# CIE Reviewer's Independent Report on the 2008 assessment of Alaska sablefish (*Anoplopoma fimbria*).

John Casey

*Prepared for*

Center for Independent Experts

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## Contents

## Executive Summary

Multiple changes have been implemented in the Alaska sablefish (*Anoplopoma fimbria*) assessment in the period since the last independent review. There are stakeholder concerns over areal apportionment of harvest and depredation of survey catches by whales. Therefore, NOAA Fisheries' Alaska Fisheries Science Center (AFSC) requested a thorough review of the Alaska sablefish assessment. Accordingly the CIE appointed a panel of independent experts to undertake a review of the 2008 assessment of Alaska sablefish. The Panel comprised three CIE reviewers, Michael Armstrong (Cefas, UK), John Casey (Cefas, UK) and Neil Klaer (CSIRO, Tasmania) and the review was chaired by Jim Ianelli (AFSC, Seattle). The review was held at the AFSC laboratory at Auke Bay, Alaska from Tuesday 17 March 2009, through Thursday 19 March 2009.

The meeting was undertaken in plenary sessions comprising presentations by AFSC scientists on aspects of the assessment followed by questions and open discussion by the Review Panel and other participants. The review panel heard presentations on sablefish biology, fishery, and assessment history, a summary of the fishery-dependent and fishery-independent data, the current stock assessment model used for Alaska, and recent changes to the model were highlighted. Further presentations were made on results of the assessment, results from archival tagging, migration and movement modelling using tagging data and the available information on depredation by killer whales and sperm whales and the potential effects on survey and fishery indices.

A thorough discussion followed each of the presentations and all review participants had the opportunity to express their views. In addition to open discussion, the review panel also conferred on the issues to be included in the summary report. I felt the process worked extremely well and all participants cooperated to ensure that the assessment input data and assumptions and model were appropriate and that the results were reliable. I would like to express my appreciation to all participants for their valuable input and professionalism throughout the review process.

My overall conclusions from the review in relation to each of the terms of reference reflect those reached by the panel and are as follows:

*1. Evaluation, findings, and recommendations on quality of input data and methods used to process them for inclusion in the assessment.*

In general, the input data and methods used to process them for inclusion in the assessment were adequate and appropriate. The fishery and survey data were extensive and well documented. The current treatment of abundance index data affected by whale depredation is unlikely to have affected the overall management advice for the Alaskan sablefish stock, but the Panel notes that alternative approaches should be investigated for dealing with any further increases in whale depredation.

*2. Evaluation, findings, and recommendations on the level and adequacy of knowledge and incorporation of life history, ecology and habitat requirements.*

Knowledge of stock structure, natural mortality and sex-related maturity and growth parameters are adequately represented in the assessment although there are some issues regarding the handling of sex ratio in the model that need to be resolved for future assessments.

*3. Evaluation, findings, and recommendations of the analytical approach used to assess stock condition and stock status.*

Although the assessment showed some retrospective bias up to 2006, the analytical approach provides an acceptable basis for assessing stock condition and status and for providing management advice.

*4. Evaluation, findings, recommendations of areal apportionment of harvest strategy as related to optimizing spawning stock biomass.*

The current apportionment scheme is difficult to evaluate given the information presented, particularly since there are unstated socio-economic objectives that play a role. It is recommended that a set of objectives be clearly identified. While recognizing that there are uncertainties in regional abundance and productivity, the approach of distributing ABC values taking into account regional biomass levels appears an appropriate way of attaining equivalent fishing mortality in the different regions.

*5. Recommendations for further improvements.*

It is recommended that the following issues be addressed ahead of the next assessment of Alaska sablefish:

**Input data** - age and length data, age-length sampling, commercial longline fishery catch rates, whale depredation.

**Assessment model and diagnostics** - Size selectivity, spatial structure, diagnostics, weighting of likelihood components, sensitivity analyses, model building/specification, growth parameter estimation, simulation testing, and retrospective pattern.

**General Conclusion**

The input data used for the 2008 Alaskan sablefish assessment have been processed and used appropriately and the results of the assessment represent the best estimate of current stock status and form an appropriate basis on which to take management decisions.

Accordingly and noting that Alaskan sablefish are managed under Tier 3 of NPFMC harvest rules, I concur with the findings of the 2008 assessment that the ABC for 2009 should be 16,080 t.

## 1. BACKGROUND

Multiple changes have been implemented in the Alaska sablefish (*Anoplopoma fimbria*) assessment in the period since the last independent review. There are stakeholder concerns over areal apportionment of harvest and depredation of survey catches by whales. Therefore, NOAA Fisheries' Alaska Fisheries Science Center (AFSC) requested a thorough review of the Alaska sablefish assessment. Accordingly the CIE appointed a panel of independent experts to undertake a review of the 2008 assessment of Alaska sablefish. The Panel comprised three CIE reviewers, Michael Armstrong (Cefas, UK), John Casey (Cefas, UK) and Neil Klaer (CSIRO, Tasmania) and the review was chaired by Jim Ianelli (AFSC, Seattle). The review was held at the AFSC laboratory at Auke Bay, Alaska, from Tuesday 17 March 2009, through Thursday 19 March 2009.

## 2. REVIEW ACTIVITIES

Prior to the Review Meeting, I was given web access to assessment report for the 2008 assessment of Alaska sablefish (Hanselman, et al, 2009) together with extensive relevant supporting literature (See Appendix 1.) I familiarised myself with all relevant documentation ahead of the review and gained a thorough understanding of the data and methods used for the assessment and developed a preliminary list of points for clarification and/or discussion at the workshop.

My role in the review was clearly defined by the Terms of Reference given in Annex 2 of the review's Statement of Work provided by the CIE (Appendix 2.). The review was chaired by Jim Lanelli (AFSC, Seattle) and took the form of plenary sessions comprising presentations by AFSC scientists on aspects of the assessment followed by questions and open discussion by the Review Panel and other participants. Presentations on aspects of the input data, assessment approach, results and utility and appropriateness of the results of the assessment for management were reviewed and discussed. In the course of discussions and largely to clarify a variety of issues, the Review Panel requested that additional analyses be undertaken. These were duly completed and the outcomes were presented to and discussed by the panel and other participants. I would add that the review was conducted with a spirit of openness, mutual respect and co-operation from all participants.

