AI	2,600	1,096	42%
	Total	5,810	1,986	34%
Atka mackerel	BSAI	99,400	72,807	73%
Yellowfin sole	BSAI	224,000	107,513	48%
Rock sole	BSAI	301,000	48,716	16%
Greenland turbot	BSAI	14,800	4,512	30%
Arrowtooth flounder	BSAI	190,000	30,419	16%
Flathead sole	BSAI	83,800	19,558	23%
Other flatfish	BSAI	23,100	2,177	9%
Alaska plaice	BSAI	298,000	13,944	5%
Pacific ocean perch	BSAI	22,300	15,347	69%
Northern rockfish	BSAI	8,540	3,111	36%
Shortraker rockfish	BSAI	516	205	40%
Rougheye rockfish	BSAI	660	209	32%
Other rockfish	BSAI	1,380	609	44%
Squid	BSAI	2,620	360	14%
Other species	BSAI	80,800	27,853	34%
Total		2,636,726	1,337,667	58%

Table 4. SSC recommendations for BSAI Groundfish 2011-2012 OFLs and ABCs shown with the 2010 OFL, ABC, TAC, and Catch amounts (t) (2010 catches through November 6 from AKR Catch Accounting including CDQ). SSC recommendations did not differ from the BSAI Plan Team recommendations.

Stock/ Assemblage	Area	2010 OFL	2010 ABC	2010 TAC	2010 Catch	2011 OFL	2011 ABC	2012 OFL	2012 ABC
Pollock	EBS	918,000	813,000	813,000	809,238	2,450,000	1,270,000	3,170,000	1,600,000
	AI	40,000	33,100	19,000	1,266	44,500	36,700	50,400	41,600
	Bogoslof	22,000	156	50	131	22,000	156	22,000	156
	Total	980,000	846,256	810,635	810,635	2,516,500	1,306,856	3,242,400	1,641,756
Pacific cod	BSAI	205,000	174,000	168,780	159,012	272,000	235,000	329,000	281,000
Sablefish	BS	3,310	2,790	2,790	721	3,360	2,850	3,080	2,610
	AI	2,450	2,070	2,070	1,049	2,250	1,900	2,060	1,740
	Total	5,760	4,860	4,860	1,770	5,610	4,750	5,140	4,350
Yellowfin sole	BSAI	234,000	219,000	219,000	114,600	262,000	239,000	266,000	242,000
Greenland Turbot	BS	n/a	4,220	4,220	1,706	n/a	4,590	n/a	4,300
	AI	n/a	1,900	1,900	1,883	n/a	1,550	n/a	1,450
	Total	7,460	6,120	6,120	3,589	7,220	6,140	6,760	5,750
Arrowtooth flounder	BSAI	191,000	156,000	75,000	38,098	186,000	153,000	191,000	157,000
Kamchatka flounder	BSAI	n/a	n/a	n/a	n/a	23,600	17,700	23,600	17,700
Northern rock sole	BSAI	243,000	240,000	90,000	53,111	248,000	224,000	243,000	219,000
Flathead sole	BSAI	83,100	69,200	60,000	19,863	83,300	69,300	82,100	68,300
Alaska plaice	BSAI	278,000	224,000	50,000	15,771	79,100	65,100	83,800	69,100
Other flatfish	BSAI	23,000	17,300	17,300	2,179	19,500	14,500	19,500	14,500
Pacific ocean perch	BS	n/a	3,830	3,830	2,267	n/a	5,710	n/a	5,710
	EAI	n/a	4,220	4,220	4,033	n/a	5,660	n/a	5,660
	CAI	n/a	4,270	4,270	4,033	n/a	4,960	n/a	4,960
	WAI	n/a	6,540	6,540	6,234	n/a	8,370	n/a	8,370
	Total	22,400	18,860	18,860	16,567	36,300	24,700	34,300	24,700
Northern rockfish	BSAI	8,640	7,240	7,240	4,039	10,600	8,670	10,400	8,330
Blackspotted/ Rougheye	EBS/EAI	n/a	n/a	n/a	n/a	n/a	234	n/a	240
	CAI/WAI	n/a	n/a	n/a	n/a	n/a	220	n/a	225
	Total	669	547	547	232	549	454	563	465
Shortraker rockfish	BSAI	516	387	387	252	524	393	524	393
Other rockfish	BS	n/a	485	485	179	n/a	710	n/a	710
	AI	n/a	555	555	497	n/a	570	n/a	570
	Total	1,380	1,040	1,040	676	1,700	1,280	1,700	1,280
Atka mackerel	EAI/BS	n/a	23,800	23,800	23,599	n/a	40,300	n/a	36,800
	CAI	n/a	29,600	29,600	26,387	n/a	24,000	n/a	21,900
	WAI	n/a	20,600	20,600	18,657	n/a	21,000	n/a	19,200
	Total	88,200	74,000	74,000	68,643	101,000	85,300	92,200	77,900
Squid	BSAI	2,620	1,970	1,970	402	2,620	1,970	2,620	1,970
Other species	BSAI	88,200	61,100	50,000	21,783	n/a	n/a	n/a	n/a
Skate	BSAI	n/a	n/a	n/a	16,419	37,800	31,500	37,200	31,000
Shark	BSAI	n/a	n/a	n/a	47	1,360	1,020	1,360	1,020
Octopus	BSAI	n/a	n/a	n/a	149	528	396	528	396
Sculpin	BSAI	n/a	n/a	n/a	5,168	58,300	43,700	58,300	43,700
Total	BSAI	2,462,945	2,121,880	1,655,739	1,353,005	3,954,111	2,534,729	4,731,995	2,911,610

Notes: New in 2011: 1) Kamchatka flounder category, 2) subarea specifications for Blackspotted/Rougheye rockfishes, and 3) separate Skate, Shark, Octopus, and Sculpin assemblage specifications replaces "Other Species" category; 2010 catches through November 6, 2010 from AKR Catch Accounting.

