STAR Panel Report

LINGCOD

Northwest Fisheries Science Center
Seattle, Washington, USA
15-19 August 2005

Stock Assessment Review (STAR) Panel Members:
Ray Conser (Chair), Southwest Fisheries Science Center & SSC representative
Chris Francis, Center for Independent Experts
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Stock Assessment Team (STAT) Members Present:
Thomas Jagielo, WDFW
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General Overview

The STAR Panel met during of 15-19 August 2005 at the NMFS Northwest Fisheries Science Center in Seattle, WA. The Panel reviewed four stock assessments, namely full stock assessments for canary rockfish and lingcod; and updated assessments for yellowtail and yelloweye rockfish. Draft assessment documents and extensive background material (previous assessments, previous STAR Panel reports, etc.) were provided to the Panel in advance of the meeting. In addition, an FTP site was set up for Panel usage. The model input and output files for each assessment – along with the associated executable files – were uploaded to the FTP site prior to the Panel meeting. Finally, the Panel set up a file server in its meeting room to provide common access to all presentation material and the additional model runs that were conducted during the course of the Panel meeting.

For each stock assessment, the STAT presented its draft assessment document to the Panel and entertained questions and clarifications during the course of the presentation. The Panel then requested additional model runs designed to clarify aspects of model behavior and/or to rectify problems found in the draft assessment. After allowing sufficient time for the STAT to complete the additional work, the Team was asked to present the results on the new model runs and its interpretation of whether a base case had been achieved. Where possible, this process was repeated until a consensus base case – including an adequate representation of the uncertainty – was achieved.

The Panel wrote the first draft of its report during the course of the meeting and as scheduling allowed, reviewed the draft with the respective STATs on the final day of the meeting. Finally, the Panel agreed to have its Chair complete a final version of the report and have it reviewed by other panel members via email after the meeting.

Lingcod Overview

Lingcod has been assessed since 1986 and most recently in 2003. The resource is assessed as northern and southern components (LCN/LCS). Both components are designated as overfished stocks and currently are being managed under Pacific Council rebuilding plans.

Neither the initial lingcod models nor the revisions carried out during the Panel meeting were adequate to support management advice, particularly in the case of LCN. In LCN, the model indicated a strong rebuilding based on two exceptional year-classes. The Panel was concerned by the apparent lack of evidence in the data for these two strong year-classes. Provisional analysis on LCN data conducted during the review raised doubts concerning the reliability of the last two triennial survey estimates. This in turn raised doubts about the LCS assessment in which the estimated rebuilding was strongly dependent upon these two surveys. There was not sufficient time for the STAT to investigate additional concerns of the Panel.

The Panel felt that considerable progress was made in the assessment models. If the STAT were able to adequately address the concerns of the Panel, the LCN and LCS assessments might be suitable for management advice. While the Panel appreciates the

perception of the Industry that lingcod is recently more abundant, the support for this in the assessment data was not apparent.

Analyses Requested by the STAR Panel

1) **What is the proportion over time of biomass (SSB, Female) that is unseen in the fishery and/or survey. Also, this could be extended for males and females as a check to illustrate potential male depletion. This is an issue because the commercial, recreational, and survey selectivities were all dome-shaped.**
This was done by the STAT and showed that a considerable fraction of the resource was in this "cryptic" portion of the stock. For example in LCN, the cryptic fraction began at about 30%; then rose to over 40% in the 1990s; and then fell rapidly in recent years to under 10%. This observation led to the request that runs be made with asymptotic selectivity for the commercial fleet. It is noted that domed versus asymptotic selectivity was an issue for the previous STAR Panel, which recommended that it be investigated in future assessments.

2) **The Panel asked for a matrix or plot of the observed catch and abundance at age and year to see how prominent the recent year-classes are, especially the two very strong recent ones (1998, 1999) in LCN.**
The data showed that the commercial and recreational age frequencies did not suggest that these year-classes were very strong, but that the survey did. Further investigation of the survey data (and there remains a need to check the data and analysis) shows that the 2001 and 2004 triennial lingcod catches were very high across all ages relative to previous surveys. This suggested a change in availability and as a result a further request was made to perform sensitivity runs with these indices removed.

