Bocaccio

STAR Panel Report

Southwest Fisheries Science Center
Santa Cruz, California
August 1-5, 2005

STAR Panel members:

André Punt (Chair), University of Washington, SSC representative
Mark Maunder, Center for Independent Experts
Robert Mohn (rapporteur), Center for Independent Experts
Tony Smith, Commonwealth Scientific and Industrial Research Organization
Michael Schirripa, Northwest Fisheries Science Center

Susan Ashcraft, GMT representative
John Field, GMT representative
Peter Leipzig, GAP representative

STAT member present:

Alec MacCall, Southwest Fisheries Science Center

Overview

The STAR Panel convened the week of August 1-5, 2005 at the Southwest Fisheries Science Center, Santa Cruz Laboratory to review the update for the boccacio assessment by the STAT. A draft report was provided to the STAR Panel in advance of the meeting and an updated version incorporating some pre-meeting feedback was distributed before the author's presentation

The STAR Panel evaluated the assessment based on the Terms of Reference for Expedited Stock Assessments. Bocaccio is an update to the 2003 assessment. The new length-frequency data included in the assessment were for trawl, hook and line, set net, recreational north and south, and the triennial survey. New abundance indices were available for the triennial survey and CALCOFI. The earlier triennial and CALCOFI indices were updated using a GLM analysis. The STAR Panel agreed that the assessment satisfied the requirements for an Expedited Stock Assessment; the model was identical to that on which the 2003 assessment was based because SS1 was retained as the analytical framework and no assumptions were changed. Three models were included in the 2003 stock assessment. The base-case model is known as STATc and it was bounded by two models known as STARB1 and STARB2. The updated base-case model forecasts a slow increase in biomass (spawning output), with depletion (current spawning output divided by unfished spawning output) increasing from a current value of 11% to approximately 20% over the coming decade.

Analyses requested by the STAR Panel

As this was an update assessment, most of the requests were for clarification or complementary analysis. Most of the requests came before the meeting and were addressed either before the STAR Panel or during meeting.

1) Do the length data suggest a strong 2003 / 2004 yearclass?

Early 2005 recreational catches show a strong length mode corresponding to the 2003 year-class. There was some evidence in the California pier catch and submersible observations of a stronger than average 2003 year-class. The latter observations are, however, not part of the data set included in the assessment.

2) Provide a profile in *M* as *M* had previously been identified as a major source of uncertainty.

The profile was provided ranging from *M* of 0.1 to 0.2yr^{-1}. It showed a minimum at *M* = 0.15, the value used in STATc. The author cautioned that there was insufficient age information available to the model to determine *M*.

3) Provide plots of the fits to the abundance indices and the length-frequency data to evaluate whether the inclusion of new data affected model performance, and to understand the reasons for the changes in the results.

The abundance indices were provided and most show a recent increase. An increase in abundance is also reflected in the model results. The fits to the length frequency data

were also presented. The model could not fit the more pronounced recent increase in the RecFIN CPUE index for Northern California. The model fits the other indices fairly well.

4) Conduct 10-year projections under the default harvest policy.
The results of 10-year projections under the 40:10 rule and those for a rebuilding analysis will be included in the final document. No results were provided to the Panel for examination.

5) Summarize the STATc model (parameters, data, priors...) in a table.
This was done (see below).

6) Conduct a retrospective analysis.
A retrospective analysis covering 10 years exhibited a tendency to increase estimates of spawning output and recruitment over time. This may be due in part to the anomalously low values for the 1998 and 2001 triennial survey indices. The 2004 triennial survey index was near the model expectation, and no retrospective pattern is evident in the most recent years.

Final base-case model[s] and quantification on uncertainty

$M = 0.15\text{yr}^{-1}$; $\sigma_R = 1$ (but λ=0.1 so the actual σ_R is greater than this); h estimated;
Von Bertalanffy growth curve fitted for males and females

Abundance indices:

- RecFIN CPUE north 1980–2002
- CDFG CPUE north 1987–1998
- RecFIN CPUE south 1980–2002
- Trawl CPUE 1982–1996
- Triennial survey 1977–2004
- CalCOFI 1951–2005

Length frequencies:

- Trawl 1978–2004
- Hook and line 1980–2004
- Set net 1978–2004
- Recreational south 1975–2004
- Recreational north 1980–2004
- Triennial 1977–2004

Technical merits and/or deficiencies in assessments

The STAR Panel agreed that the assessment satisfied the requirements for an expedited stock assessment update. It did not examine the deficiencies identified by the 2003 STAR Panel, but highlighted some areas for future research.

Areas of disagreement regarding STAR Panel recommendations

There were no areas of disagreement between the STAT and STAR Panel.

Unresolved problems and major uncertainties

There were no unresolved problems or major uncertainties given the scope of an update assessment.

