

**Report on the  
Stock Assessment Review (STAR) Panel for Dover Sole and Sablefish**

Prepared for:  
The Center for Independent Experts

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## **EXECUTIVE SUMMARY**

*The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.*

The Stock Assessment Review (STAR) Panel for sablefish and Dover sole took place at the Northwest Fishery Science Center (NWFSC), Newport, Oregon, from 25<sup>th</sup> to 29<sup>th</sup> July 2011. The review was hosted by the NWFSC. For both stocks, the Panel reached a point where agreement was reached on what would constitute base case runs and sensitivity tests, and what would go in to decision tables. In the case of sablefish, corrections to the base case following a technical correction in software. In the case of Dover sole, corrections to the base case were made following minor revisions to input data. In both cases, the need for corrections was seen by the relevant STAT prior to STAR 4 and additional materials were prepared. In both cases, following further exploration, the pre-STAR base case candidates were chosen.

The sablefish and Dover sole assessments were both effectively new with major revisions since the previous assessments. Both assessments were thoroughly investigated and well communicated, with clear arguments for changes and decisions made. Presentations were well measured with sufficient material for useful discussion but no unnecessary detail.

The assessments of sablefish and Dover sole were both implemented using Stock Synthesis 3. Stock Synthesis has been extensively used and the main software and extensions have been validated and documented. Tuning of model runs followed standard procedures with multiple passes (iterative re-weighting) to refine index and composition weights. The models for both stocks are complex but both have been developed with care to balance complexity with data availability and to provide credible and robust science inputs to the fishery management process. In this respect, both models are successful. The models and methods used are fairly standard and I see no major causes for concern. A number of suggestions and recommendations are made.

Both stock assessments suffer from problems with residual lack of fit but both have been thoroughly explored. The agreed base cases and accompanying sensitivity tests provide a good basis for depicting uncertainty and informing management. Decision tables have been defined.

## **BACKGROUND**

### **Dover Sole**

Dover sole (*Microstomus pacificus*) is a right-eyed flounder distributed from the Bering Sea to Baja California, at depths from 35 m to over 1500 m, typically inhabiting muddy or mud-sand habitat. The lifespan of Dover sole is of the order of 50 years, reaching maturity at 4-5 years. Dover sole display complex spatial patterns with evidence of separation by sex as well as ontogenetic dispersal by depth. They also have an extended larval period of at least a year, perhaps extending to 18 months. The complex spatial patterning by size and sex is an important consideration in model development and interpretation.

The assessment region for widow rockfish considered in this review covers the US west coast ranging from southern California, through Oregon to the USA-Canada border. Linkages with widow rockfish in Canadian and Alaskan waters are assumed to be negligible though there is likely connection.

Catches of widow rockfish were reported in the 19<sup>th</sup> Century but recorded catches start in 1911 in California. Catches in Oregon and Washington developed in the 1930s. Dover sole were not a primary target in early fisheries but catches steadily increased during the 1940s and were stable in excess of 5,000 t during the 1950s and 1960s before rapidly increasing to a peak of near 20,000 t during the 1980s. Catches declined from the early 1990s as management measures were put in place. In recent years, catches have been of the order of 10,000 t per year. Historically, the greatest catch proportion has been from California but catches from Oregon are now dominant.

Dover sole was last assessed in 2005. At that time, the point estimate for depletion of spawning biomass was well above the then management target of 40% of virgin biomass. Since then, new management targets have been adopted for flatfish by the PFMC. The current target is 25% of virgin biomass with the limit set at 12.5%. Since the last assessment, as well as new management reference points being set, new modeling approaches have been developed and many new data have become available. The 2011 assessment is effectively a new assessment.

### **Sablefish**

Sablefish (*Anoplopoma fimbria*) is a long-lived deep sea fish common throughout the north Pacific. It is distributed from southern California, through the US west coast and Alaska and across to Kamchatka, at depths ranging from 35 m to over 1500 m. Young fish are typically found in shallow waters but move offshore as they age with juveniles and adults found between 100 m to 300 m and older adults much deeper. The lifespan of sablefish is of the order of 100 years, but reaching maturity at just 5-7 years, and maximum size around 10 years.

The assessment region for sablefish considered in this review covers the US west coast EEZ ranging from southern California, through Oregon to the USA-Canada border. Linkages with

sablefish beyond west coast waters are assumed to be negligible for assessment purposes though there is likely a connection with Canadian stocks and in deeper waters beyond the US EEZ.

Catches of sablefish on the US west coast have taken place since the early 20<sup>th</sup> century, fluctuating around 2-3,000 t, primarily from hook and line fisheries, until about 1970. At that time, foreign vessel catches, principally using pots, led to a rapid increase in catches to a peak of more than 24,000 t in 1976. Domestic catches also increased in this period with potting and trawling increasing more than hook and line. Catches slowly declined from 1980 as market demand decreased and with the introduction of management measures. Over the past decade catches have been fairly constant below 10,000 t with hook and line and trawling each accounting for 40-45% of catches and potting the remainder.

Sablefish was last assessed in 2007. At that time, the point estimate for depletion of spawning biomass was 38.3%, just below the management target of 40% of virgin biomass. The exploitation rate was estimated well below (less than half) the reference SPR rate. The 2011 assessment is a simpler model than that used in 2007 and makes substantial changes, many resulting from comments by the 2007 STAR Panel, the SSC and industry.

## REVIEW PROCESS

**ToR 7** *Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations*

The Stock Assessment Review (STAR) Panel for sablefish and Dover sole took place at the NWFSC, Newport, Oregon, from 25<sup>th</sup> to 29<sup>th</sup> July 2011. The review was hosted by the NWFSC.

Participants in the review are listed in Appendix 3. The STAR Panel comprised a PFMC SSC appointed Chair (Wespestad), a PFMC appointed reviewer (Sampson, SSC and OSU) and two CIE reviewers (Kupschus and Stokes). The rapporteurs (Sampson and the chair for sablefish and Stokes and Kupschus for Dover sole) for the STAR Panel reports were appointed on the first morning during the opening session. The STAR Panel was tasked with providing separate reports for sablefish and Dover sole. Notification of the meeting and dissemination of papers followed closely the schedule laid out in the CIE Statement of Work (see Appendix 2). Materials were provided in advance *via* a dedicated ftp server (see Appendix 1). Overall, administration of the review was sound and meeting facilities good.