The first day of the review meeting (Tuesday 17 March) dealt largely with input data for the assessment. Presentations commenced on the first morning with an overview of sablefish biology, fishery, and assessment history (Jeff Fujioka ), followed by a summary of the fishery-dependent data including abundance indices, data on age and length compositions in the catch and their derivation, logbook data and data collected via an onboard observer programme (Cara Rodgveller). A number of issues were discussed especially relating to stock discreteness, timing and location of spawning, sex ratio in the catches and the apparent change in recruitment pattern over time. A fishery-dependent catch rate (cpue) index is used for the assessment and a major focus was on the

potential effects of whale depredation on the value of such an index as a relative measure of stock abundance and on the scheme used to apportion the ABC by region.

An overview of fishery-independent Alaska and West Coast surveys that capture Alaska sablefish was presented on Tuesday afternoon (Chris Lunsford). Questions were raised regarding the utility of longline surveys as a measure of relative abundance, given the potential for survey-fishery interactions leading to local depletion effects, the competition for hooks/bait between sablefish and other predators, and the different measures that had been undertaken over the years to mitigate such potential effects.

The current stock assessment model used for Alaska sablefish was presented on the second morning (Wednesday, 18 March) of the review meeting (Dana Hanselman). Recent changes to the model were highlighted including separation by sex, changes to selectivity functions, a step-change in growth parameters and estimation of catchability priors. Discussions focussed on the possibility of exploring selectivity by length instead of age and the use of a spatially disaggregated model for future assessments. The panel also discussed the multiple use of some indices in the objective function and methods to re-weight likelihood components and requested a series of model runs that removed each survey index in turn and a sensitivity analysis of results of the assessment to the assumed rate of natural mortality. Diagnostic statistics on input and output CVs for survey indices and recruitment deviations and a comparison between input sample size and effective sample sizes for length and age composition for the base case model were also requested by the panel.

The results of the assessment model base run and apportionment regime was presented on Wednesday afternoon (Dana Hanselman), followed by an overview of results arising from archival tagging of juveniles.

On the final morning (Thursday 19) results on sablefish tagging data, migration and movement modeling was presented (John Heifetz). There have been a large number of tag releases - 326,500 in the years 1972-2007 - and the resulting data have been used for the assessment of growth rates, sablefish availability, ageing error, movement patterns, evaluation of apportionment schemes and population estimation.

An overview of depredation by killer and sperm whales was also presented on Thursday morning (Chris Lunsford) and the potential effect on survey and fishery dependent catch rates. Depredation by killer whales in western areas has been occurring for a number of years and sperm whale depredation in the east has been increasing in recent years. This is perceived as a major problem by industry participants who were concerned that sperm whale interactions have led to the domestic longline survey becoming less reliable over time. Hence industry favours increased reliance on fishery-dependent data as commercial operators are more adept at avoiding sperm whale depredation.

The results of the Panel's requests for additional analyses related to the stock assessment were also presented on Thursday morning, followed by a brief overview of ecosystem considerations for Alaska sablefish. The main issues highlighted as potentially having an influence on sablefish populations were natural and fishery induced environmental change (such as trawling impact on juvenile habitat), competition (juveniles are resident with arrowtooth flounder that have greatly increased in abundance recently), and predation rates (whales and possibly sharks).

Following formal closure of the review meeting on the afternoon of 19 March, the CIE reviewers and the meeting Chair held further discussion to decide on the content of the summary report and who should take responsibility for drafting the issues that we had identified and any recommendations. Each CIE reviewer then spent the morning of Friday 20 March preparing initial drafts of their appointed section of the summary report and these drafts were briefly discussed and combined that afternoon. Discussions on the summary report continued via e-mail after the panel participants returned to their home institutes and the report was finalised in 1 April for submission to the CIE by 2 April.

The Panel's summary report contains a number of observations and recommendations in relation to each of the Terms of Reference of the review and I agree with the all of the comments and recommendations listed.

I would personally like to thank the AFSC scientific personnel for their excellent preparation for and organisation of the review meeting, for their cooperation in responding to questions and requests, for their warm welcome and for being such marvellous hosts.

## 3. SUMMARY OF FINDINGS

While there are a number of aspects of the data and methodology used for the assessment of sablefish that should be examined ahead of future assessments, my overall conclusion is that the input data used for the 2008 Alaska sablefish assessment have been processed and used appropriately, and the results of the assessment represent the best estimate of current stock status and form an appropriate basis on which to base fishery management decisions.

Observations and findings in relation to each of the Terms of Reference are given below.

## 3.1 ToR 1. Evaluation, findings, and recommendations on quality of input data and methods used to process them for inclusion in the assessment.

### Fishery-dependent data

Fishery-dependent data comprised abundance indices (cpue) age and length compositions of the catch, data from mandatory and voluntary logbooks and data from an at-sea observer programme.

**Catch data:** I had some concerns regarding the potential for underreported catches in the earlier part of the time series before the declaration of the 200 mile EEZ. If such catches were under-reported, this is likely to have a bearing on the historic trends in the stock but is unlikely to have a significant effect on recent stock trends. Noting that data from the observer programme is extensive (approximately 25% of the IFQ catch is accounted for by fishing trips where an observer is present), coverage is not even throughout the fleets exploiting sablefish. There is therefore the potential for the data collected on observer trips to give a biased representation of the composition of the catches for the whole fleet. However, my overall impression is that fishery-related data are extensive and are likely to provide a relatively good representation of the composition of the catches of sablefish throughout the assessment area.

It was also noted that State catches are not included in the assessment and that catches from the western Bering Sea in the earlier part of the time period are unknown. Furthermore, there is anecdotal information that high-grading took place in the past but the extent is not quantified. The sensitivity of the assessment to alternative plausible catch histories has not been investigated but unless the past catch history is radically different to that recorded, the results of the assessment are unlikely to be significantly affected.