EBS Pollock

Public testimony was received from Ed Richardson (Pollock Conservation Cooperative). He supported the author's model and the author and Plan Team recommended ABC, noted that this year's data reinforced his comment from last year that the 2009 survey underestimated the strength of incoming year classes, and supported the Plan Team and SSC recommendation that a workshop be held to investigate the spawner-recruit relationship.

Survey and fishery information from this year showed a dramatic improvement in the condition of the population. The biomass estimate from the bottom trawl survey increased 64% from last year, and the biomass estimate from the acoustic trawl (previously EIT) survey increased 151%. Catch, age composition, weight-at-age, and an age-length key were also updated.

The stock assessment model was the same one that has been used for several years with the updated data added sequentially to show the effect of each data source on the assessment, an approach that the SSC appreciates. Alternative model configurations were also considered: (1) excluding the two most recent recruitment estimates in fitting the Ricker spawner-recruit model, (2) including an ageing error matrix, and (3) using a new acoustic index (AVO) from recordings of vessels conducting the bottom trawl survey.

The author's final recommended model excluded the two most recent recruitment estimates, because the author did not consider the increase in fishing mortality at MSY that resulted to be realistic when the two estimates were included. The ageing error matrix was not included because it degraded the fit to the data. The new acoustic index was not included because the model could not fit it very well, raising the concern about its utility as an abundance index.

Recent biomass estimates and projected biomass values have increased substantially, reversing the declines in biomass that resulted from poor year classes in the early 2000's. Revised estimates of the population in 2009, 2010 and the 2011 projected biomass were much higher than last year. The strength of the 2006 year class was confirmed, and indications of strong year classes in 2008 and 2009 were observed, although this latter result is highly uncertain. Tier status has changed from 1b to 1a, because estimated biomass is above B_{msy}. The resulting maximum permissible ABC for 2011 of 2.15 million tons increased 164% from the 2010 ABC and 94% from the 2011 projected ABC last year. The author's recommended 2011 ABC of 1.27 million t is much lower than the maximum permissible. The adjustment was made because age composition is dominated by a single year class (2006) such that about half the catch will come from this cohort. Until a more robust age composition exists, it is prudent to be cautious. The recommended ABC keeps the harvest rate at the average of the last five years and hedges against poor environmental conditions that could occur in the future.

The Plan Team accepted the author's final model to make management recommendations but only for this assessment. The Plan Team expressed concern about deletion of the most recent two recruitment estimates in fitting the spawner recruit curve. A strong scientific rationale for the deletion should have been provided. Alternative ABC estimates were not in the document, and the Plan Team was reluctant to request them at its meeting. The Plan Team also surmised that the recommendations would not be much different if an alternative was selected.

The SSC accepted the recommendations of the authors regarding tier level, the model used, and the resulting ABC and OFL values (shown in the metric tons in the Table below) for this assessment. But it shares the Plan Team's concern about deleting estimates when fitting the spawner-recruit curve. In the future, a strong scientific rationale should be given. The SSC also repeats the recommendation from last year that a workshop should be held to provide guidance on criteria for choosing Tier 1, including evaluation of the fit of a spawner-recruit relationship. It would be natural to consider the topic of deleting data points at the workshop.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
EBS Pollock	EBS	2,450,000	1,270,000	3,170,000	1,600,000

SSC recommendations to the assessment authors

1. Continue work on incorporating an ageing error matrix into the model. This would make the model more consistent with the Aleutian Islands and GOA assessments.
2. Conduct a retrospective analysis on average fishing mortality to understand how actual harvest rates correspond to the harvest control rule. Current average fishing mortality is relatively high compared to previous time periods. This will also help in future decisions to reduce ABC from the maximum permissible value.
3. Determine if it is possible to determine at what age year class strength is set. Sometimes year classes appear strong but then fail to materialize at older ages. A retrospective analysis of patterns in the apparent availability of age-2 and age-3 pollock to the bottom trawl and acoustic surveys may help inform the model about the strength of incoming year classes.
4. Continue evaluation of the AVO index. Recent work showing the index is compatible with the AT index is encouraging, even though it has not improved the stock assessment model yet.

Aleutian Islands Walleye Pollock

The SSC's concern last year about a lack of recent surveys in the Aleutians has been assuaged, because a bottom trawl survey was conducted this summer. It showed a 46% increase from 2006 to 2010 and that the population was unevenly distribution across the area, with much higher densities in the Eastern subarea than in the Western and Central areas.

This assessment includes an update of last year's preferred age-structured model with updated total catch and catch-age information. Because there have been concerns about ageing accuracy, a model that includes ageing error was also developed. Because the model with ageing error fit the data better, the author and Plan Team recommended use of the model with ageing error. Results from this model show that biomass has increased from $B_{22\%}$ to $B_{33\%}$.

The SSC concurs with the Plan Team to use this model for setting ABC. The SSC agrees that this stock is in Tier 3b and concurs with the recommended ABC's and OFL's recommended by the author and Plan Team (shown in the table below in metric tons).