The Terms of Reference (ToR) for the review are given in Appendix 2, Annex 2. Often, reviews including CIE experts focus on a particular phase of the stock assessment process – either the data inputs or the assessment *per se*, and often deal only with a single stock. The ToR set for the STAR 4 review (and other STAR meetings) were very wide, spanning for each of sablefish and Dover sole, data quality (including collection and analysis) and the stock assessment. For STAR 2 it was noted in a separate CIE report that given the scope of the ToR and review meeting, it

was not possible to devote as much time as would be desirable to every issue area. This was not a major difficulty during STAR 3, despite substantial difficulties with one stock. In STAR 4, there were no constraints on time, and the Panel was well able to review both stock assessments in the time available.

The STAR 4 process was very good. Although only single STAT members were available for each stock assessment, the presentations were well prepared, thoughtful, and of appropriate detail to allow thorough discussion and exploration without becoming bogged in unnecessary detail. Responses to requests were thorough, often going beyond the narrow request, and well communicated. The review demonstrated that with appropriate preparation it is possible reasonably thoroughly to review two stocks in the one week. This is not a criticism of some of the previous presentations and reviews, notably STAR 2. What stands out when comparing STAR 2 and 4 is that while all assessments were thorough and well considered, and all responses to requests willing and helpful, the presentations in STAR 4 were much leaner, allowing faster delving in to key issues. In STAR 2, with hindsight, the presentations were perhaps too long and detailed, leading to the Panel getting distracted too early in to unnecessary issues. This is reflected in the number of requests made of the respective STAT.

The meeting followed the general outline of the draft agenda (Appendix 2, Annex 3) but with sufficient flexibility to allow necessary responses from the two STAT. The STAR process involves the STAR Panel working with Advisors and the STAT not just to review data and assessments but also to agree to definitions of final decision tables. For both sablefish and Dover sole, the Panel reached a point where agreement was reached on what would constitute a base case run and sensitivity tests, and the states of nature (and initial) catch options to go in to decision tables. The final, specified base case runs and sensitivity tests were all finalized during the Panel meeting, and the final decision tables prepared.

The sablefish and Dover sole STATs comprised staff from the NWFSC. Panel advisors included representatives from the PFMC staff, Groundfish Management team (GMT) and Groundfish Advisory Panel (GAP). Other participants included NWFSC staff as well as fishing industry representatives and the public. I am not aware of any problems with notification of the meetings and interpret from the presence of stakeholder representatives and the public, and lack of complaint, that notification was appropriate. All participants were able to participate throughout the meeting and opportunity was explicitly and regularly given for input. Many non-Panel participants contributed usefully to discussion and I believe that all were provided appropriate opportunity for involvement both during the Panel meeting and during extra-mural discussions.

## **REVIEWER'S ROLE IN THE REVIEW ACTIVITIES**

The role of the reviewer is set out in the CIE Statement of Work, Attachment A, attached here in Appendix 2, Attachment A. Both CIE reviewers are tasked with producing an independent

report to the CIE. The reviewers are additionally tasked with contributing to Panel Reports for each of Dover sole and sablefish.

In addition to *becom(ing) familiar with the draft stock assessments(s) and background materials (ToR 1)*, I (Stokes) participated in all discussions and contributed to note-taking (both stocks), recording requests and rationales, and drafting Panel reports (with Kupschus for Dover sole). After the meeting, I further contributed by e-mail to drafting and editing of Panel reports which at the time of writing this CIE report are with the Panel Chair for final formatting. Both are close to completion. Note that at the time of writing this (CIE) report, the STAR 2 and 3 Panel Reports have also yet to be finalized; I am unsure where they stand.

## **SUMMARY OF FINDINGS BY STOCK**

**ToR 2** *Comment on the quality of data used in the assessments including data collection and processing.*

### **Dover Sole**

Stock structure: Limited information on distribution of Dover sole was presented during STAR 4 though information is provided in the pre-STAR report. There is clearly a linkage between Dover sole stock(s) along the western coast of the USA and Canada but the results from tagging studies and genetics work do not obviously point to a specific stock structure for assessment and management. Given the complexity even of the assumed single stock, and lack of data to provide information on detailed structure and fish movements, the assumption of a single stock in US west coast waters for assessment purposes is a reasonable simplification at this time, recognizing the need to strike a balance in the modeling of complex dynamics with available data and the need to assess for the purposes of informing decision making. Nevertheless, discussion during STAR 4 suggests substantial variation in the distribution of males and females by size, especially in the southern part of the defined stock and further work to understand the details of Dover sole distribution and movement is encouraged.

Natural Mortality: Unusually, there are no published estimates of natural mortality for Dover sole. Previous assessments have used a constant value of 0.09 based on the assumption of a maximum age of close to 50 years and using standard techniques. In this assessment, natural mortality is estimated for males and females separately in the stock assessments with priors derived from unpublished meta-analyses by Hamel. Extensive discussion took place during STAR 2 and a presentation was made at that meeting by Hamel (see file *Mprior.ppt* on the ftp server for STAR 2) which explained background theory and alternative methods of estimation as well as derivation of the priors used for a number of stock assessments to be reviewed during the 2011 STAR Panels. The proposed priors for Dover sole are shown in the Dover sole pre-STAR report as Figure 25; the median for both males and females is just above 0.1 with a range spanning from less than 0.05 to about 0.25. Use of the prior is appropriate. During STAR 4, for

both Dover sole and sablefish, exploration of age-specific natural mortality (based on length) using SS3 was undertaken. The work was not extensive. It is **suggested** in general that further consideration of age-based natural mortality be made and guidance as to appropriate use provided.

**Steepness:** Steepness is assumed fixed at 0.8 (the value for flatfish from the meta-analyses by Myers et al, 1999). Likelihood profiling on steepness was carried out and reported in the pre-STAR report (Fig. 87) and in the STAR 4 presentations. From profiling, it is clear that there is little or no information available to the model to estimate steepness. Use of the fixed value combined with sensitivity testing is appropriate.

**Length/Age/Growth:** Growth is estimated in the stock assessment separately for males and females. Data on length and age and age *versus* length are available variously from commercial fisheries and surveys. As ever, inter-laboratory comparative work on ageing is encouraged. An issue of note for Dover sole is that the spatial patterning of males and females, together with sex-related differences in growth, even in the wide-distribution NWFSC shelf-slope survey, is such as to cause strong variations in sex ratio with year, depth and perhaps latitude. This may explain some of the differences seen in survey data, especially of major differences in sex ratios at older ages. However, these differences, which cause difficulty in model fitting, could also be due to unrepresentative sampling of ages at length. Investigation of sampling procedures would be worthwhile.