**Age and length sampling:** The current assessment is age-and length based and hence sampling for age and length is fundamental to the process. Samples are derived for vessels accounting for 30% of the catch, which is quite high and while the longline fishery is well sampled, data from the trawl fishery are sparse. It would be useful to establish whether existing sampling levels for both fisheries are adequate by investigating the precision of estimates.

It is recognised that sablefish are difficult to age accurately, but the procedures adopted for evaluating the accuracy of age determination using validated known-age samples and the compilation of an age error matrix to allow for use in the assessment model are appropriate.

**Voluntary logbooks:** It was concluded that the voluntary logbook program was a useful source of information to evaluate the under-60' fleet which is otherwise only monitored through fish-ticket declaration. Historically, sampling coverage for this fleet was very low and it would be useful to get assurance that the fishery-dependent abundance index for sablefish is not significantly affected by

such a low sampling level. Hence the implications of this low sampling level for this fleet component on the derived abundance index should be investigated.

**Commercial longline fishery catch rates**: While the use of fishery CPUE is appropriate for the assessment, the current practice of post-screening fishing operations to derive target-specific effort may lead to bias CPUE indices. A more appropriate approach would be to derive standardised catch rates using a statistical (GLM) analysis of the raw catch and effort data.

**Other sources of fishery-dependent and fishery-independent data not currently included in current assessment.**

A number of data sources not currently used in the assessment were identified as candidates for inclusion in future assessments and their utility should be investigated:

- Combined sex data from early fishery size composition data
- Sex ratio data can potentially be used in the fitting the model
- The time-series of sablefish CPUE from IPHC surveys
- EBS slope surveys (although there are concerns regarding the sex ratio and a predominance of large males need to be investigated)
- State surveys (recognizing potential issues with applicability to the AK-wide stock)

**Fishery-independent data**

There were a number of discussion points in relation to fishery-independent data and indices that are worthy of mention as follows:

**Alaska Longline survey:** I had some concerns about the use of the longline survey as a relative abundance index for sablefish, largely as a result of not being very familiar with the utility of such surveys in stock assessments. My main concerns related to issues such as soak time, gear configuration including hook size, survey interactions with the fishery, predation and competition for bait from other species and their potential effects on catch rates and catchability of sablefish.

However the panel were provided with several papers that had addressed such effects and, after considerable discussion during the review, I concluded that use of the Alaska longline survey as an index of relative abundance for the current assessment is appropriate. The survey is well designed and appropriately executed and covers a large area of the stock distribution. The derived cpue indices are likely to give an independent unbiased estimate of the relative abundance of fully selected size groups of sablefish.

**Survey-fishery interactions:** The panel was informed that it is not known whether interaction between commercial fishing and survey operations is likely to significantly affect survey catchability or catch rate indices but that the extent of interaction had declined over time. If interaction is of significant concern, the reported decline over time is likely to have resulted in relatively higher catch

rates in the survey in recent years. The only available information to the panel on the effect of fishery–survey interactions were the results of experiments conducted by the IPHC which indicated that for halibut, there was no significant effect. The effect on sablefish catch rates therefore remains unknown and for the present, I see no alternative but to assume that any effects are negligible. However, I recommend that, if possible, the effect of survey-fishery interactions should be investigated and quantified.

**Gear saturation**: Considerable discussion took place on the potential for the longline sets to become saturated with sablefish or other species and the effect on survey indices. Supporting literature and the outcome of discussions led me to conclude as did the rest of the panel, that this is unlikely to be a significant problem in deriving representative abundance indices.

**Regional abundance trends**: The abundance indices for the different survey areas showed differing trends over the past 15 years. In the central and eastern GoA, there is a gradually declining trend in abundance, whereas in the western GoA, BS and AI, there is relatively little trend or perhaps an indication of an increase in abundance. The diverging trends in the different areas suggest that it may be more appropriate to use spatially-disaggregated abundance indices in a spatial assessment model.

**Whale depredation**: Industry participants were particularly concerned of the effects of whale depredation on the survey index. Two species of whales have been observed to remove sablefish from survey longline sets on hauling and the way that affected sets are treated varies by species. Information suggests that killer whale depredation has remained relatively stable over time whereas sperm whale depredation appears to have increased in recent years and especially for 8 stations in the W and E Yakutat slope area. In deriving survey indices, killer whale affected sets are removed from the dataset used to derive the survey index. This seems appropriate since it will remove any bias created by depredated sets but may result in less precision in the index due to fewer sets being included in the index. Sperm whale depredation has not been accounted for in the indices, largely because of a lack of any recent information to quantify the effect of any increase in depredation on the survey index. Previous studies, using data from 1998-2004, indicate that the impact of sperm whale interactions on catch rates is small (~2% for sets with observed depredation) and is similar to those observed in other fisheries elsewhere. The industry participants in the review expressed a view that the sperm whale depredation rate is higher than these estimates.

Given the absence of recent quantifiable estimates of depredation rates by sperm whales, I see no alternative at present but to assume that they remain at a low level and that the effect on survey index is negligible. However, I support the proposals to try to develop better ways to quantify depredation impacts, including acoustic techniques, hook monitoring, deterrents, set/skate classification (depredated or not), masking vessel noise, and innovative ways to compare between indices (e.g., parallel pot sets).

**Other surveys/indices:** The utility of the GoA bottom trawl survey to derive abundance indices of abundance incoming year classes was discussed. The survey extends to a depth of 500m and, since younger sablefish are distributed in shallower water than adults, this should in principle give valuable information of the relative year-class strength of younger sablefish. However, the current assessment does not fit this index well.

## 3.2. ToR 2. Evaluation, findings, and recommendations on the level and adequacy of knowledge and incorporation of life history, ecology and habitat requirements.

The main points of concern to me under this term of reference related to stock structure and discreteness, geographical distribution and migrations, growth and age structure, maturity at age/length, sex ratios, natural mortality rate and ecosystem and competition effects on sablefish. However, my overall conclusion is that the data treatment and assumptions on the life history, ecology and habitat requirements of sablefish have been appropriately addressed in the assessment.

**Stock structure and distribution**: Taking into account the available information on stock structure, the data available for the stock assessment are most likely representative of the bulk of the stock distributed from the Bearing Sea, through the Aleutian Islands, Gulf of Alaska to northern British Columbia.