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
AI Pollock	AI	44,500	36,700	50,400	41,600

Bogoslof Walleye Pollock

Because there is no new information, this assessment is a rollover with updated catch data. The stock is in Tier 5 but the ABC is calculated with a more conservative quasi-Tier-3b approach as explained in the document. The SSC approved the ABC and OFL values in the table below.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Bogoslof Pollock	Bogoslof	22,000	156	22,000	156

BSAI Atka mackerel

Stock assessment for BSAI Atka mackerel has been hampered by infrequent trawl surveys in the Aleutian Islands area, including a hiatus in the biennial survey schedule in 2008. The successfully completed survey in 2010 was therefore a welcome source of new data. There were minor changes to the model used

previously, including a 1 year shift in the change points for the years of constant fishery selectivity. This led to a drop in F rates that was offset by increases in biomass.

The SSC agrees with management under Tier 3a, and supports the OFL and ABC recommendations for 2011 and 2012 with area apportionments of the ABCs as shown metric tons in the table below. The apportionment calculations have been updated, such that the survey biomass for area 541 now includes the southern Bering Sea area.

The SSC requests that in the next assessment stock assessment address the lack of fit of model estimates to survey biomass as shown in the past 4 survey data points in Figure 16.18.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Atka mackerel	Total	101,000	85,300	92,200	77,900
	EAI/BS	n/a	40,300	n/a	36,800
	CAI	n/a	24,000	n/a	21,900
	WAI	n/a	21,000	n/a	19,200
	Total	101,000	85,300	92,200	77,900

BSAI Flatfish

Yellowfin Sole

Improvements in this year's stock assessment model include sex-specific and time-varying selectivities, as well as some changes in input data. Sex-specific selectivities are appropriate because females achieve larger sizes than males. The assessment included maps showing monthly changes in catch locations of the fishery. The SSC appreciates the authors' responses to previous SSC recommendations.

The SSC commends the authors for exploring stock-recruit relationships over different time periods. The author chose to use data over 1978-2003 to estimate the stock-recruit relationship, because it yielded a more conservative estimate of B_{msy} and MSY, given uncertainty in recruitment at low stock sizes. As in other recent assessments, bottom temperature is used in the estimation of catchability *(q)*.

There was much discussion at the Plan Team about the estimation of time-varying selectivities, such as whether it should be estimated annually, in four-year blocks of time, or other approaches. The SSC appreciates this discussion and recommends that the authors continue to evaluate the best method to estimate changes in selectivity over time.

The author and Plan Team recommended use of the 2010 base model in which M = 0.12 and q is estimated based on bottom temperature. The Plan Team also supported the author's recommended OFL and ABC under Tier 1. The SSC agrees with both the authors' and Plan Team's recommended OFLs and ABCs expressed in metric tons below.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Yellowfin sole	BSAI	262,000	239,000	266,000	242,000

Greenland Turbot

Greenland turbot biomass trends differ from many other flatfishes. Estimated biomass has generally been declining since the mid1970s. Survey catches have recently increased for the shelf trawl survey (2010 estimate was more than double the 2009 estimate), but declined in the slope trawl survey and longline

survey. The increase in biomass on the shelf survey appears to be largely due to an apparent large increase in recruitment of young fish, which is encouraging.

For this year's assessment, last year's stock synthesis 3 model was used, updated with catch and survey data. The author and Plan Team both recommend setting ABC and OFL using Tier 3a (same as endorsed by the SSC last year). The Plan Team agreed with the authors' recommendations for OFL and ABC for 2011 and 2012 expressed in metric tons below. The SSC agrees with this approach.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Greenland Turbot	Total	7,220	6,140	6,760	5,750
	BS	n/a	4,590	n/a	4,300
	AI	n/a	1,550	n/a	1,450
	Total	7,220	12,280	6,760	11,500

Arrowtooth Flounder

This is the first assessment for arrowtooth flounder as a single species. In previous assessments, arrowtooth and Kamchatka flounders were assessed together as a complex. The model is identical to last year's, but the input data are confined to only arrowtooth flounder. In last year's assessment, the SSC expressed concern about a very small separation between ABC and OFL. This is no longer the case for this year's assessment. As with yellowfin sole, survey catchability is estimated as a function of bottom temperature; arrowtooth are less catchable in cold years. The current model assesses arrowtooth flounder in three areas with biomass apportioned on the Bering Sea shelf (76%), and slope (10%), and Aleutian Islands (14%). For 2010, age 1+ biomass and female spawning biomass was estimated to be the highest on record. In the future, it will be interesting to see if this increasing biomass causes density dependence in the stock-recruit relationship.

The authors and Plan Team recommended Tier 3a for catch specifications, the same as last year. The SSC supports the authors' and Plan Team's recommended ABC and OFL for 2011 and 2012 expressed in metric tons below.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Arrowtooth flounder	BSAI	186,000	153,000	191,000	157,000

Kamchatka Flounder

This is the first assessment model for Kamchatka flounder. In previous assessments, arrowtooth and Kamchatka flounder were assessed together as a complex. The emergence of a directed fishery for Kamchatka flounder necessitated the separate assessment. The assessment author recommended management under Tier 5 status as there is no age-structured model for this stock. Varying periods for averaging of biomass estimates were considered for the Tier 5 calculations. A 7-year moving average was recommended, because it has the most resilience to trawl survey variability, while providing consistency with alternative periods of averaging.