**Maturity:** Studies on maturity of Dover sole have led to variable estimates through time. In the previous assessment a trend in 50% maturity was included loosely based on multiple maturity studies conducted between 1952 and 2000. This assessment assumes a constant maturity schedule based on the earliest study (1952). Given the lack of evidence for systematic change, this seems appropriate. The assumption should have little impact on estimates of key management quantities. Nevertheless, as often noted in reviews, it would be useful if more systematic and thorough collection of maturity data were undertaken.

**Surveys:** Five sets of fishery independent indices are available: triennial trawl surveys conducted between 1980 and 2004, split (effectively, by separate catchability but not selectivity estimation) in 1995 to create two series reflecting differences in depth and spatial coverage; AFSC slope trawl surveys between 1996 and 2001; and annual trawl surveys conducted by the NWFSC between 1999 and 2008 but split in 2002 as the survey coverage extended from slope-only to cover both the shelf and slope. Survey age and length data were expanded by tow (as opposed to trip for fishery composition data). This could lead to over-weighting of survey composition data in the assessment if there are correlations between tows; the issue was not considered in the limited time available. From the limited presentations during STAR 4, the indices appear to be sound.

**CPUE:** CPUE were used in previous assessments but have been dropped in this one. The reason given is that survey series are available for the same period and for more recent years, plus the

relationship between CPUE and abundance and the appropriate selectivity assumptions are unclear. No new attempt was made to fit CPUE. Within the time constraints of developing a new assessment this is understandable but it is always interesting to attempt to derive CPUE indices. Although no CPUE index is used, it is good to see that attempts were made to engage with fishermen and representatives to help develop a picture of the fishery both in recent and historical times. Coupled with the extensive management measures history, this is a useful background to sensitive modeling.

Removals: Total removals (landings and discards) are important, especially when virgin biomass based reference point are used. The Dover sole assessment is fairly standard in that productivity parameters are estimated using a complex model and fitting procedure for a period relatively late in the fishing history and then those parameters are applied in a simple accounting exercise, taking account of removals (withdrawals) over a prolonged period to estimate initial capital (virgin biomass). Any uncertainty in removals can therefore be a major source of uncertainty in estimates of depletion (as a ratio of current to virgin biomass). The new reconstruction is split by state (3 areas) rather than the two areas used in the 2005 assessment. Direct comparison is therefore difficult although total catches may be compared; there appears to be little difference overall, although the catches used in 2005 are slightly higher. Recent catches (1981 onwards) for all states are from the PacFIN. Historical catches for Oregon are from the 2010 reconstruction used for many PFMC fisheries. As noted elsewhere, that work still needs to be formally reviewed. Catches for California are from CALCOM or taken directly from the 2005 assessment. Again, as noted elsewhere, there is a need to review catch reconstructions for California. Catches for Washington have been reconstructed by the STAT for this new assessment based on a variety of sources outlined in the pre-STAR document. This is commendable but as a general point it seems inefficient for STAT to reconstruct specific catch histories for each assessment. It is **recommended** that completing the reconstruction of the Washington historical catches, as for California and Oregon, should be a priority, together with review of the Oregon and California reconstructions.

The pre-STAR assessment used Washington catches which were slightly in error. Prior to the STAR 4 review, data were corrected and a new base case model prepared. All work during STAR 4 used the corrected data stream.

## **Sablefish**

Stock structure: It is clear that sablefish are widely distributed beyond the area of assessment, major changes in distribution take place as fish age, life-history characteristics vary with latitude, and environmental variation is an important driver of dynamics. All these factors suggest that, from an ecological perspective, modeling of sablefish should be complex. However, the purpose of assessment is to support management and given the management and assessment history, it is reasonable to maintain west coast-only assessments. It is known there are fish at greater depths than surveyed or fished. These fish are likely older and will contribute to spawning; not

including them in analyses is likely precautionary. Stock connections to the north (Canada) are potentially more of a concern but only if those stocks are much more heavily exploited or if there is a major stock-recruit dependency. Neither factor seems to be a major issue but a closer examination of the Canadian fisheries and management is encouraged to confirm whether or not these need to be taken in to account.

Natural Mortality: Previous assessments have used a constant value of 0.07 (implying longevity of the order of 60 years) but it is unclear where this originated. In this assessment, natural mortality is estimated for males and females separately in the stock assessments with priors derived from unpublished meta-analyses by Hamel. Extensive discussion took place during STAR 2 and a presentation was made at that meeting by Hamel (see file *Mprior.ppt* on the ftp server for STAR 2) which explained background theory and alternative methods of estimation as well as derivation of the priors used for a number of stock assessments to be reviewed during the 2011 STAR Panels. The priors for sablefish have a range spanning from 0.06 to above 0.2. This appears high compared to the previously used estimate and given that sablefish may live to 100 years (implying a natural mortality rate nearer 0.04). However, for a “long-lived” species, sablefish is unusual in that both maturity and maximum size are reached quickly, and the population can be dominated by young fish. Use of the prior is appropriate. As noted above, during STAR 4, for both Dover sole and sablefish, exploration of age-specific natural mortality (based on length) using SS3 was undertaken. The work was not extensive. It is **suggested** in general that further consideration of age-based natural mortality be made and guidance as to appropriate use provided.

Steepness: Steepness is assumed fixed at 0.6. Likelihood profiling on steepness was carried out and reported in the pre-STAR report and in the STAR 4 presentations. From profiling, it is clear that there is little or no information available to the model to estimate steepness. Further, sensitivity of status estimates to steepness is relatively small and well captured within the uncertainty envelope of the base case model with fixed steepness. Use of the fixed value combined with sensitivity testing is appropriate.