**Growth and age structure**: There are some strong assumptions in the assessment model inputs about growth of sablefish over time and for the present assessment the data on growth have been revised. Updated growth curves for the period 1981-1993 have been derived using a bias-corrected data from that period and new growth curves derived using from random otolith collections in subsequent years have been produced. These changes represent improved use of age data in the assessment but assume a step-change in growth, which is probably an oversimplification. I agree with the suggestion that an investigation of year and year class effects in length-at-age as a potential alternative to the simple step change in growth parameters be undertaken. Such an exercise may provide more accurate length compositions from model-based age compositions for use in the fitting of observed length compositions.

To take into account the age reading error in the assessment, an ageing error matrix seems appropriate for the statistical assessment model used. However, the smearing of ages across adjacent year-classes is likely to remain a source of error in the assessment and to dampen any changes in year-class strength.

**Maturity**: Separate maturity ogives for female and male sablefish are used so that female spawning biomass can be computed. This represents an improvement on the use of combined sex maturity ogives. However, the ogives used in the current assessment were derived using data collected prior to the mid 1980s. More recent data indicate that since that time, the age of 50% maturity for females has increased slightly and these data will be used for future assessments. I agree that temporal trends in maturity should be monitored and,

in addition, given the observed changes in growth, it would be valuable to clarify and quantify the age and length dependence of maturation.

**Natural mortality (M)**: At the request of the panel, results of sensitivity analysis of the results of the assessment model to different values of M were presented. The results indicate that the assumed value for natural mortality ($M$=0.1) is appropriate for this stock and is further supported by the observed longevity of sablefish. However, M is assumed constant at all age groups in the model over time and it would be useful to explore the sensitivity of the assessment to plausible time-varying estimates of M especially the potential for a trend in natural mortality resulting from changes in the ecosystem or predation rates (see also ecosystem aspects below)

**Ecosystem aspects and competition/predation levels**: There are no quantitative estimates of ecosystem or competition effects on sablefish despite large scale observed changes in the environment. However, studies on factors that particularly are likely to affect conditions for pre-recruit sablefish would be useful to provide insights on medium-term future trends. For example, it was pointed out that there has been a large increase in arrowtooth flounder abundance in recent years, and it would be valuable to be able to quantify the effect that such an increase has had on the dynamics of juvenile sablefish so that such effects can be accounted for in the assessment.

## 3.3 TOR3. Evaluation, findings, and recommendations of the analytical approach used to assess stock condition and stock status.

My overall conclusion with respect to the analytical approach to assess the stock is that it is appropriate and provides an acceptable basis for providing management advice. The sensitivity runs requested by the panel suggest that the results of the assessment are robust to plausible changes in input data and assumptions.

There were several points worth of note:

**Abundance indices**: The use of the highly correlated RPN and RPW indices from the Japanese and domestic longline surveys has the effect of doubling the weight given to these indices in the model. It is recommended that the RPW values should be omitted in future assessments.

**Retrospective pattern**: There is a relatively strong retrospective bias in the current assessment model. However, the bias appears much reduced over the past 2 years especially with regard to the estimate of total stock biomass but not as reduced with respect to spawning stock biomass. The bias has the effect of overestimating biomass in the most recent years and successive assessments revise the entire biomass series downwards. It was not possible to establish the causes of the bias during the review and this requires further investigation. The impact of the bias on ABC estimates is uncertain and also warrants further investigation.

**Diagnostics and sensitivity analysis**: As a check on the sensitivity of the assessment model to input data and assumptions, the following additional assessment diagnostics and sensitivity analyses were requested and presented to the Panel:

A comparison of input and output CV for abundance indices. The comparison indicated that the base model configuration tended to produce larger output CVs than input CVs, indicating that the CVs for all indices in the base model should be doubled.

A comparison of input and effective sample sizes for compositional data. The results indicated that the input N may be overestimated for the cooperative and domestic longline survey age data, and underestimated for other compositional data.

A sensitivity analysis for plausible alternative natural mortality values. Results indicated that the likelihood profile is relatively flat for values of *M* between 0.08 and 0.12, and are a value in this range is therefore considered plausible. The values of $B_{40\%}$ and ABCs associated with *M* values in this range are sensitive to the choice of M, varying between about 12,000 t and 20,000 t. However, the likelihood profile has a minimum at M=0.1 indicating that for the base model configuration, a value of *M* = 0.1 appears the most appropriate.

A sensitivity analysis for the removal of each abundance index individually. Results indicate that when selectivity was held constant at base case estimates, the biomass trend was most sensitive to the removal of both domestic longline indices, resulting in the lowest biomass estimates for the recent period, and removal of the RPW index, which resulted in higher historical biomass estimates. The assessment results were relatively insensitive to removal of other indices.

**Projections**: Current biomass is 38% of $B_0$, slightly below the target of 40%. Hence, under the Tier 3b harvest strategy the ABC was derived from $F_{40\%}$ reduced to account for the current biomass being below the target. This form of harvest control rule is similar to that used for other fisheries and is appropriate. Stochastic projections indicate that the stock will decline further from the current position and fall below the overfished level of $B_{35\%}$ in the near term until about 2012. It is predicted to recover after 2012. Taking into account the uncertainty around the projection, there is a high probability that ABC estimates will be reduced in the next few years.

## 3.4 TOR4. Evaluation, findings, recommendations of areal apportionment of harvest strategy as related to optimizing spawning stock biomass.

My thoughts on the current apportionment scheme are that in order to advise on its appropriateness there is a need for a set of management objectives to be clearly defined. At present the implicit aim of the scheme is set quotas to

achieve equivalent fishing mortality rates in each of the IFQ management areas. If this is the overall management aim, then the current scheme represents a pragmatic solution to distribute the ABC by region given the current data and information. However, there may be socio-economic objectives that can only be achieved by adopting a different approach. While recognizing that there are uncertainties in regional abundance and productivity, the approach of distributing ABC values taking into account regional biomass levels appears an appropriate way of attaining equivalent fishing mortality in the different regions.