The SSC agrees with the authors' and Plan Team's recommended OFL and ABC expressed in metric tons below.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Kamchatka flounder	BSAI	23,600	17,700	23,600	17,700

A preponderance of Kamchatka flounder catches occur in the eastern AI. The SSC supports the Plan Team's recommendation that the authors should report catches and exploitation rates separately for the EBS and AI, and analyze options for area apportionment for next year's assessment. Also, the SSC asks the assessment authors to more thoroughly evaluate alternative methods for estimation of *M*. Longevity is 33 years for both sexes; the preliminary estimate of $M = 0.2$ may be high. Finally, the justification for using a 7-year period of averaging should be reviewed periodically.

Northern Rock Sole

The main change for this year's assessment is the inclusion of time-varying, sex-specific fishery selectivity. Catch and survey data were updated, with a noteworthy 34% increase in survey biomass from last year.

The author's preferred model is the base model from last year, which separates the sexes. An attempt was made to estimate bottom temperature effects on survey catchability, but results were inconsistent with experimental results. Therefore, the survey catchability coefficient was estimated and constrained by the results of trawl herding experiments; this same approach was used in past assessments.

The authors and Plan Team recommended management under Tier 1a, the same as last year. The SSC endorses the authors' and Plan Team's recommendations for OFL and ABC expressed in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Northern rock sole	BSAI	248,000	224,000	243,000	219,000

Flathead Sole

The base model for this year's assessment remains unchanged from last year, except for the updating of catch, survey, and sex-specific age composition data. This is another flatfish assessment in which survey catchability varies as a function of bottom temperature. Three alternative models were explored but not adopted. The SSC wishes to thank the authors for exploring stock-recruit curves plotted with the replacement lines.

The authors and Plan Team both recommended management using Tier 3a, the same as last year. The SSC supports this approach as well as the ABCs and OFLs for 2011 and 2012 expressed in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Flathead sole	BSAI	83,300	69,300	82,100	68,300

Alaska Plaice

This year's assessment was updated with catch and survey biomass and age composition data. Interestingly, expanded surveys found 38% of the biomass of Alaska plaice in the northern Bering Sea. The model is a split-sex model, which was introduced in 2009. In response to an SSC request last year, the assessment authors re-estimated M with three alternative methods. The assessment model was run with alternative M values to determine which parameterization resulted in the best fit. As a result, the author recommended use of M = 0.13 for both sexes in this year's assessment, compared to M = 0.25 in last year's assessment. The SSC appreciates the authors' analyses of M and the SSC supports use of the new estimates in this year's assessment. The new M estimate is more in line with other Bering Sea flatfishes with similar life history characteristics. However, this change in M resulted in significantly

lower estimates of spawning biomass and biological reference points used to manage the fishery. Interestingly, last year's recommended OFL is nearly as large as this year's estimated spawning biomass.

The SSC supports the authors' and Plan Team's ABC and OFL recommendations using the model with the new estimate of M under Tier 3a. Owing to the change in M, the resultant ABCs and OFLs (expressed in metric tons) are significantly lower than levels recommended for 2010.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Alaska plaice	BSAI	79,100	65,100	83,800	69,100

The SSC discussed the observation that expanded surveys found 38% of the biomass of Alaska plaice in the northern Bering Sea and revisited the Plan Team's discussion about whether Alaska Plaice constitute one or more stocks and how best to handle occasional surveys in the north. The SSC encourages the assessment authors to consider how best to handle biomass data from the northern Bering Sea, particularly if future northern Bering Sea surveys are planned.

Other Flatfish

For this year, the assessment was updated with new catch and biomass data, and the M for flatfish other than Dover and rex sole was revised from 0.2 to 0.15, owing to the revisions to Alaska plaice. The reduction in M results in lower estimates of OFL and ABC. The SSC supports the proposed ABC and OFL determinations of the authors and Plan Team expressed in metric tons below.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Other flatfish	BSAI	19,500	14,500	19,500	14,500

BSAI Rockfish

Pacific Ocean Perch (POP)

New data incorporated into current assessment include: 1) 2010 AI survey biomass estimate and length composition; 2) 2006, 2007, and 2008 fishery age compositions; and 3) 2009 fishery length composition. In 2010 there was a 46% survey biomass increase in the AI and in EBS, and survey age compositions indicate signs of fairly strong recruitment in recent years.

There were a number of important model changes since the last assessment in 2008. Model changes include: fishery selectivity was set to vary between 4-year blocks of time; growth parameters and the age-length conversion matrix were re-estimated; and years in which recruitment for recent year classes is not estimated was reduced from 7 to 3. Results indicate a substantial increase in biomass that seems implausible for a long-lived rockfish species like POP. Changes in the model, and incorporation of the 2010 trawl survey biomass and compositional data, resulted in a substantial shift in the estimate of catchability. This resulted in an upward scale change for the entire historical time series of biomass and recruitment. Because of the four-year gap between the 2006 and 2010 trawl survey, it is difficult to properly assess the rapid change in trawl survey abundance. The SSC shares the Plan Team's concerns and rationale for a stair-step approach, where the ABC would be increased halfway to the authors' recommended 2011 ABC until a new Aleutian Islands survey is conducted in 2012, after which a new assessment would be conducted. **The SSC agrees with Plan Team OFL and ABC recommendations.**

This stock qualifies for management under Tier 3a and the 2011 and 2012 ABCs and OFLs are below in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Pacific ocean perch	BS	n/a	5,710	n/a	5,710
	EAI	n/a	5,660	n/a	5,660
	CAI	n/a	4,960	n/a	4,960
	WAI	n/a	8,370	n/a	8,370
	Total	36,300	24,700	34,300	24,700

SSC recommendations to the author:

- Explore alternative selectivity patterns for the fishery.
- Evaluate alternate selectivity time periods and state the rationale
- Consider increasing the number of age bins and evaluate model sensitivities

Northern Rockfish

The 2010 AI bottom trawl survey was the first new survey since 2006. These data and the final 2009 catch and preliminary estimate of 2010 catch were incorporated into this assessment. Age 3+ biomass and spawning biomass has been increasing slowly and almost continuously since 1977.