Length/Age/Growth: Growth is estimated in the stock assessment separately for males and females. Data on length and age and age *versus* length are available variously from commercial fisheries and surveys. Given the large amount of composition data in the assessment (and its high weighting; especially for surveys for which data are expanded by tow) the quality of these data is important, both for estimating productivity parameters but especially if the stock is estimated to be at or below the MSST when estimates of recent year-classes are likely to impact projections and management decisions. The impact of weighting was tested by arbitrarily weighting very high each of length, age (and index) data sources. It is clear that the information contained in the different data sources leads to different interpretations of recent stock size and year-classes. The issue is essentially one to be considered at ToR 4 but is mentioned here because appropriate weighting depends also on a consideration of sampling. More fundamentally, ageing bias and imprecision is a recognized problem for sablefish and considerable work has been undertaken on the issue as part of the 2011 assessment. The approach taken ultimately was again to test model

sensitivity (in terms of derived parameters) to various ageing bias and ageing scenarios. As tested, bias has relatively little effect except on scale, implying that model fits are not much affected. Imprecision obviously impacts estimates of uncertainty. Overall, there is a clear need to better understand ageing bias and imprecision and improved age-reading and comprehensive age sampling is encouraged.

**Maturity:** There is considerable information on sablefish maturity with indications of variability that are hard to interpret. Whether the variations measured are due to sampling or process error is hard to disentangle. The approach taken, of using an intermediate value from the many studies and carrying out sensitivity analyses, seems reasonable. Unsurprisingly, model runs with alternative maturity assumptions do not affect model fits while estimates of spawning biomass (including virgin and current) scale linearly. Although better maturity (and fecundity) sampling is encouraged in order to understand the complex dynamics of sablefish, it is not clear that further sampling will lead to gains in the assessment and management of sablefish.

**Surveys:** Four sets of fishery independent indices are available: triennial surveys conducted between 1980 and 2004, with separate catchability fit before and after 1995 to reflect changes in timing and coverage; AFSC slope surveys between 1997 and 2001; and annual surveys conducted by the NWFSC between 1998 and 2010, split in 2002/3 to reflect differences in spatial and depth coverage. Survey age and length data were expanded by tow (as opposed to trip for fishery composition data). This could lead to over-weighting of survey composition data in the assessment if there are correlations between tows; the issue was not considered in the limited time available. From the limited presentations during STAR 4, the indices appear to be sound and the use of length, age and age-at-length compositions sound. A difference from the 2007 assessment is that a previously used environmental index has been dropped. Extensive work was conducted to derive two new indices and sensitivity testing to those indices is reported in the pre-STAR report; both had negligible effect on estimates of spawning biomass or recruitment.

**Removals:** Total removals (landings and discards) are important, especially when virgin biomass based reference point are used. The sablefish assessment is fairly standard in that productivity parameters are estimated using a complex model and fitting procedure for a period relatively late in the fishing history and then those parameters are applied in a simple accounting exercise, taking account of removals (withdrawals) over a prolonged period to estimate initial capital (virgin biomass). Any uncertainty in removals can therefore be a major source of uncertainty in estimates of depletion (as a ratio of current to virgin biomass). The new reconstruction is split by gear (hook and line, pot, trawl). Recent catches (1981 onwards) for all states are from the PacFIN. Historical catches for Oregon are from the 2010 reconstruction used for many PFMC fisheries. As noted elsewhere, that work still needs to be formally reviewed. Catches for California are from CALCOM. Again, as noted elsewhere, there is a need to review catch reconstructions for California. Catches for Washington have been reconstructed by the STAT for this new assessment based on a variety of sources outlined in the pre-STAR document. This is commendable but as a general point and as noted elsewhere it seems inefficient for STAT to reconstruct specific catch histories for each assessment. It is **recommended** that reconstruction

of the Washington historical catches, as for California and Oregon should be a priority, together with review of the Oregon and California reconstructions

**ToR 3** *Evaluate and comment on analytic methodologies.*

### **Dover Sole**

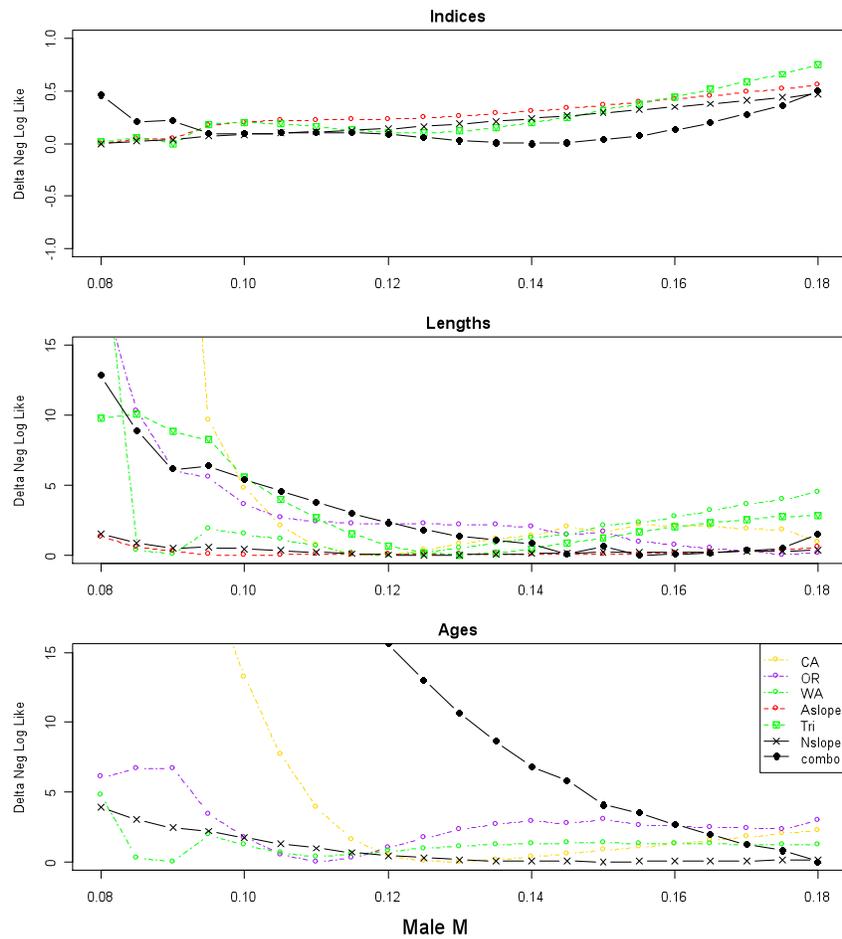
The assessment model assumes a distinct US west coast-wide stock of Dover sole and uses catch data from 1911 to 2010 separated by sex and state. Catches and compositions are provided by state and observer data and compositions are provided from 2002 onwards. Five survey indices are provided with associated length compositions plus age and conditional age composition data for the most recent and extensive NWFSC shelf-slope survey. Maturity at length and weight at length are assumed constant. Steepness is fixed at 0.8. The model estimates separate length-based selectivity for three trawl fleets (by state), by sex, with female selectivity an offset of male selectivity which is assumed to be asymptotic. Retention is fit separately. Survey selectivity is fit for each survey separately (though common for the two Triennial survey periods) using a flexible cubic spline function available in SS3. Female selectivity is again modelled as an offset of male selectivity. The flexible selectivity function allows a complex selectivity pattern to be fit, arguably reflective of the complex spatial/length/gender patterning. Growth is estimated in the model (by sex) as are natural mortality (by sex, with male mortality as an offset to estimated female mortality). Informative priors derived from meta-analyses are provided for natural mortality.