**Use of survey indices and fishery CPUE data:** While the current apportionment scheme provides more weight to the longline survey data for regional abundance than to the fishery CPUE data, I conclude that this is appropriate since the survey data represent an unbiased fishery-independent index of the relative distribution of stock biomass, despite the potential for trends in survey-fishery interaction and whale depredation to affect the survey index and the fact that the survey provides only a snapshot of the stock distribution part way through the fishing season. Variation between areas and times in the fishery CPUE data may not fully reflect the pattern of abundance of sablefish due to targeting and differences in fishing gears.

However, modifications to the apportionment may be appropriate if region specific selectivity estimates are utilised. Projections taking region-specific selectivity factors into account could be used to evaluate the performance of different allocation strategies against management objectives for the fishery. It would also be useful to utilise movement estimates using results from the updated tagging model to devise and evaluate the impact of different allocation schemes.

**Whale depredation:** The impacts of whale depredation on survey and fishery indices are discussed in Section 3.1. If whale depredation has a significant impact on the survey indices, it will also have an impact on the assessment and on the apportionment of the ABC to the different regions. I conclude that there is insufficient information to quantify any perceived trend in whale depredation at present and, in the absence of such information, the current scheme seems a pragmatic method to allocate regional quotas.

## 3.5 TOR5. Recommendations for further improvements.

I fully agree with the recommendations arrived at by the panel and listed in the consensus report and have no additional comments. The recommendations are reproduced below.

The Panel recommends that in future assessments, the following points are addressed.

**Input data**

**Age and length data:** The panel recommends that comparisons between the length frequency distribution of the age-samples with the overall length

frequency be undertaken as an internal consistency check for sampling bias. Furthermore, it would be desirable to develop age-length-keys (ALKs) and apply these to the observed length frequency distributions to compare the resulting raised age composition estimates with the randomly sampled age compositions.

**Commercial longline fishery catch rates:** The panel recommends that fishery catch and effort data be screened using a statistical modelling (GLM) approach to evaluate and where possible correct for factors other than sablefish abundance affecting CPUE.

**Fishery age-length sampling:** The adequacy of existing sample sizes in terms of precision should be investigated.

**Data sources not currently used in the assessment:** The utility of a number of additional sources of data for the assessment should be investigated including combined sex data from early fishery size composition data, sex ratio information from various sources, CPUE from IPHC surveys, EBS slope surveys and surveys.

**Stock Assessment**

**Size selectivity**: Selectivity is currently modeled by age separately by sex, and the difference in the fitted selectivity curves appear to be largely due to growth differences by sex. The panel recommends that size-based selectivity be implemented in future assessments, and that single combined-sex selectivity curves be tested for each fishery. This will potentially reduce the number of selectivity parameters used by the model.

**Spatial structure**: An area-disaggregated assessment approach should ideally be developed and may lead to improved management advice. Abundance trends and size/age composition vary by area, and spatially separable index and composition data and movement data from tagging are available. Such a model can also provide better insight on the impact of apportionment policies. Area-disaggregation options include:

- Treating areas as separate fisheries, fitting area-specific selectivity.
- Modeling movement between areas using tagging information.

**Diagnostics**: Standard assessment diagnostics should include plots of input and output CV for abundance indices, input and effective sample size for age and length composition, and input and output CV for recruitment deviations.

**Weighting of likelihood components**: Iterative reweighting using input and output CVs, and input and effective sample size should provide default weightings for likelihood components in the assessment model.

**Sensitivity analyses**: Sensitivity of estimated depletion and recommended ABC to important fixed parameters should be part of the assessment documentation.

**Model building/specification:** It would be useful to have a more formal examination of the basis for decision making when building towards the final model configuration and adding individual data sets. Also, the impact of "smoothing" factors. (e.g., annual F, R) should be evaluated and avoided if unnecessary.

**Growth parameter estimation**: Growth parameters should be estimated within the assessment model so that the impact of size-based selectivity is properly accounted for. The sablefish growth parameters have high $t_0$ values that may be symptomatic of not accounting for selectivity when fitting growth models.

**Simulation testing**: The current model should be validated by simulation testing using simulated data to ensure that biomass and recruitment trends are faithfully reproduced.

**Retrospective pattern**: The source of the retrospective pattern shown by the assessment requires further investigation, particularly if such a pattern continues as the assessment evolves from year to year.

## 4. Comments on the NMFS review process

### Process

The NMFS review process proved to be largely successful. The arrangement of plenary session presentation followed by a session of question and answers and an open discussion was excellent and allowed a thorough examination of data and assumptions, applicability of the model formulation and very importantly, the views of all participants. There was a clear intention from all participants to ensure that the assessment results were reliable and robust to the input data and assumptions. I am confident that the process on this occasion delivered a through evaluation of the assessment, which led to its subsequent endorsement by the review panel.

### Products

CIE reviewers were asked to prepare an independent report of proceedings and also a summary report. Personally I found the requirement to prepare an independent report rather redundant, since the reviewers discussed at length the issues raised in discussion and if deemed worthy of mention, these were incorporated into the summary report. On this occasion I was unaware of any conflicting opinions that remained unresolved and the summary report from this meeting represents a consensus of the panel. I suspect that the individual reviewers' reports are unlikely to list any additional major issues or recommendations, although the findings in the summary report may be elaborated.

Perhaps an alternative and more informative way forward, would be for reviewers to draft their own independent reports ahead of the summary report and give the responsibility for compiling a summary report to the meeting Chair. The summary report should include a list of commonly agreed observations and

recommendations and an additional list of points and recommendations that were not collectively identified by the individual reviewers.

## Appendix 1: Bibliography of materials provided for the 2009 CIE review of the 2008 assessment for Alaska sablefish held at the Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, 17109 Pt. Lena Loop Rd. Juneau, Alaska.

### Primary Documents


Hanselman, D.H. Lunsford, C.R. Fujioka, J. T. and Rodgveller, C. J. 2009. Assessment of the Sablefish stock in Alaska. NPFMC, Bearing Sea, Aleutian Islands and Gulf of Alaska SAFE, 303-420.