Changes to assessment methodology consisted of removing the constraining parameters on fishery selectivity, re-estimation of growth parameters, and reducing the number of years in which recruitment for recent year classes is not estimated from 7 to 3.

The SSC agrees with Plan Team OFL and ABC recommendation. This stock qualifies for management under Tier 3a and the resulting ABCs and OFLs are below in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Northern rockfish	BSAI	10,600	8,670	10,400	8,330

SSC recommendations to the author:

- The model consistently underestimates the early fishery age composition and overestimates the recent fishery age compositions. This should be evaluated and model improvements should be explored to resolve this pattern and/or attempt to better fit age composition data.
- Consider alternative selectivity patterns for the fishery.
- Consider alternate selectivity time periods and state the rationale.
- Explore increasing the number of age bins and evaluate model fit to the data.

Shortraker Rockfish

New data incorporated into the current assessment include: 1) final 2009 catch and preliminary estimate of 2010 catch; 2) 2010 Aleutian Islands survey data; and 3) 2010 EBS slope trawl survey data. There were no changes to the current model. The survey biomass has increased 50% since 2006.

The SSC agrees with Plan Team OFL and ABC recommendation. This stock qualifies for management under Tier 3a and the resulting ABCs and OFLs are tabled below in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Shortraker rockfish	BSAI	524	393	524	393

Blackspotted and Rougheye Rockfish Complex

New data incorporated into the current assessment include: 1) biomass estimate from the 2010 AI survey; 2) 2008 fishery age composition; 3) 2009 fishery length composition; 4) 1983 and 2010 survey length compositions; and 5) final 2009 catch and preliminary estimate of 2010 catch.

The Plan Team recommends allocating the BSAI ABC into two areas that include the Western and Central AI area and an Eastern AI and EBS area. **The SSC agrees with the Plan Team's rationale and ABC area splits for ABC. The SSC agrees with Plan Team OFL and ABC recommendation. This stock qualifies for management under Tier 3a and the resulting ABCs and OFLs are below in metric tons.**

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Blackspotted/ Rougheye	EBS/EAI	**n/a**	**234**	**n/a**	**240**
	CAI/WAI	**n/a**	**220**	**n/a**	**225**
	Total	**549**	**454**	**563**	**465**

Other Rockfish Complex

New data incorporated into current assessment include: 1) 2010 AI survey; 2010 EBS slope trawl survey; and 3) final 2009 catch and preliminary estimate of 2010 catch. Trends in spawning biomass are unknown. Stock biomass, as measured by trawl surveys of the Aleutian Islands and the EBS slope, has increased since the 2008 assessment.

The author presented a revised area apportionment using a weighting of 4:6:9 of the last three surveys, similar to area apportionment for other BSAI rockfish species. **The SSC agrees with the approach that was recommended by the Authors' and Plan Team.** It was thought as an appropriate compromise between smoothing variability and emphasizing the most recent information.

The SSC agrees with Plan Team OFL and ABC recommendations that this stock qualifies for management under Tier 3a, the resulting ABCs and OFLs are shown below in metric tons.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Other rockfish	BS	n/a	710	n/a	710
	AI	n/a	570	n/a	570
	Total	1,700	1,280	1,700	1,280

BSAI Sharks

Changes to the BSAI shark assessment include updated catch and longline and trawl survey data. Also, the analysts presented an analysis of spatial patterns in observed catch and considered alternative procedures for Tier 6 specifications. The SSC appreciates the authors' responsiveness to previous recommendations.

Most sharks caught in the BSAI area are Pacific sleeper sharks (68%), followed by other/unidentified sharks (20%), many of which may be sleeper sharks. Salmon shark (9%) and spiny dogfish (2%) make up small percentages of the catch. Survey estimates of sleeper sharks vary widely, but appear to be declining in surveys conducted on the EBS slope, Aleutian Islands and perhaps the EBS shelf.

Management of the BSAI shark complex is complicated by the fact that EBS shelf, slope, and Aleutian Islands survey data do not provide reliable abundance estimates of sharks. Moreover, there are no estimates of *M* for the primary species, Pacific sleeper shark, and the mortality rate for dogfish, used for the GOA shark complex, would not be appropriate. So, it is not possible to manage sharks as Tier 5 at this time.

The authors recommend continued management of the shark complex under Tier 6, based on average catch over 1997-2007. However, the Plan Team recommended management under Tier 6 based on maximum catch. The Plan Team's rationale for using maximum, rather than average, catch is two-fold. First, sharks were formerly in an "Other Species" category that had a very large OFL, but now are managed separately under a much smaller OFL that affords greater conservation. Nonetheless it is based on catch records that are known to be underestimates. Second, sharks are relegated to bycatch only, so there is no possibility for a new fishery to target sharks. **For these reasons, the SSC endorses the Plan Team's recommended OFLs and ABCs for BSAI sharks based on Tier 6 using maximum catch expressed below in metric tons.**

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Shark	BSAI	**1,360**	**1,020**	**1,360**	**1,020**

The SSC provides the following advice to the assessment authors. A priority need for improvement in the shark assessment is the development of improved estimates of shark catches. This is a difficult task, owing to the probable large amount of dogfish bycatch in un-observed fisheries. The SSC appreciates the formation of a working group to develop methods to estimate shark bycatch in the unobserved halibut IFQ fleet and looks forward to inclusion of this important information into catch estimates in next year's assessment. As with the GOA shark assessment, the SSC also encourages approaches to attempt to estimate shark removals in other unobserved fisheries that may have substantial shark catches. Research priorities for BSAI shark research should also include priorities identified by the SSC for sharks in the GOA.