The assessment of Dover sole was implemented using Stock Synthesis 3 (SS3; v3.21f). Stock Synthesis has been extensively used and the main software and extensions have been validated and documented. The implementation in SS3 was new in 2011 and used a number of new features (e.g. cubic spline function for selectivities, age-specific natural mortality based on length for sensitivity testing). The new implementation was tested with settings and data as closely as possible mimicking the previous assessment. Results of the analysis suggest that there are some differences in estimates of spawning biomass and depletion which are probably caused by the new model structure, though the possibility that some differences may be due to changes in SS versions cannot be ruled out. These differences are small compared to the differences caused by removal of CPUE data from the assessment and especially compared to removal of the NWFSC indices as used in 2005. It is notable that the differences in median estimates of spawning biomass and depletion between the old and new models, when fit to the same data, are very small when compared to differences caused by replacement of data and that they are smaller still in comparison to the confidence intervals on the new base case. Overall, the link analysis provides confidence in the new model as a starting place for exploration.

During STAR 4 the model was explored extensively using SS3. Most model runs were to MPD only although a full MCMC has been conducted on the base case and there do not appear to be any problems with convergence or obvious bias in MPD estimates. Tuning of model runs

followed standard procedures with multiple passes to refine index and composition weights. Although a simplification of the biological and fishery dynamics, the model is nevertheless complex, fitting a total of 216 parameters. Pre-STAR and STAR 4 exploration of the model was thorough and uncertainty (see below) seems to be well depicted around the base case with the major axis of uncertainty, natural mortality, well investigated. The model and methods used are fairly standard and I see no cause for concern.

Of note during STAR 4, during model explorations, was the response to a request to tabulate the likelihood components and key model parameters when holding female natural mortality constant but profiling on male natural mortality. The intent of the request was to explore tensions between model parameters and data sources. The response from the STAT was a graphic (replicated below) showing the log-likelihood contributions of the various survey data sources. This graphic was especially useful and it is **recommended** that similar summary plots be made available as a standard output.



*Figure 1 (replicated from STAR 4 Panel report): Log-likelihood contributions of the various survey sources to the estimation of natural mortality (M) simulated by fixing male natural mortality in the base model over the range of 0.08 to 0.18 while fixing female M.*

## **Sablefish**

The assessment uses age-based selectivity fit in SS3 using cubic splines. Prior to the STAR 4 meeting an error was found by the STAT lead author in SS3 coding for this function. Pre-STAR results were quickly updated and made available for STAR 4. All exploration during STAR 4 used the corrected SS3 implementation.

The assessment model fit assumes a distinct US west coast-wide stock of sablefish and uses catch data separated by sex. The catch history starts in 1900. Catches and compositions are provided by gear type (built up from state) and observer data and compositions are provided from 2002 onwards, as well as a single discard rate estimate from the 1980s. Discard ratios and compositions (as mean weight) are fit in the model. The model estimates separate age- and sex-based selectivity (with females modeled using an offset to male selectivity) for each fleet using a flexible cubic spline function available in SS3. Two selectivity periods are fit, chosen on the basis of management measures and extensive discussion. Survey selectivity, also by sex, assumes a double normal function (as older fish at greater depths are not covered by the survey). Growth is estimated in the model (by sex) as are constant natural mortality (by sex, with male mortality as an offset to estimated female mortality). Steepness is fixed. A prior derived from meta-analyses are provided for natural mortality. Four survey series fit. Age, length, and conditional age-at-length compositions are fit in the model.

The assessment was implemented using Stock Synthesis 3 (SS3; v3.21f). Stock Synthesis has been extensively used and the main software and extensions have been validated and documented. The implementation in SS3 was new in 2011 and considerably revised from the previous assessment. Extensive exploration was conducted before deciding on a base case candidate model. Tuning of model runs followed standard procedures with multiple (iterative) passes to refine index and composition weights; there was no arbitrary data weighting of data sets. A full MCMC has been conducted on the candidate base case and there do not appear to be any major problems with convergence or bias in MPD results.

Although a simplification of the biological and fishery dynamics, the model is nevertheless complex, fitting a total of 238 parameters. Pre-STAR and STAR 4 exploration of the model was thorough and uncertainty (see below) seems to be well depicted around the base case with the major axes of uncertainty well investigated. The model and methods used are fairly standard and I see no cause for concern.

**ToR 4** *Evaluate model assumptions, estimates, and major sources of uncertainty and provide constructive suggestions for improvements if technical deficiencies or additional major sources of uncertainty are identified.*

### **Dover sole**

The model assumes a single, distinct US west coast stock with no linkage beyond US waters. This is clearly a simplification, as is the assumption of a uniform stock within US waters. There is clearly substantial spatial patterning within and between sexes. As noted above, there is a need to strike a balance in stock assessment modeling for management advisory purposes. The need is not to model all complexities but rather to model sufficiently to provide reliable, robust and credible advice given knowledge, reasonable assumptions and data availability. The new Dover sole assessment is simpler than the 2005 assessment and fits to data are far from perfect. Overall, however, the balance struck seems to be appropriate, especially given the thoughtful and careful explorations of uncertainty. As noted under ToR 2 further work to understand the details of Dover sole distribution and movement is encouraged. If further investigation were to suggest alternative model structures and if data were available for fitting such models, then it might be appropriate to consider more detailed assessment modeling. My expectation is that such work would be interesting but not necessarily of great utility from a strict management perspective.