Recommendations for future research

Specific to bocaccio rockfish

1. There is a problem with the lack of indices of abundance for this stock

A) The triennial survey will likely be discontinued in 2006 so it is desirable to calibrate the triennial survey indices with those from the NWFSC Combined Survey.

B) Exempted fishing permits are unlikely to provide the quality of catch and effort data hoped for. If exempted fishing permits are to be used to provide indices of abundance, it is necessary to check the power of the monitoring program first.

C) An exploratory delta-GLM analysis of the triennial survey was provided to the STAR Panel. The STAR Panel considered the analysis to be promising and suggested that it be applied to the NWFSC Combined Survey.

D) This species exhibits multiple annual spawning (as a function of age, size, or environment?). This possibility needs to be investigated based on fish collected from the fisheries or the survey if an index of spawning output based on larval counts is to be developed for comparison with the CALCOFI index or juvenile surveys.

E) The indices of abundance are assumed to be linearly related to abundance. There is a possibility of non-linear relationships between the triennial indices and abundance due to density dependence and habitat (trawlable and untrawlable) considerations. Investigation of historical data and *in situ* observations may shed light on some possible relationships.

2. Additional effort needs to be directed towards quantifying growth

A) Models with time-varying growth should be included in the assessment if data can support them. The length data exhibit strong modes which could form the basis for such estimates.

B) Although ageing of bocaccio is difficult, there are large numbers of otoliths that have been collected, but not been read. There is potential for using the age information to resolve broad-scale questions regarding changes over time in growth. Multiple reader studies, or other methods of validation, are desirable to assess reader bias and imprecision.

C) Models could be fitted to data on check marks if there is uncertainty about the interpretation of check marks as annuli. Check mark data could be treated in the same way as age data, i.e. subject to ageing bias and ageing imprecision, with the extent of ageing error treated as estimable within the model.

3. Improving the modeling

A) Future assessments should be based on Stock Synthesis 2. This should allow more formal quantification of parameter uncertainty. The next assessment should include a formal comparison of the results of SS1 and SS2 based on the current assessment.

B) Consideration should be given to the development of a more spatially-disaggregated model for bocaccio. Although this approach was rejected by the 2002 STAR Panel, improved CalCOFI coverage north of Pt Conception since 2003 may support more spatial structure within the assessment.

C) According to the STATC model, the spawning output was close to the overfished threshold in the first year of the model (1951), which differs from the common assumption that the biomass is close to B_0 at the beginning of the analysis. This species has highly variable recruitment and its biomass would vary substantially over time and a single B_0 may not be appropriate. The STAR Panel stresses the need for guidelines for defining B_0 (and hence proxies for B_{MSY}) for stocks with episodic recruitment. The related problem of what subset of annual recruitments to average to obtain Recruits/Spawning output values for forecasts should also be addressed.

Generic recommendations

A) There should be further consideration of the implications of using the prior on steepness derived by He *et al*. (in review), including its implications for species with other life history characteristics.

B) The approach used to estimate B_0 for widow rockfish had been modified from the 2003 assessment to be consistent with that on which rebuilding analyses are based (multiplying average recruitment in the early years of the fishery by unfished spawning biomass per recruit). This led to a change to the current depletion of 10%. There is a need for more explicit guidance regarding determination of B_0 in assessments and in rebuilding analyses.

C) There is a need for a series of cut-off dates for data to be included in assessments, with cut-offs dependent on the type of data. The lack of such dates means that assessment authors may be forced to revise decisions on base-case models very close to the date the assessment needs to be submitted to the STAR Panel, and even revise the draft assessment after this. Given that documents are supplied to reviewers two weeks in advance of meetings, major changes in assessments thereafter could compromise the integrity of the review.

D) Several of the 2005 assessments have conducted historical catch reconstructions. An effort needs to be made to develop a consistent approach to reconstructing catch histories. The ideal outcome would be a single document outlining the best reconstructed catch histories for each species (c.f. Rogers (2003)[1] that lists foreign catches). The California landing receipts on microfilm back to 1950 should be incorporated into the landings database.

E) There is still some inconsistency in how assessment authors decide whether to include or exclude recreational indices in assessments. Attempts to provide guidelines for the development and use of indices of abundance based on recreational catch and effort data would be worthwhile.

F) Stock Synthesis 2 should be extended to: a) allow assessment authors to include weight-frequency data in assessments; b) estimate the parameters of the ageing error matrix; and c) estimate the extent of overdispersion of the indices.

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[1] Rogers, J.B. 2003. Species allocation of Sebastes and Sebastolobus sp. Caught by foreign countries of Washington, Oregon, and California, U.S.A. in 1965-1976. NMFS, Northwest Science Center.

G) The raw data on which recreational length-frequency and catch-effort information are based should be made available to assessment authors in a convenient format. This will allow more detailed examination of the spatial patterns, and allow more sophisticated analyses of the catch-effort information; at present it is impossible to distinguish between lack of data and zero catch records.