Fujioka, Jeffrey J., Heifetz, J. and Siegler, M. F. 1997. . Choosing a harvest strategy for sablefish (*Anopoploma fimbria*) based on uncertain life-history parameters. NOAA Technical Reports NYMFS 130, 247-252.

Hanselman, D. H. 2007. Development of prior distributions for sablefish catchability NPFMC Bering Sea, Aleutian Islands and Gulf of Alaska Plan Team DRAFT, 5pp.

Hanselman, D.H. and Howard, K. Updated growth analysis for Alaska sablefish. 12pp. Working document no citation.

Heifetz, J. and Fujioka, Jeffrey J. 1991. Movement dynamics of tagged sablefish in the northeastern Pacific. Fisheries Research 11, 335–374.

Heifetz, J. and Quinn, T. J. 1998. Dynamics of a migratory fish population with applications to the management of sablefish. Fish stock assessment Models, Alasks Sea Grant College Program AK-SG-98-01.

Heifetz, J. and Fujioka, Jeffrey J. 1997. Geographical Apportionment of Sablefish , *Anoplopoma fimbria*, Harvest in the Northeastern Pacific Ocean. NOAA Technical Reports NYMFS 130, 229-237.

Anon 1997. Sablefish Workshop Summary February 21-23, 2007 Seattle, Washington. NPFMC, Bearing Sea, Aleutian Islands and Gulf of Alaska SAFE, 19pp.

Pope, J.G. 1996. Notes on sablefish assessment.

Sasaki, T. 1985. Studies on the sablefish resources in the North Pacific Ocean. Wbulletin 22, (1-108) March 1985 Far Seas Fisheries Research Laboratory Shimizu, 424, Japan

Sigler, M.F. 2000. Abundance estimation and capture of sablefish (*Anoplopoma fimbria*) by longline gear. Can. J. Fish. Aquat. Sci. 57, 1270–1283.

Sigler, M. F. and Lunsford, C. R. Longline survey protocol Alaska sablefish longline survey, AFSC Document 12pp.

Sigler, M. F., Lunsford, C. R., Atralet, J. M. and Liddel, J. B. 2007. Sperm whale depredation of sablefish longline gear in the northeast Pacific Ocean. MARINE MAMMAL SCIENCE, 24(1): 16–27

**Additional relevant documents**


Fujioka, J.T., Shaw, F. R., McFarlane, G. A., Sasaki, T. and

Bracken, B. 1998. Description and Summary of the Canadian, Japanese, and U.S. Joint Data Base of Sablefish Tag Releases and Recoveries During 1977-83E. NOAA Technical Memorandum NMFS F/NWC-137, 41 pp.

Heifetz, J and Maolney, N.E.2001. Estimates of tag-reporting rates for the northeastern Pacific Ocean. Alaska Fishery Research Bulletin 8(1) , 1-11.

Jonathan Heifetz, J., Anderl, D., Maloney, N.E. and Rutecki, T.L. 1998. Age validation and analysis of ageing error from marked and recaptured sablefish, *Anoplopoma fimbria*. Fish. Bull. 97,256–263 (1998).

Kimura, D.K., Shimada, A.M. and Shaw, F.R. 1998. Stock Structure and movement of tagged sablefish *Anapoploma fimbria*, in offshore northeast Pacific waters and the effects of El Niño-southern oscillation on migration and growth. Fish. Bull. 96,462–481.

Kimura, D. K., and Zenger, Jr, H. H. 1997. Standardizing sablefish (*Anoplopoma fimbria*) long-line survey abundance indices by modeling the log-ratio of paired comparative fishing cpues. – ICES Journal of Marine Science, 54: 48–59.

Maloney, N.E . 2005. Sablefish, *Anoplopoma fimbria*, Populations on Gulf of Alaska Seamounts. Marine Fisheries Review 66(3) 1-12.

Maloney, N.E. and Sigler, M.E. 2008. Age-specific movement patternsof sablefish (*Anoplopoma fimbria*) in Alaska. Fish. Bull. 106:305–316.

Mason, J.C., Beamish, R.J. and McFarlane, G. A. 1983. Sexual maturity, fecundity, spawning and early life history of sablefish *Anoplopoma fimbria* off the Pacific coast of Canada. Can. J. Fish. Aquat. Sci. 40, 2126–2134.

Rodgveller, C.J. Lunsford, C.R. and Fujioka, J.T., 2008. Evidence of hook competition in longline surveys. Fish. Bull. 106,364–374.

Rutecki, T.L. and Varosi, E.R Distribution, Age, and Growth of Juvenile Sablefish, *Anoploploma fimbria*, in Southeast Alaska. NOAA Technical Report NMFS 130, 45-54.

Sigler, M.F. 1999. Estimation of sablefish, *Anoplopoma fimbria*, abundance off Alaska with an age-structured population model. Fish. Bull. 97,591–603.

Sigler, M.F., Rutecki, T.L., Courtney, D.L. Karinen, J.F. and Yang M.S. 2001. Young of the year sablefish abundance, growth and diet in the Gulf of Alaska. Alaska Fishery science Bulletin, 8(1), 57-70.

Sigler, M.F. and Lunsford, C.R. 2001. Effects of individual quotas on catching efficiency and spawning potential in the Alaska sablefish fishery. Can. J. Fish. Aquat. Sci. 58, 1300–1312.

Rutecki, T.L. and Lunsford, C.R. 2008. F/V Alaskan Leader Cruise Report AL-08-01. Longline Survey of the Gulf of Alaska and Eastern Aleutian Islands. AFSC 16pp.

# Appendix 2: Statement of Work

## Attachment A: Statement of Work for Dr. John Casey

### External Independent Peer Review by the Center for Independent Experts

## Review of Alaska Sablefish Stock Assessment

**Scope of Work and CIE Process:** The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract to provide external expertise through the Center for Independent Experts (CIE) to conduct impartial and independent peer reviews of NMFS scientific projects. This Statement of Work (SoW) described herein was established by the NMFS Contracting Officer's Technical Representative (COTR) and CIE based on the peer review requirements submitted by NMFS Project Contact. CIE reviewers are selected by the CIE Coordination Team and Steering Committee to conduct the peer review of NMFS science with project specific Terms of Reference (ToRs). Each CIE reviewer shall produce a CIE independent peer review report with specific format and content requirements (**Annex 1**). This SoW describes the work tasks and deliverables of the CIE reviewers for conducting an independent peer review of the following NMFS project.