Steepness is fixed at 0.8 in the assessment. Likelihood profiling as part of the pre-STAR work clearly demonstrated the lack of information on the parameter and the tendency to estimate steepness high. Sensitivity testing demonstrated the lack of dependency of the scale of spawning biomass on steepness, and of depletion. Given the overall high estimate of depletion (that is, high current:virgin spawning biomass ratio) and prior on steepness, this is unsurprising. Certainly, in this case, a flatfish at high depletion, steepness should not be expected and does not appear to be a major cause of uncertainty in estimates of relevance to management. Use of fixed steepness seems appropriate.

Natural mortality and selectivity are the major points of interest in the assessment. Exploration during STAR 4 revealed tensions in age and length data from various sources and an undesirable dependency of female spawning biomass on male natural mortality (female spawning biomass increases with male natural mortality). The relationship between female spawning biomass and male natural mortality was found ultimately to be caused by the way selectivity is parameterized in SS3 using an offset for the less selected sex (in this case females), when applied also using the double normal function. It was not possible during STAR 4 to break the linkage (offset) between male and female selectivity. A simple attempt to use age-specific natural mortality (length-based, by sex) to reduce the conflict was unsuccessful given the large differences in sex ratios at older ages and relatively small differences in growth patterns. It is important to investigate the problem further before any future assessment and it is **recommended** that SS3 be modified to allow independent fitting of selectivity by sex.

The model uses substantial data sources, fitting to survey and fishery-dependent indices and length and age composition data, with priors and externally calculated parameters, to estimate a range of parameters and derived parameters of interest to management. The fits to composition data are acceptable though there are clear compromises given model structure and tensions between data, for instance as exposed by profiling on male natural mortality (see Fig 1). Fits to indices are acceptable though they show little variation and have large CVs. Despite the complexity of fitting productivity parameters using composition data, the major uncertainty in the assessment remains in those parameters, most notably natural mortality and the way it influences female spawning biomass through the selectivity functions.

The STAR 4 Panel decision was to accept the pre-STAR base case (with corrected data), estimating growth, natural mortality and selectivity, but with fixed steepness, and to characterize uncertainty by choosing male/female natural mortality combinations consistent with the 12.5 and 87.5 percentiles of current spawning biomass from the base case run (see figure 2). This captures the range of uncertainty within the model as structured. The agreed states of nature for the decision table include the base case and low and high states with female:male natural mortality combinations, respectively, of 0.117:0.142, 0.110:0.125, and 0.120:0.159.

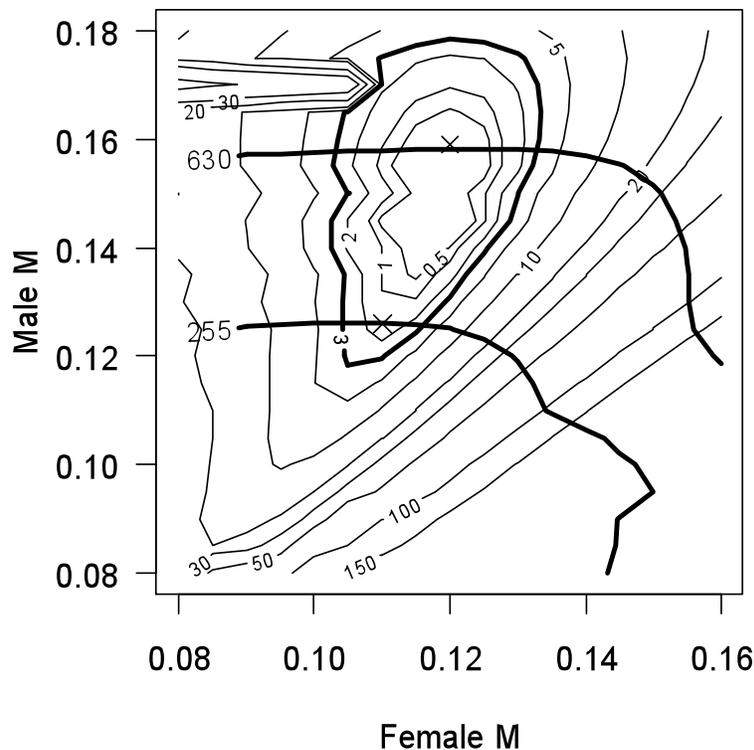


Figure 2 (replicated from presentation by STAT during STAR 4). 12.5% and 87.5% quantiles from distribution of the log of current spawning biomass corresponding to male and female natural mortalities which minimize the log-likelihood. (Note that runs in upper left not converged/need checking before final assessment report.)

## Sablefish

The model assumes a single, distinct US west coast stock with no linkage beyond US waters. This is clearly a simplification, as is the assumption of a uniform stock within US waters. There is clearly much spatial patterning, especially by age. As noted for Dover sole, there is a need to strike a balance in stock assessment modeling for management advisory purposes. The need is not to model all complexities but rather to model sufficiently to provide reliable, robust and credible advice given knowledge, reasonable assumptions and data availability. The new sablefish assessment is simpler than the previous (2007) assessment and fits to data are far from perfect, with under-estimation of large year-classes and some periods of systematic misfit. Overall, however, the balance struck seems to be reasonable, especially given the thoughtful and careful explorations of uncertainty.

Multiple model configurations and sensitivity tests were performed pre-STAR and during STAR 4 further exploration was made of selectivity blocking, plus group choice and age-specific natural mortality. In all cases, the intention was to investigate if fits could be improved, especially of recent year-classes. Regardless of the tests conducted, no real improvements were made. While it is possible a more complex model structure might help to improve overall fit, there are insufficient grounds to add complexity and too few data to justify the attempt at this time.

Two areas that might yet be considered more thoroughly are the use of age-specific natural mortality and changes to the plus group. Sensitivity tests during STAR 4 included both these factors. A change of the plus group from 50 to 35 resulted in overall similar estimates of virgin and current biomass but with necessarily different trajectories in the period for which information on recruitment was lost (roughly 1960-1980). Importantly, the change in plus group had little or no impact on estimation of recent year-classes. It is **recommended** that SS3 be modified to allow simpler changes in plus groups (which had to be done by manual changes to the data during STAR 4). Sensitivity tests using the SS3 implementation of Lorenzen M (i.e. growth-related, age-specific natural mortality) also had little effect overall or on estimation of recent year-classes.

