

## **STAR Panel Report**

### **YELLOWEYE 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:**

Farron Wallace, WDFW  
Tien-Shui Tsou, WDFW  
Thomas Jagielo, WDFW

## **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.

## **Yelloweye Rockfish Overview**

Yelloweye rockfish were assessed previously in 2001 and again in 2002. The new assessment (reviewed by this Panel) was scheduled as an “update” of the 2002 “full” assessment. However, a new model was used for this assessment – a change normally reserved for “full” assessments – causing review process difficulties in that the STAR Terms of Reference guidelines for reviewing “update” vs. “full” assessments are quite different. A further complicating factor was that the new model appears to have introduced instability, causing convergence problems in the assessment, and making it difficult to interpret results and to compare them to the 2002 assessment. After considerable deliberation, the Panel reviewed the new assessment as an “update.”

The Panel found that, although there were substantial uncertainties, this assessment was adequate to use for stock management. The stock remains in an overfished state, but appears to have been rebuilding slowly since the late 1990’s. The uncertainties derive mostly from a paucity of data. The length and age composition data were available for relatively few years, and no biomass indices were available for years after 2000. This latter deficiency, in particular, makes the extent of rebuilding in this stock highly uncertain.

## **Analyses Requested by the STAR Panel**

### **Initial Requests from the Panel**

The Panel noted that in Washington, catches were much lower, and the decline in CPUE was less than in the other states. This suggested that it might be useful, from a management perspective, to assess the three states separately. The Panel also noted a convergence problem, i.e. it was not possible to estimate all model parameters simultaneously. To achieve the initial base case fit, it was necessary to follow an iterative procedure in which some selectivities were fixed while others were estimated.

The Panel made the following requests of the STAT.

1. Presentation of the length- and age-composition data that the model used to infer the biomass decline in the period prior to the CPUE data.
2. Try runs after forcing all selectivities to be asymptotic.
3. Further investigate convergence problem.

### **Initial Response from STAT**

Runs were presented with asymptotic (logistic) selectivity, and also with the original domed selectivities after fixing the parameters associated with the right-hand limbs. Both solved the convergence problem and estimated depletion similar to that in the original run. The switch to logistic selectivities may have caused a problem lack of fit to the right-hand side of the composition data, but this was not investigated. One concern was that steepness was estimated at its lower bound (0.2). It was decided to abandon the logistic selectivities for the moment.

A first investigation of the convergence problem examined the depletion values encountered in the search for the minimum in a run that started from the base-case parameter estimates. This was reassuring because whenever the objective function was near its minimum the depletion was near its final estimate.

### **Additional Requests from the Panel**

1. Continue investigation of convergence problem, doing runs with jittered starting points.
2. Pursue request 1 from first set of Panel requests.
3. Investigate the dependence of the assessment on stock-recruit assumptions by doing a run like the base run, except that steepness and  $\sigma_R$  set equal to 1.

### **Additional Response from STAT**

To address the convergence problem, 20 model runs were done in which the starting point was jittered from the base case estimates. Only two of these runs found a minimum close to that of the base run, and those runs exhibited results similar to base case. Five runs found solutions with much higher objective function values and a wide range of

depletion. In thirteen runs the model was unable to escape from a region of parameter space in which the observed catch could not have been caught (so the objective function included large  $F$  penalties). The only other run crashed in an early phase. The Panel were divided on how comfortable they were about the convergence problem but agreed to continue with exploring other aspects of the assessment.

With regard to the first of the Panel's initial requests, it was shown that it was only in California that the composition data preceded the CPUE data. In this area, there was a clear decline in mean length in the composition data which is consistent with the pre-CPUE biomass decline estimated by the model.

With regard the last of the Panel's additional requests, the model run with steepness and  $\sigma_R$  set to 1 estimated a slightly more depleted stock. The estimated recruitment pattern was similar to that in the base run except that it was much more variable (as expected with a higher  $\sigma_R$ ) and the most recent recruitments were lower.

### **Final Base-Case Model and Quantification of Uncertainty**

The Panel found that, although there were substantial uncertainties, this assessment was adequate to use for stock management. The stock remains in an overfished state, but appears to have been rebuilding slowly since the late 1990's. The uncertainties derive mostly from a paucity of data. The length and age composition data were available for relatively few years, and no biomass indices were available for years after 2000. This latter deficiency, in particular, makes the extent of rebuilding in this stock highly uncertain.

For future reference, key attributes of the base case as documented below.

#### **Data**

1. Catch biomass (1955-2004), new data for 2002-2004, all data revised
2. Length and age composition data:

	<u>Number of years of data: original + new</u>	
	Length	Age
CA recreational	22+1	1+0
CA commercial	10+0	2+0
OR recreational	18+2	8+1
OR commercial	7+0	0
WA recreational	6+0	3+0
WA commercial	3+1	0+1
WA line	2+1	1+1

3. Size at age data for CA recreational and commercial, OR recreational, and WA recreational and line; no new data.

4. CPUE indices from the following recreational fisheries (no new data)

California	11 years	1988-1998,
Oregon	14 years	1979-1987, 1994-1996,1998,1999
Washington	10 years	1991-2000

**Model.** Despite this being an update assessment, the modeling software was changed from Stock Synthesis to Stock Synthesis II.

### **Non-data inputs**

Most non-data inputs (e.g., biological parameters) were unchanged from the last assessment. The only one that was changed was the ageing-error matrix, which was updated after an outlier was removed from the replicate age data used to construct this matrix.

### **Estimated parameters**

Recruitment in unfished stock	1
Fishing mortality in initial population	1
Selectivities	76
Growth	5
Recruitment deviations	<u>49</u>
	132

### **Important fixed parameters**

Natural mortality	$M = 0.045$
Stock-recruitment steepness	$h = 0.437$
Standard deviation of log-recruitment	$\sigma_R = 0.4$

## **Areas of Disagreement Regarding Star Panel Conclusions**

There were no areas of disagreement concerning this assessment.

## **Unresolved Problems and Major Uncertainties**

The problem of model convergence was not fully resolved, but the Panel did not feel that this problem was of sufficient magnitude to reject the assessment. Other major uncertainties in the assessment derive from the paucity of data and the concomitant qualitative concern regarding the overall precision and reliability of the assessment.

## **Recommendations for Yelloweye Rockfish**

1. Consideration should be given to providing separate regional assessments. The GMT representatives mentioned the desirability of this from a management perspective, and all the data inputs are already split by region. However, it may be that the data for some region or regions (particularly Washington) will be found to be insufficient to support separate assessments.
2. In future assessments, effort should be made to reformulate the model to avoid convergence problems. A recommended area to investigate is the parameterization of selectivity.
3. The possibility of starting new CPUE series for this stock should be investigated. The lack of current biomass indices strongly limits the reliability and precision of this assessment. It is clear that recent management changes have altered the nature of this fishery so much that recent CPUE is not comparable to that before these changes.

However, it may be possible to start new CPUE series starting after the management changes.

4. The development of a fishery-independent index should be considered.

### **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 than 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.