**Project Description:** Multiple changes have been implemented in the Alaska sablefish (*Anoplopoma fimbria*) assessment in the period since the last independent review. There are stakeholder concerns over areal apportionment of harvest and depredation of survey catches by whales. Therefore, NOAA Fisheries' Alaska Fisheries Science Center (AFSC) requests a thorough review of the Alaska sablefish assessment.

Sablefish are assessed as a single population in Federal waters off Alaska because northern sablefish are highly migratory for at least part of their life. Sablefish are then managed by discrete regions to distribute exploitation throughout their wide geographical range. There are four management areas in the Gulf of Alaska: Western, Central, West Yakutat, and East Yakutat/Southeast Outside, and two management areas in the Bering Sea/Aleutian Islands: the Eastern Bering Sea and the Aleutian Islands region. The assessment is a split-sex, age, and length structured model coded in AD Model Builder. Important data are an annual AFSC sablefish-specific longline survey, a biennial AFSC trawl survey, fishery CPUE, and age/length data from all three sources.

The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

**Requirements for CIE Reviewers:** Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein. CIE reviewers shall have the expertise, background, and experience to complete an independent peer review in accordance with the SoW and ToRs herein. CIE reviewer expertise shall have expertise and work experience in analytical stock

assessment, including population dynamics, age/length based stock assessment models, uncertainty, survey design, and fisheries biology.

**Location of Peer Review:** Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled during March 2009 in Juneau, Alaska.

**Statement of Tasks:** Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering committee, the CIE shall provide the CIE reviewer information (name, affiliation, and contact details) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and information concerning other pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., name, contact information, birth date, passport number, travel dates, and country of origin) to the NMFS Project Clearance for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations (available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send by electronic mail or make available at an FTP site the CIE reviewers all necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE on where to send documents. The CIE reviewers shall read all documents in preparation for the peer review.

AFSC will provide copies of the statement of work, stock assessment documents, sablefish longline survey reports, and other background materials to include both primary and grey literature.

This list of pre-review documents may be updated up to two weeks before the peer review. Any delays in submission of pre-review documents for the CIE peer review will result in delays with the CIE peer review process, including a SoW modification to the schedule of milestones and deliverables. Furthermore,

the CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein.

Panel Review Meeting: Each CIE reviewers shall conduct the independent peer review in accordance with the SoW and ToRs. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified in the contract SoW. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: Each CIE reviewer will assist the Chair of the panel review meeting with contributions to the Summary Report. CIE reviewers are not required to reach a consensus, and should instead provide a brief summary of their views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

**Specific Tasks for CIE Reviewers:** The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review;
2) Participate during the panel review meeting at the Auke Bay Laboratories at the Alaska Fishery Science Center, Juneau, Alaska, from March 17-29, 2009, as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
3) No later than April 2, 2009, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to David Die ddie@rsmas.miami.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in Annex 2;
4) CIE reviewers shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

**Schedule of Milestones and Deliverables:** CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

| | |
|---|---|
| February 10, 2009 | CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact |
| March 3, 2009 | NMFS Project Contact sends the CIE Reviewers the pre-review documents |
| March 17-19, 2009 | Each reviewer participates and conducts an independent peer review during the panel review meeting |
| April 2, 2009 | CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator |
| April 16, 2009 | CIE submits CIE independent peer review reports to the COTR |
| April 23, 2009 | The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director |

**Modifications to the Statement of Work:** Requests to modify this SoW must be made through the Contracting Officer's Technical Representative (COTR) who submits the modification for approval to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the CIE within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and Terms of Reference (ToR) of the SoW as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToRs and deliverable schedule are not adversely impacted. The SoW and ToRs cannot be changed once the peer review has begun.

**Acceptance of Deliverables:** Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

**Applicable Performance Standards:** The contract is successfully completed when the COTR provides final approval of the contract deliverables. The

acceptance of the contract deliverables shall be based on three performance standards: (1) each CIE report shall have the format and content in accordance with Annex 1, (2) each CIE report shall address each ToR as specified in Annex 2, (3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

**Distribution of Approved Deliverables:** Upon notification of acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the approved CIE reports to the NMFS Project Contact and regional Center Director.

**Key Personnel:**

William Michaels, Contracting Officer's Technical Representative (COTR)
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-713-2363 ext 136

Manoj Shivlani, CIE Lead Coordinator
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NMFS Project Contact:

Philip Rigby
National Marine Fisheries Service, NOAA
17109 Pt. Lena Loop road, Juneau, AK 99801
Phillip.Rigby@noaa.gov Phone: 907-789-6653

William A. Karp, AKFC Science Director
National Marine Fisheries Service, NOAA
Alaska Fisheries Science Center
7600 Sand Point Way, NE, Bldg 4, Seattle, WA 98115
Bill.Karp@noaa.gov Phone: 206-526-4000

## Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a detailed summary of findings, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the proceedings and findings of the meeting, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include as separate appendices as follows:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

## Annex 2: Terms of Reference for the Peer Review

## Review of Alaska Sablefish Stock Assessment

CIE reviewers shall address the following Terms of Reference during the peer review and in the CIE reports.

a. Evaluation, findings, and recommendations on quality of input data and methods used to process them for inclusion in the assessment.
b. Evaluation, findings, and recommendations on the level and adequacy of knowledge and incorporation of life history, ecology and habitat requirements.
c. Evaluation, findings, and recommendations of the analytical approach used to assess stock condition and stock status.
d. Evaluation, findings, recommendations of areal apportionment of harvest strategy as related to optimizing spawning stock biomass.
e. Recommendations for further improvements

## Annex 3: Tentative Agenda

## Review of Alaska Sablefish Stock Assessment

**Alaska Fisheries Science Center**
**Auke Bay Laboratories**
**Ted Stevens Marine Research Institute**
**17109 Pt. Lena Loop Rd.**
**Juneau, Alaska**