The model uses substantial data sources, fitting to survey and fishery-dependent indices and length and age composition data, with priors and externally calculated parameters, to estimate a range of parameters and derived parameters of interest to management. The fits to composition data are acceptable though there are clear compromises given model structure and tensions between data. These are well exposed by likelihood profiles by data type on female natural mortality, exploited equilibrium recruitment, and steepness. These profiles by data source are highly informative and as for Dover sole it is recommended that they be a common output. As well discussed in the pre-STAR document, even when fixing steepness, the base case model in which other leading parameters are estimated reasonably characterizes overall uncertainty.

The STAR 4 Panel decision was to accept the pre-STAR base case (using the corrected SS3 implementation), estimating growth, natural mortality and selectivity, but with fixed steepness, and to characterize uncertainty by using the 12.5 and 87.5 percentiles of current spawning biomass from the base case run. This captures the range of uncertainty within the model as structured. These are the agreed states of nature for the decision table.

*ToR 5 Determine whether the science reviewed is considered to be the best scientific information available.*

### **Dover Sole and sablefish**

In my opinion, the STAT initially, and in conjunction with the STAR Panel and advisors, has comprehensively reviewed the available information on Dover sole and sablefish and has conducted thorough analyses to provide estimates of management-related quantities. Uncertainties in inputs and estimates of interest have been adequately explored and overall I am confident that the resulting assessments and decision tables represent the best scientific information available.

*ToR 6 Provide specific suggestions for future improvement in any relevant aspects of data collection and treatment, modeling approaches and technical issues.*

Specific recommendations and suggestions are highlighted in **bold, red** in the preceding sections. I distinguish between recommendations as necessary activities and suggestions as desirable ones, recognizing that research planning and prioritization requires consideration of multiple factors and applies to many stocks, fisheries and other factors.

A number of general recommendations emerged during STAR 4, especially with respect to SS3 updating. These include implementing the option to fit selectivities independently for males and females (see ToR 4, above), implementing the ability simply to alter and investigate plus group options (see ToR 4, above), standard plotting of likelihood components by data source (see ToR 3, above), and provision of guidance on use of age-specific natural mortality (based on length; see ToR 2, above). The general recommendation is again made to complete Washington catch reconstructions and review those already carried out for California and Oregon (see ToR 2, above). In discussion on Dover sole related to catchability estimates for surveys, it was further noted that conclusions from the NMFS workshop held in 2008 on developing priors on catchability were not available to the STAT or Panel. It is **recommended** that these should be made generally available and where appropriate followed up for specific assessments.

## CONCLUSIONS AND RECOMMENDATIONS

Because of the wide scope (two stocks, consideration of both data collection and analysis, and stock assessment), it is highly likely that misinterpretation of some materials, presentations or discussions has been made. This is the fault of the reviewer, not of the many excellent STAT scientists who gave good presentations and made the review an enjoyable experience – to them, many thanks. As noted previously, the NWFSC is in the enviable position of having many excellent scientists doing good work and providing support to the PFMC.

The STAR Panel system is well established and I am reluctant to criticize it on the basis of a few meetings. My view may change over the course of the 2011 Panel meetings. My initial view, after STAR 2, was that reviewing two entire stock assessments and all data inputs in one week, using the same Panel, is too frenetic. That view was based on the conclusion at the time that the time available was insufficient to do justice to the substantial efforts of the STAT and to review in detail all necessary aspects of the work. After STAR 4 the view is clearly not generally applicable.

The assessments for Dover sole and sablefish are both effectively new assessments, developed after thorough and careful examination of data and considered modeling. Both assessments seek to simplify complex biological and fishery issues and therefore compromised to varying degrees when fitting data. Both assessments strike a good balance in this respect. Both assessments have resulted in credible base cases and have well explored uncertainty. The emergent management advice for both Dover sole and sablefish represents the best scientific information available at this time.

## **APPENDIX 1**

### **BIBLIOGRAPHY**

Prior to the Workshop, extensive materials were provided *via* a dedicated, anonymous ftp server ([ftp.pccouncil.org/pub/GF\\_STAR\\_4\\_2011\\_Sablefish\\_DoverSole\\_July\\_25-29](ftp.pccouncil.org/pub/GF_STAR_4_2011_Sablefish_DoverSole_July_25-29)). The materials were extensive and relevant to all terms of reference in varying degrees.

During the workshop multiple presentations were given, and additional materials were provided on request, including further background documents and presentations as well as responses to Panel requests. All files were made available using the dedicated server which was accessed using hotel guest Wi-Fi throughout the meeting. The access was generally adequate. Directory listings are not provided here as the server is anonymous (and therefore publicly available).

## **APPENDIX 2**

### **Attachment A: Statement of Work for Dr. Kevin Stokes**

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

##### **Stock Assessment Review (STAR) Panel for Sablefish and Dover Sole**

**Scope of Work and CIE Process:** The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from [www.ciereviews.org](http://www.ciereviews.org).

**Project Description:** Benchmark assessments will be conducted for sablefish and dover sole. These are critical species to the slope fisheries and previous STAR panel reviews identified modeling issues to address. Additionally, the NWFSC shelf-slope survey data can only be fully included for the stock if full or benchmark assessments are conducted. Assessments for these two stocks will provide the basis for the management of the groundfish fisheries off the U.S. west coast, providing scientific basis for setting OFLs and ABCs as mandated by the Magnuson-Stevens Act. The technical review will take place during a formal, public, multiple-day meeting of fishery stock assessment experts. Participation of external, independent reviewer is an essential part of the review process. 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:** Two CIE reviewers, one of which will participate during all STAR panels for consistency, shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have working knowledge and recent experience in fish population dynamics, with experience in the integrated analysis modeling approach, using age-and size-structured models, use of MCMC to develop confidence intervals, and use of Generalized Linear Models in stock assessment models. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

**Location of Peer Review:** Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Newport, Oregon during 25-29 July 2011.

**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 (full name, title, affiliation, country, address, email) 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 other information concerning 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., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact 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) to the CIE reviewers the 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 Lead Coordinator on where to send documents. 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. The CIE reviewers shall read all documents in preparation for the peer review.

Documents to be provided to the CIE reviewers prior to the STAR Panel meeting include:

- The current draft stock assessment reports;
- Previous stock assessments and STAR Panel reports for widow rockfish;
- The Pacific Fishery Management Council's Scientific and Statistical Committee's Terms of Reference for Stock Assessments and STAR Panel Reviews;
- Stock Synthesis (SS) Documentation
- Additional supporting documents as available.
- An electronic copy of the data, the parameters, and the model used for the assessments (if requested by reviewer).