BSAI Squid

The Plan Team reported no change in the assessment approach for BSAI squids. **The SSC agrees with continuation of Tier 6 management for this complex, with OFL set equal to the average catch from 1978-1995, with ABC set equal to 75% of the OFL, as shown in the table below in metric tons.**

The new figures and maps for squid bycatch and trawl surveys were helpful and informative. The SSC requests that seabirds be added to the un-numbered table under Ecosystem Considerations that summarizies fishery effects on the ecosystem via squid bycatch; while the report notes that squid are important prey for some birds, particularly Procellarids, seabirds are not included in this table. Additionally, Figure 18, showing seabird diet, is labeled as GOA seabird diet. It would be helpful if this figure used the same colors as the GOA Figure 11 for respective species.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Squid	BSAI	**2,620**	**1,970**	**2,620**	**1,970**

BSAI Skates

With passage of Amendment 96 to the BSAI Fishery Management Plan this year, which separated the "other species" complex into constituent groups, the plan team presented recommendations to the SSC for OFLs and ABCs specific to BSAI skates. **The SSC agrees with the BSAI plan team that biomass**

estimates are reliable for skates in the BSAI, and notes that the biomass trends for BSAI skates has been fairly stable. The SSC agrees with the combined estimate of OFLs and ABCs for Alaska skates under Tier 3a combined with all other skates under Tier 5 for combined skate specifications as shown in the table below. The SSC supports the change of using the last 3 survey years to determine average biomass for the "other skates" group, as opposed to using the prior 9 surveys.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Skate	BSAI	**37,800**	**31,500**	**37,200**	**31,000**

BSAI Sculpins

With passage of Amendment 96 to the BSAI Fishery Management Plan this year, which separated the "other species" complex into constituent groups, the Plan Team presented recommendations to the SSC for OFLs and ABCs specific to BSAI sculpins. **The SSC agrees with the BSAI Plan Team that biomass estimates are reliable for sculpins in the BSAI, and supports the estimate of OFLs and ABCs for under Tier 5, as shown in the table below (metric tons), based on an estimate of M that is a weighted average for 6 species.**

The SSC seeks clarification from the stock assessment author of the zero values in Table 6a as to whether those values represent true zeroes or missing values.

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Sculpin	BSAI	**58,300**	**43,700**	**58,300**	**43,700**

BSAI Octopus

With passage of Amendment 96 to the BSAI Fishery Management Plan this year, which separated the "other species" complex into constituent groups, the plan team presented recommendations to the SSC for OFLs and ABCs specific to BSAI octopus. **The SSC agrees with the plan team recommendation to base the OFL in 2011 and 2012 on the maximum catch in the 1997-2007 period, with the ABC = 75% of the OFL, as shown in the table below in metric tons.**

Stock/ Assemblage	Area	2011 OFL	ABC	2012 OFL	ABC
Octopus	BSAI	**528**	**396**	**528**	**396**

Groundfish SAFE Appendices

GOA – BSAI Grenadiers

Grenadiers were discussed in appendices to the BSAI and GOA SAFEs. Grenadiers were not included in the recent ACL amendments that addressed non-target species management. Therefore, grenadier are not in the NPFMC GOA or BSAI Fishery Mangement Plans (FMPs). Of the seven species of grenadier that have been captured in waters off Alaska, the giant grenadier is the dominant species. The author and the SSC recommend placing grenadier into the FMPs. The high biomass and notable catch of grenadier, coupled with its role in the BSAI and GOA ecosystems, justify management of this species within the FMPs. Jane DiCosimo noted that the NPFMC has agreed to develop a plan amendment to address grenadier management in the BSAI and GOA. The SSC considers this an important issue and looks forward to reviewing management options for this species group.

The authors provided information for estimation of biological reference points for the BSAI and GOA if the NPFMC elects to manage this complex in the fishery. The SSC agrees with the proposed methods for estimation of reference points in the GOA and BS. However, the estimation method proposed for the AI requires further work. The SSC requests that the author considers the uncertainty associated with the proposed Tier 5 expansion method for the AI.

GOA – BSAI Forage fish

There was no BSAI forage fish summary. Beginning in 2011, forage fish are designated as Ecosystem Components in the GOA and BSAI FMP, thus they are outside the stock specification process. The last full report on forage fish was in 2008 and no new data were presented, thus this report consists only of an executive summary.

The authors acknowledge the lack of good survey data for forage fish, and suggested the GOA Integrated Ecosystem Research Project (IERP) may enhance our understanding of GOA forage fish abundance, distribution, and ecology. **Given the high variability of forage fish abundance indices and the limited GOA-IERP field seasons (2011 and 2013), it seems imperative that related studies be used to advance long-term survey capabilities as they relate to forage fish**. The lack of useful data remains a hindrance to meaningful integration of forage fish into ecosystem management. Hopeful developments include refinement of NOAA acoustic surveys that could provide regular abundance and distribution data of species such as capelin, juvenile pollock, and euphausiids.