3) **The Panel questioned how discards are handled in the model for both recreational and commercial catches. For LCN, a sensitivity run is requested in which the STAT team uses recent data (Table 8 in draft assessment document); 20% inflation for earlier years (1996-1999); and zero prior to that. We are only interested in the portion that are dead or die subsequently because of the fishing. Can plausible age compositions be found for the recreational fishery? For LCS, just put in B1 catches (and a fraction [5%] of B2) as all small fish and a make a second run with the same ages as landings.**
This issue was raised in the previous STAR Panel as a research recommendation. New estimated of discarding were provided by the STAT and incorporated into the assessments.

4) **How was the period for recruitment deviation estimation determined? Plot the standard deviation of recruitment deviations for candidate periods to gain insight.**
Using the base case in the draft assessment document, the STAT carried out a standard analysis of the effect of various starting (and ending) year dev's on the sigma-r implied from trial model runs. Based on the results, the STAT revised the period over which recruitment dev's were estimated, and the Panel concurred. However, a repeat of this

analysis may be warranted should the final base case differ appreciably from the draft base case used here.

5) Update retrospective analysis after a base case is defined. Carry out both historical analysis (SSB only, cf. Fig. 11 of the draft assessment document), and a traditional retrospective analysis (truncating years).

Because of attention to other concerns, time did not permit the completion of this request during the Panel meeting – although a comparison was provided to the results from the 2003 assessment.

6) After a base case is defined, provide a scatter plot of recruitment estimates for LCN vs LCS. Also provide similar plot of LCN versus Canadian lingcod assessment results.

Because of attention to other concerns, time did not permit the completion of this request during the Panel.

7) Provide sensitivity analysis on alternative definitions of B0. In particular, compare model-based estimates of B0 with the B0 estimate derived from average recruitment times the unfished SPR.

Time did not permit the completion of this request during the Panel.

8) Explore the definition of a base case model.
   a. Explore time varying selectivity for the commercial fishery. An exploration of the residual patterns may help define time dependent factors.
   b. Explore other levels of recruitment variability (sigma-r).

Because of attention to other concerns, time did not permit the completion of this request during the Panel.

9) The sensitivity of the results to the tagging data in the North.

Although the sensitivity was not investigated, the abundance estimate from tagging was removed because it only covered as small proportion of LCN stock area.

10) The center of the distribution for lingcod is near the Canadian border making it important to consider what is happening in Canadian waters. Canadian data and assessment results should be evaluated and presented in any assessment of lingcod in USA waters, especially for the LCN assessment.

A cursory search was made. The document which was found appeared to be a very brief update and did not provide relevant information or data. This recommendation was made by the last STAR Panel as well.

11) To more fully understand the recent peak and fall of SSB -- which is not seen in the total biomass -- and questions regarding the relationship between SSB and total biomass in the early years, provide matrices (by year and age) of numbers at age and biomasses at age. Numbers at age for males and females are also requested.

The pattern was resolved by correcting an error in the maturity parameters.

12) For each assessed area (LCN and LCS), a set of four runs is requested to try and define a base model. Use a 2 x 2 design: flat or domed commercial selectivity (with others being domed) and 2001-04 survey abundance in and out. Tagging should be left out of all runs.

The results concerning the 1998-99 year-classes for LCN were insensitive to exclusion of the 2001-04 survey data. The Panel was not able to understand these results. For LCS, the exclusion of survey data considerably reduced the recent biomass and hence rebuilding. The asymptotic selectivity reduced the LCN cryptic biomass considerably. For LCS, the choice between asymptotic and domed selectivity had serious implications for management.

Final Base-Case Models and Quantification of Uncertainty

The newly proposed, though not accepted, base models are described below, with the principal change since the 2003 assessment being the dropping of the tagging index of abundance previously used in LCN because it covered only a small area. Also, discard information has been included for the first time. Although base models were not accepted by the Panel, considerable work and improvements were seen during the meeting. The final configurations are given below for future reference.

The two region model had common mortality parameters. Note that the previous STAR requested an investigation of area specific parameters.

