STAR Panel Report

CANARY ROCKFISH

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
Stratis Gavaris, Department of Fisheries and Oceans, Canada
Dan Kimura, Alaska Fisheries Science Center
Robert Mohn, Center for Independent Experts

Brian Culver, WDFW & GMT representative
Pete Leipzig, GAP representative
Mark Saelens, ODFW & GMT representative

Stock Assessment Team (STAT) Members Present:

Richard Methot, Northwest Fisheries Science Center

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.

Canary Rockfish Overview
The STAR Panel reviewed a "full" assessment by the STAT for canary rockfish. A draft report was provided to the STAR Panel members in advance of the meeting and additional analyses were presented during the meeting. A base model was adopted that incorporated established fishing mortality and growth dynamics, included increasing natural mortality for older females and introduced an innovative length/sex-based selectivity. This model appeared to fit observations reasonably well and its critical management results were robust to various sensitivity tests. Therefore it was considered adequate upon which to base management advice and decisions. The overall indication was that canary rockfish continues to be in an overfished state and requires rebuilding. Rebuilding over recent years has not occurred. There are no indications of strong incoming recruitment that may change this overall perception in the near future, considering that this is a long lived species.

Analyses Requested by the STAR Panel

1) **Set weightings for all likelihood components at 1, iterate once for effective sample size of composition data and use proportional catchability for trawl and recreational CPUE.**

Panel members considered that the setting of weightings was somewhat arbitrary and confounded with priors placed on effective sample size for compositional data and variances for biomass index data. They wanted to compare results of the STAT team results with a "default" weighting based on iterative re-weighting. Further, the inclusion of a term to allow the trawl and recreational CPUEs to depart from a proportional relationship and be a function of changing biomass was considered an inappropriate mechanism for addressing the lack of standardization for technological changes to fishing practices. The panel asked to see the impact this assumption had on management quantities. The STAT conducted analyses using a range of model formulations to obtain comparable results. A sizeable adjustment to effective sample size was indicated from the iterative procedure and the impact of admitting non-proportional catchability was important with an age-based selectivity model formulation.

2) **Explore the cause of differences in results between the previous assessment and a similarly formulated age-based selectivity model.**

The Panel was concerned about the magnitude of the difference in results between a new age-based selectivity model option and the age-based selectivity model used in the previous assessment. It was suspected that some of that difference might be due to a) incorporation of bias correction and internally estimated growth parameters in the new model; b) the signal in the recent data; and/or c) revisions to data that were used in the previous assessment.

    a. **Remove bias correction on ageing for the age-based selectivity model option and compare the estimated growth parameter to those input in the last assessment.**

Results from additional analyses carried out by the STAT indicated that inclusion of bias correction had a minor impact, but the estimated growth parameters were notably different than those used in the previous assessment.

    b. **Drop recent data on age-based selectivity model option.**

This was not done, but subsequent comparisons of results from the emergent base case with those from the previous assessment, where the recent data were not used, indicated nominal differences. It was inferred that the recent data and past data were indicating consistent perception of stock status. Therefore, the request was withdrawn.

    c. **Apply age-based selectivity model option with non-revised data from previous assessment.**

Rather, a length-based selectivity model that admitted selectivity differences by sex was developed and used in subsequent comparisons. The Panel was satisfied that the explorations using length/sex-based selectivity were sufficient.

3) Using the emergent length/sex-based selectivity base case model, conduct a sensitivity analysis where weightings for all likelihood components are set at 1.
The Panel recognized that there was merit to down weighting the length composition and age composition data relative to other data sources because these composition data are from the same fish. Nevertheless, they considered that it would be informative to compare results to a naïve "default" approach of giving equal weight to all data sources.

4) Compare results of the emergent base case with an analysis where the trawl and recreational CPUE indices are excluded.
After settling on a length/sex-based selectivity base model, it was considered appropriate to investigate again the impact of introducing a term to allow the trawl and recreational CPUEs to depart from a proportional relationship and be a function of changing biomass. It was now found that the degradation to the fit was nominal and the biomass trajectory results were almost identical when the additional term was removed.