The authors note the listing of the southern Distinct Population Segment (DPS) of eulachon (British Columbia to California) as threatened under the Endangered Species Act, in May 2010. Two key issues in the listing assessment of the southern DPS were the effects of climate change and the lack of data leading to an inability to assess population status and trends, both of which also apply to the Alaska population. The SSC encourages close tracking of developments in the southern DPS population that might inform management actions for eulachon and other key forage species in Alaska.

Ecosystem Considerations

Kerim Aydin (NMFS-AFSC) presented updates for the Ecosystem Considerations report to the SSC. The SSC commends the Ecosystem editors and contributors for continued improvement and for their responsiveness to SSC comments. The Eastern Bering Sea Report Card is a particularly useful addition. Regarding other sections, the Ecosystem Trends succinctly put recent trends in context of long-term trends and environmental conditions, and the section on gaps and needs for future EBS assessments identified potential analyses or research goals. New indices include the use of late summer and fall large zooplankton abundance in EBS, fall YOY condition index for age-1 EBS pollock recruitment, a combined juvenile salmon growth and temperature change index for GOA and EBS groundfish. To the extent that predictive models are being developed, they should be moved into each species' assessment.

Some key Plan Team findings include: 1) Bering Sea ecosystem indices for pollock recruitment are up, (ie, copepods, euphausiids, forage fish are all up, predation by arrowtooth flounder is low); 2) AI 2010 surveys indicated ecosystem shifts since 2006 (P.cod and Atka mackerel in particular); 3) the GOA team is looking forward to a synthesis workshop, and the team has identified three hot topics: Chinook salmon bycatch, Cook Inet Belugas, and the listing of the southern Distinct Population Segment of eulachon (British Columbia to California).

For ecosystem indicators, the SSC finds the format helpful with 1) the description of the index, 2) description of the trends, 3) possible explanations of the trend and 4) thier implications. However, not all sections conformed to the format, (e.g., the marine mammal section combined 2-4 and did not discuss sections 3 and 4). The figures with time series of indicators are particularly helpful and the legends of the 5 year mean ± s.d. and trend is appreciated. However, it may be useful to also highlight the historical trend, which often is orthogonal to the 5 year trend, so as not to lose sight of major historical changes

The Early Warnings and Hot Topics sections highlight interesting changes and could ultimately be quite useful. The early warning section could be improved by linking the observation to potential management implications. For example, the apparent incursion of GOA skates and spiny dogfish into the Bering Sea was reported but not examined further. In the Hot Topics section the text clearly refers only to the Eastern Bering Sea, but this is not clear in the table of contents; it would be helpful to mention that the Western Aleutian area is the area of major decline for Steller sea lions.

The SSC looks forward to the planned spatial investigation of key indices and how distributions of prey species might affect central place foragers such as birds and mammals. The suggested development of these indices by shelf domain is also encouraged.

The selected indicators are often unique for different regions, but it may be useful to identify a few indicators that are common to all regions (e.g. temperature) that will allow cross-region comparisons. That being said, each region also has distinct features, and some region-specific indicators, e.g. freshwater influx in GOA, would be useful and should be included if possible. A 2009 request from the SSC was that indices be tied to thresholds that might indicate regime shifts. Towards this end, the editors plan a workshop in Spring 2011 to address such links. The SSC encourages the establishment of an Ecosystem Synthesis Team for each of the three major regions (AI, BS, GOA). **The SSC also recommends that the team make an effort to diversify and include more expert opinions in the workshops.**

In the Summary Statement section, the SSC encourages a guild approach for seabirds, similar to fish guilds. For seabirds, the authors rely on a diving species and a surface foraging species, but both are primarily piscivorous, and inclusion of a planktivorous guild could be informative. The number of seabird indicators under 'Ecosystem Status and Management Indices (p.172), might, however, be reduced or altered. For example, planktivores are represented by least auklets and northern fulmars, but the latter are not primarily planktivorous nor are they regularly monitored. The proposed addition of sea ducks would contribute a benthic foraging bird guild. On p.61, the authors suggest that for seabirds it would be ideal to have a single multivariate index representing all birds. Any such analysis should consider that piscivore and planktivore seabird species often show opposite trends and a single value might be misleading.

The sections on Steller sea lions and Pribilof Island seabirds are informative and thorough, but **other sections on seabirds and marine mammals are still lacking recent indices beyond 2008; in particular, the section on seabird incidental take was last updated in 2006. This gap is not due to lack of data and should be rectified.** Similarly, the time trend in incidental take of prohibited species under Ecosystem Goal: Maintain Diversity (p.189) was last updated in 2007.

Some guilds used as EBS indicators are dominated by a single species and should probably be split. For example, the pelagic foragers guild is dominated by walleye pollock, primarily because it is the only species with reliable data and with time series data. The forage fish, salmon, and squid lumped into this guild become inconsequential and conclusions could be misleading for the data-poor species. If a major component is > x (i.e., 40%), run the index with and without that species to test for sensitivity to the dominant species. Similarly, guilds like the mobile benthic epifauna, are dominated by non-target fish and invertebrates. The SSC again suggests that Ecosystem Teams strive to be consistent in fish foraging guilds in the GOA and EBS.

The section on Fishing and Fisheries Trends was a nice summary of key issues. Related to the trawl data, it might be useful to have a measure of HAPC biota caught as a function of the length of time since that exact location was last trawled, in order to get a sense of regeneration rates.

In several sections, and particularly for forage species, the authors note that indices are of limited value to managers because sampling is inadequate, and they look towards the GOA Integrated Ecosystem

Research Program (IERP) to improve these abundance estimates. However, the authors also acknowledge the high variance in indices of forage abundance, and the GOA-IERP will be limited to two field seasons. The GOA-IERP and related studies will ideally lead to improved long-term monitoring of forage species.