$M = 0.18F / .32M$
SigmaR $= 1$
$h = 0.90$
VonB growth fitted externally for males and females for LCN and LCS

LCN

Catch 1956-2004
Abundance indices:
    Trawl CPUE 1976-1997
    Triennial survey 1977 – 2004
Length frequencies:
    Recreational 1981-1983
    Commercial 1975-1978
    Triennial survey 1986, 1989
Age frequencies:
    Recreational 1980, 1986-2004
    Commercial 1979-2004
    Triennial survey 1992 – 2004
Selectivity
    Commercial – domed or asymptotic
    Recreational - domed
    Survey - domed

LCS

    Catch 1956-2004
    Abundance indices:
        Trawl CPUE 1978 -1997
        Triennial survey 1977 – 2004
    Age frequencies:
        Recreational 1992-1998, 2000-2004
        Commercial 1992-1998, 2000-2004
        Triennial survey 1995-2004
    Selectivity
        Commercial – domed or asymptotic
        Recreational - domed
        Survey - domed

Technical Merits and Suggestions for Improvement in Assessments

The primary difficulty with this assessment was in demonstrating how the data supported the model output – particularly (but not entirely) with respect to the large estimates of recent recruitment. Although numerous other important issues were raised by the Panel (see "Analyses Requested" section, above), most of these were sequential issues in that they could not be evaluated before putting the primary recruitment issue to rest. The assessments could be improved by following-up on the Panel's requested analyses.

Areas of Disagreement Regarding Star Panel Conclusions

There were no significant areas of disagreement within the STAR Panel. The only area of disagreement between the STAR Panel and the STAT was in how well the recent strong year-classes in LCN model results are supported by data.

Unresolved Problems and Major Uncertainties

The unresolved problems are discussed in the 'Technical Merits and Suggestions for Improvement in Assessments' section, above. Because base case models could not be established, the issues pertaining to uncertainty were not addressed.

Recommendations for Lingcod

The principal recommendations for the lingcod assessment are contained in the "Analyses Requested" and "Technical Merits and Suggestions for Improvement in Assessments" sections, above. Other miscellaneous recommendations that surfaced during the Panel discussions are listed below.

1) There exists some RecFIN data for Oregon which may helpful in determining the strengths of recent year-classes.

2) Consider the application of biological association filters (Stephens and MacCall, 2004) to the commercial and recreational data.

3) Investigate the possibility of an index of abundance to be defined from observer program data. This is especially important as traditional CPUE data is strongly affected by recent management regulations.

4) Domed versus asymptotic selectivity needs more attention. But it was agreed that generally at least one component should be asymptotic.

Recommendations for All Assessments Reviewed by this STAR Panel

- This panel reviewed four stock assessments within a contiguous 5-day period of time. Each of the assessments comprised a unique, complex mix of data attributes and related shortcomings; biological information; assessment models and related assumptions; and presentation style of the respective STAT. The panel found it quite challenging to absorb all of the details associated with each assessment, and quite frustrating to keep those details correctly in mind as the presentations cycled repeatedly through the four species under review. Future STAR panels should not be asked to undertake the review of more than two stock assessments with a 5-day period.

- Three of the four species considered by this STAR panel were in an overfished state and being managed under a Pacific Council rebuilding plan (canary rockfish, lingcod, and yelloweye rockfish). In principle all stock assessments should receive the same level of review. However, in practice there is a natural tendency to examine overfished stocks more closely, necessitating a greater amount of time needed per stock. If future reviews can be limited to two stocks per 5-day STAR panel (as recommended above), then overfished stocks may not be an issue. However, if this cannot be done then minimally, future STAR panels should not be asked to review three species that are in an overfished state within a single 5-day panel meeting.

- A significant time management constraint during STAR panel meetings is the time available for STAT members to make additional runs, synthesize the results, and prepare the new material for presentation to the panel. This becomes especially time critical when multiple iterations are needed for each assessment. For future STAR panels, an individual stock assessment scientist should not serve on more that one of the STATs involved in the review.

- The Panel found the FTP site, file server, and printer that were set up for its use to be extremely valuable in conducting its work; and recommends that this become standard procedure for all future STAR panels.

Acknowledgements
The Panel thanks all of the STATs for their cooperation and hard work during the course of the review. Special thanks also to the NWFSC and particularly to Stacey Miller for graciously hosting the meeting and providing administrative support for the Panel.