Final Base-Case Model and Quantification of Uncertainty

The Panel considered that in the absence of a convincing approach for standardizing the CPUE, it would be preferable to exclude it from analyses rather than to invoke a mechanism that could not be supported with the available information. The STAT is commended for incorporating all available information on discards, allowing consideration of the best estimates for complete catch removals. The information used for the base-case model was:

- Biomass index from the NMFS triennial survey for 1980, 1983, 1986, 1989, 1992, 1995, 1998, 2001 and 2004
- Length/age compositional data from the NMFS triennial survey for 1980, 1983, 1986, 1989, 1992, 1995, 1998, 2001 and 2004
- Length/age compositional data from southern California trawl
- Length/age compositional data from northern California trawl
- Length/age compositional data from Oregon trawl
- Length/age compositional data from Washington trawl
- Length/age compositional data from southern California non-trawl
- Length/age compositional data from northern California non-trawl
- Length/age compositional data from Oregon and Washington non-trawl
- Length/age compositional data from southern California recreational
- Length/age compositional data from northern California recreational
- Length/age compositional data from Oregon and Washington recreational

The analysis incorporated established fishing mortality and growth dynamics, admitted higher natural mortality for older females (progressive linear increase), estimated deviation from a Beverton-Holt stock recruitment relationship and a applied a flexible lenth/sex-based selectivity model.

The estimated parameters included, growth parameters, natural mortality for oldest age females, recruitment deviations, selectivity parameters, NMFS trawl survey catchability,

and annual exploitation. The uncertainty due to variation in the data, conditioned on the assumed model structure, was derived as asymptotic variance for estimated parameters using an analytical approximation. That uncertainty was translated into the management quantities of interest, again using analytical approximation. Uncertainty about states of nature (assumed model structure) can be accommodated with a decision table depicting the plausible alternatives, but in this case, the base model alone was considered adequate upon which to base management advice and decisions.

Technical Merits and Suggestions for Improvement in Assessments

The STAT is commended for the completeness of their draft report and for accommodating the subsequent analysis explorations that were requested.

The STAT migrated the assessment to the updated Stock Synthesis II software which takes advantage of computational efficiencies and casts the dynamics as length-based selectivity processes. While generally preferred, this approach (as initially presented to the Panel) did not accommodate the differences in availability by sex that had been incorporated in previous assessments. During the course of the Panel meeting, the STAT modified the model formulation to include sex differences in selectivity. The length/sex-based selectivity approach was adopted for the base model.

There was consensus that data weighting is very difficult. Stock Synthesis II permits users to specify external weights but also determines effective sample size for compositional data using an iterative procedure. A deficiency of the presentation is absence of a simple summary showing the resulting data weighting after the composite effect of external weights and internal iterative re-weighting are combined.

While it is generally expected that imposing a functional stock recruitment function should not greatly affect the estimated recruitment time series and resulting biomass trajectory, it would be useful to be shown results that "turned off" the emphasis and influence of that likelihood component.

Areas of Disagreement Regarding Star Panel Conclusions

There were no areas of disagreement concerning this assessment.

Unresolved Problems and Major uncertainties

Recognizing that the recruitment process and larval dispersal has the potential to link components of the population coast-wide, the general sedentary nature and longevity of this species, differences in the nature of exploitation from the various fleets along the coast and differences in the availability of suitable habitat along the coast, merits consideration of regional analysis of fishery dynamics. Along these same principles, examination of the linkages between the most northerly components in continental US with the Canadian components appears warranted and remains unresolved despite being recognized for some time.

Recommendations for Canary Rockfish

While there was considerable debate about the determination of appropriate weightings for the various sources of information in the assessment, all agreed that the subject merited further attention.

Recent restrictive management measures preclude extension of fishery CPUE series and severely limit any interpretation of fishery performance. The observer program represents an opportunity to collect information from the fishery regarding catch rates and size/age compositions. It is recognized that restrictions to exclude vessels from some areas may introduce complications with interpretation, but the availability of positional information can be exploited in the analyses.

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