Where indicator data are acknowledged to be unreliable, that conclusion is often buried at the end of the species' section. The SSC suggests that deficiencies in data be stated up front or consolidated into a single section. Many indicators have not been updated for several years, and if there are no plans to update a specific indicator, perhaps it should be dropped from the main text body and incorporated into a table that lists indicators that are out of date. The SSC recognizes that the chapter editors depend on people to contribute to the updates, and there may not be any data available. Where data are available, the editors need to remind contributors that these updates are critical to incorporating all components into the Ecosystem Assessment. The SSC recognizes that the Stock Assessment Reports (SARs) for Alaska marine mammals are updated on a schedule, except for endangered species, which are updated annually. Perhaps a sentence or two about this system would be helpful in explaining the lack of updates for marine mammals.

The SSC requests that the authors be clear about what the data say and what the interpretation is of those data. For example, the authors state that "predation is low" for pollock, but further discussion revealed that this conclusion was not based on diet data, but rather on low spatial overlap of adults and young Pollock.

The northern fur seal (NFS) pup number time series is the longest term continuing data set for pinnipeds in the EBS, however, it may not be an appropriate index of pinniped status in the EBS. The rationale for choosing this measure is that females on St. Paul feed primarily on the shelf, but that is during lactation when the pup is on the breeding beaches at St. Paul. Although lack of food early in gestation might reduce the number of pups born the following year, food and condition during the winter and spring when they are not feeding on the EBS shelf may be the causative factor. The SSC suggests that authors investigate a recent study showing a significant relationship between the number of arrowtooth flounder and number of NFS pups the following year.

In general, the report could be improved by consolidating key statements or reducing repetitions, such as the repeated statement that the usefulness (or lack thereof) of data for a species for management applications is limited. Throughout, there are also comments about planned changes or ideas for new analyses. These could be consolidated into one section, perhaps as a preface.

Some statements require clarification, such as:

- What is meant by easterly winds (p. 4)? From the east or to the east? Different disciplines designate direction differently.

- Area disturbed by bottom trawls (p. 63): What is considered a bottom trawl? Only true bottom trawls, or also mid-water trawls that come up with crabs?

- The variability in the miscellaneous category is dismissed as an artifact of standardized survey sampling methodology, but such patterns are accepted elsewhere in the document.

- Are the trends in fish numbers (p. 154) caused by differences in production or movements and resulting distributions? What are the time lags between primary production and availability of food for fish?

Economic SAFE
The SSC did not receive a formal report on the Economic SAFE. We will request a more formal presentation in February.

D-1(c) Initial review of Hagemeister Is. Closures for walrus

The SSC received the presentation from Jeannie Heltzel (NPFMC) and Jonathan Snyder (USFWS). Public testimony was received from Jason Anderson (Alaska Seafood Cooperative).

A draft EA/RIR/IRFA was discussed with respect to release for public review. This document is based on the staff discussion paper from December 2009, on the new walrus haulout area and options for designating a protection zone around it. The motivation for this action is to provide consistent protection for the walrus haulouts in the Bristol Bay haulout complex. **After the changes requested below are made, the SSC recommends the draft be released for public review.**

In SSC discussion with the presenters and public testimony, several other possible transit corridors were identified that might be added to the analysis at a later date. The SSC notes that the majority of the vessel traffic in northern Bristol Bay would not be regulated or controlled by the proposed closure. Snyder noted that USFWS plans to establish a transit corridor for federally licensed vessels, and to encourage use by other vessels as well.

In the presentation, the possibility of the ESA listing of Pacific walruses was discussed first, but this discussion in the document was toward the back. The SSC suggests making that discussion more prominent and expanding it, including text that explains walruses are managed by USFWS under the MMPA and that Hagemeister Island is part of the Togiak National Wildlife Refuge.
Figures and tables require improvement. As mentioned in the presentation, the SSC noted some problems with document figures of state and federal waters and table numbers. These should be rectified before public release. The SSC suggests that the Hagemeister Roadstead be included on the figures of closures. Inclusion of some explanation of the precision of the counts in Table 3-14 would be helpful. Note also alignment problems in this table.
Clarifications and corrections of text should also be included. On page 4, the last two paragraphs describe different scenarios under various alternatives and options. It would be helpful to include a table summarizing these options and possible actions. The mismatch on pages iv in the executive summary, p.51 under Target Species, and p. 52 under Ecosystems considerations should be examined. The latter concludes that Alternative 2 is not expected to change effort or harvest levels of groundfish fisheries in the NBBTA, but the executive summary and other sections note the potential for reducing participation in the yellowfin sole fishery, imposition of greater costs to affected fisheries, and potential shift of fishing effort to other sites. Section 4.3 on page 51 should mention SSL as a marine mammal potentially impacted by this action.
Further, the document could be improved with more information on how foraging behavior and success might be impacted by fishing boats off Hagemeister Island, especially considering Option 4, which provides a narrow transit corridor and a maximum 3nm buffer directly to the west of the haulout site. This is addressed somewhat in section 4.3 Environmental Effects: Marine Mammals (pg. 51-52), however no citations were provided.

In Section 3.3.7 (pg. 43), a 95% CI is given for the Allen and Angliss (2010) data, but not for the Angliss and Outlaw (2008) data on mortality related to fisheries interactions. An error term for the Angliss and Outlaw data, if it exists, would be useful.