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **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 herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. 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 may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's 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 in Newport, Oregon during 25-29 July 2011.
- 3) In Newport, Oregon during 25-29 July 2011 as specified herein, and conducts an independent peer review in accordance with the ToRs (**Annex 2**).
- 4) No later than 12 August 2011, 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](mailto:shivlanim@bellsouth.net), and to Dr. David Die, CIE Regional Coordinator, via email to [ddie@rsmas.miami.edu](mailto:ddie@rsmas.miami.edu).
- 5) Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

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

20 June 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
11 July 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
<b>25-29 July 2011</b>	Each reviewer participates and conducts an independent peer review during the panel review meeting
12 August 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
26 August 2011	CIE submits CIE independent peer review reports to the COTR
31 August 2011	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 approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR 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 ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not 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 and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via [William.Michaels@noaa.gov](mailto: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 be completed with 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 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 CIE reports to the NMFS Project Contact and Center Director.

**Support Personnel:**

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### **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, and specify whether the science reviewed is the best scientific information available.
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 in which the weaknesses and strengths are described, 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 brief summary of findings, of the science, 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 weaknesses and strengths of the science reviewed, 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 the following appendices:
  - 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**

### **Stock Assessment Review (STAR) Panel for Sablefish and Dover Sole**

1. Become familiar with the draft stock assessment and background materials.
2. Comment on the quality of data used in the assessments including data collection and processing.
3. Evaluate and comment on analytic methodologies.
4. Evaluate model assumptions, estimates, and major sources of uncertainty and provide constructive suggestions for improvements if technical deficiencies or additional major sources of uncertainty are identified.
5. Determine whether the science reviewed is considered to be the best scientific information available.
6. Provide specific suggestions for future improvement in any relevant aspects of data collection and treatment, modeling approaches and technical issues.
7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations

### **Annex 3: Tentative Agenda**

*Note: Final Agenda to be provided two weeks prior to the meeting with draft assessments and background materials.*

#### **Stock Assessment Review (STAR) Panel for Sablefish and Dover Sole**

Northwest Fisheries Science Center  
Hatfield Marine Science Center,  
2032 SE Oregon State University Drive,  
Newport, Oregon, 97365

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#### **Monday, July 25, 2011**

- 9:00 a.m. Welcome and Introductions
- 9:15 a.m. Review the Draft Agenda and Discussion of Meeting Format (Panel Chair)
- Review Terms of Reference for Assessment and Review Panel
  - Assignment of reporting duties
  - Discuss and agree to format for the final assessment document
- 9:45 a.m. Stock Assessment Team (STAT-1) Presentation of Species 1 (Authors)
- Overview of Data and Stock Synthesis Modeling
- 12:30 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the STAT-1 & Panel discussion
- 3:30 p.m. Coffee Break
- 3:45 p.m. Panel develops request for additional model runs / analyses for STAT 1
- 4:30 p.m. Panel provides written requests for additional model runs / analyses to STAT 1
- 5:00 p.m. Adjourn for day.

#### **Tuesday, July 26, 2011**

- 9:00 a.m. Stock Assessment Team (STAT-2) Presentation of Species 2 (Authors)
- Overview of Data and Stock Synthesis Modeling
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the STAT-2 & Panel discussion
- 3:00 p.m. Coffee Break
- 3:15 p.m. Panel develops request for additional model runs / analyses for STAT 2
- 4:00 p.m. Panel provides written requests for additional model runs / analyses to STAT 2
- 4:30 p.m. Panel check in with STAT-1 if needed
- 5:00 p.m. Adjourn for day.

## Stock Assessment Review (STAR) Panel for Sablefish and Dover Sole

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### Wednesday, July 27, 2011

- 9:00 a.m. STAT-1 Presentation of first set of model runs for Species 1
- Q&A session with the STAT-1 & Panel discussion
  - Panel develops written request for second round of model runs / analyses for STAT 1
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. STAT-2 Presentation of first set of model runs for Species 2
- Q&A session with the STAT-2 & Panel discussion
  - Panel develops written request for second round of model runs / analyses for STAT 2
- 3:30 p.m. Coffee Break
- 3:45 p.m. Continue Panel discussion with STAT-2
- 5:00 p.m. Adjourn for day.

### Thursday, July 28, 2011

- 9:00 a.m. STAT-1 Presentation of Second Set of Model Runs for Species 1
- Q&A session with the STAT-1 & Panel discussion
  - Identification of preferred model and elements for the decision table.
  - Panel develops third list of model runs for decision table and begins drafting STAR report.
- 12:00 p.m. Lunch (On Your Own)
- 1:00 p.m. STAT-2 Presentation of Second Set of Model Runs for Species 2
- Q&A session with the STAT-2 & Panel discussion
  - Identification of preferred model and elements for the decision table.
  - Panel develops third list of model runs for decision table and begins drafting STAR report.
- 3:30 p.m. Coffee Break
- 3:45 p.m. Panel discussion or report drafting continues
- 5:00 p.m. Adjourn for day.

### Friday, July 29, 2011

- 9:00 a.m. Consideration of remaining issues
- Review decision tables for Species 1 and Species 2
- 11:00 a.m. Panel agrees to process for completing final STAR report by Council's September meeting Briefing Book deadline
- 5:00 p.m. Review Panel Adjourn.

**APPENDIX 3**  
**PERTINENT INFORMATION FROM THE REVIEW**

1) Participants List

**Technical Reviewers**

Vidar Wespestad, Panel Chair, Scientific and Statistical Committee (SSC)

Kevin Stokes, Center for Independent Experts (CIE)

Sven Kupschus, Center for Independent Experts (CIE)

David Sampson, ODFW and SSC

**Panel Advisors**

John DeVore, Pacific Fishery Management Council (PFMC) Staff

Joanna Grebel, PFMC Groundfish Management Team (GMT)

Gerry Richter, PFMC Groundfish Advisory Subpanel (GAP)

**Stock Assessment (STAT) Teams**

Allan Hicks, NMFS, Northwest Fisheries Science Center, Dover Sole STAT

Ian Stewart, NMFS, Northwest Fisheries Science Center, Sablefish STAT