***March 17th – 19th, 2009***

Contacts:
Security and check-in: Phil Rigby, Phillip.Rigby@noaa.gov, 907-789-6653
Additional documents, Dana Hanselman, Dana.Hanselman@noaa.gov, 907-789-6626

***Tuesday, March 17th:***
9:00 AM – 10:30 AM: **Introduction**
Topics:
*Introductions and the agenda, overview of sablefish biology, fishery, and history of assessment.*

10:30 AM – Break
10:45 AM – Discussions
12:00 PM – Lunch
1:00 PM -3:00 PM: **Input data**
Topics:
*Survey data – abundance indices, ages, lengths, growth, ageing error*
*Fishery data – abundance indices, ages, lengths, logbooks and observer data*

3:00 PM – Break
3:15 PM – **Discussions**
5:00 PM – Adjourn for day

***Wednesday, March 18th:***
9:00 AM – 10:30 AM: **Assessment model**
Topics:
*Model structure, split-sex design, likelihood formulations, data weighting*

10:30 AM – Break
10:45 AM – **Discussions**
12:00 PM – Lunch
1:00 PM -3:00 PM: **Parameters, priors, and ages**

Topics:
*Catchabilities, selectivities, natural mortalities, recruitment variability, age reading*

3:00 PM – Break
3:15 PM – Discussions
5:00 PM – Adjourn for day

***Thursday, March 19th:***
9:00 AM – 10:30 AM: **Current issues**
Topics:
*Areal apportionment of catch, whale depredation*

10:30 AM – Break
10:45 AM – Discussions
12:00 PM – Lunch
1:00 PM -3:00 PM: **Alternative model runs, further discussion as needed**
Topics:
*TBA*

3:00 PM – Break
3:15 PM – Further discussions and summarize
5:00 PM – Adjourn meeting

**Appendix 3: Participants at the Review of the 2008 Assessment of Alaska sablefish (*Anoplopoma fimbria*), held at the Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, Juneau, Alaska, March 17th – 19th, 2009.**

**CIE Members of the Review Panel**

| | |
|---|---|
| Mike Armstrong | (CEFAS) |
| John Casey | (CEFAS) |
| Neil Klaer | (CSIRO) |

**Meeting Chair**

| | |
|---|---|
| Jim Lanelli | (AFSC, Seattle) |

**NMFS scientific participants:**

| | |
|---|---|
| Dana Hanselman | (AFSC/ABL) |
| Jon Heifetz | (AFSC/ABL) |
| Chris Lunsford | (AFSC/ABL) |
| Cara Rodgveller | (AFSC/ABL) |
| Jane DiCosimo | (NPFMC) |
| Jeff Fujioka | (AFSC/ABL) |
| Kalei Shotwell | (AFSC/ABL) |
| Phil Rigby | (AFSC/ABL) |
| Dave Clausen | (AFSC/ABL) |
| Cindy Tribuzio | (AFSC/ABL) |

**Industry**

| | |
|---|---|
| Dan Falvey | (ALFA) |
| Jack Knutsen | (FVOA) |
| Nick Delaney | (Alaska Leader) |
| Peter Hochstoeger | (AK Glacier Seafoods) |
| Tory O'Connell | (ALFA) |
| Chris McDowell | (McDowell Group) |

**Non-NYMFS scientists**

| | |
|---|---|
| Juan Valero | (IPHC) |
| Sherri Dressel | (ADFG) |
| Dave Carlile | (ADFG) |

## Appendix 4: List of Acronyms

| | |
|---|---|
| ABC | Acceptable Biological Catch |
| ABL | Auke Bay Laboratory |
| ADFG | Alaska Department of Fish and Game |
| ADMB | Automatic Differentiation Model Builder |
| AFA | American Fisheries Act |
| AFSC | Alaska Fisheries Science Center |
| AI | Aleutian Islands |
| AK | Alaska |
| AMAK | Assessment Method for Alaska |
| AP | Advisory Panel |
| BC | British Columbia |
| BRP | Biological Reference Point |
| BS | Bering Sea |
| BSAI | Bering Sea and Aleutian Islands |
| CDQ | Community Development Quota |
| CGOA | Central Gulf of Alaska |
| CIE | Centre for Independent Experts, University of Miami |
| CPUE | Catch per unit of effort |
| CVOA | Catcher Vessel Operational Area |
| EAM | Ecosystem Approach to Management |
| EA/RIR | Environmental Assessment/Regulatory Impact Review |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EGOA | Eastern Gulf of Alaska |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| EY | Equilibrium Yield |
| FEP | Fishery Ecosystem Plan |
| FMP | Fishery Management Plan |
| GHL | Guideline Harvest Level |
| GOA | Gulf of Alaska |
| GSI | Gonado-Somatic Index |
| HAPC | Habitat Areas of Particular Concern |
| IFQ | Individual Fishing Quota |
| IPHC | International Pacific Halibut Commission |
| IRFA | Initial Regulatory Flexibility Analysis |
| IRIU | Improved Retention/Improved Utilization |
| LAMP | Local Area Management Plan |
| LL | Longline |
| LLP | License Limitation Program |
| M | Natural Mortality |
| MSFCMA Act | Magnuson-Stevens Fishery Conservation & Management |
| MMPA | Marine Mammal Protection Act |
| MRA | Maximum Retainable Allowance |
| MSY | Maximum Sustainable Yield |
| mt | Metric tons |
| nm | Nautical miles |

| | |
|---|---|
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic & Atmospheric Administration |
| NPFMC | North Pacific Fishery Management Council |
| OFL | Overfishing Level |
| OY | Optimum Yield |
| POP | Pacific Ocean perch |
| PSC | Prohibited Species Catch |
| q | Catchability |
| RPN | Relative Population Number |
| RPW | Relative Population Weight |
| SAFE | Stock Assessment and Fishery Evaluation |
| SEAK | Southeast Alaska |
| SSC | Scientific and Statistical Committee |
| SSL | Steller Sea Lion |
| TAC | Total Allowable Catch |
| TSMRI | Ted Stevens Marine Research Institute |
| WGOA | Western Gulf of Alaska |
| USFWS | United States Fish & Wildlife Service |
| YOY | Young of the Year |