

# **BLACKGILL ROCKFISH**

## **STAR Panel Report**

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

### **STAR Panel members:**

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

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

### **STAT member present:**

Tom Helser, NWFSC

## Overview

The STAR Panel convened the week of August 1-5, 2005 at the Southwest Fisheries Science Center, Santa Cruz Laboratory to review a draft assessment by the STAT for blackgill rockfish (*Sebastes melanostomus*). A draft report was provided to the STAR Panel in advance of the meeting and was updated during the meeting. The STAR Panel evaluated the assessment based on the Terms of Reference for a Full Stock Assessment.

The model of blackgill rockfish assesses the resource off the coast of the United States in the Conception and Monterey INPFC areas using the SS2 model under the assumption of a single stock in these areas. Blackgill rockfish are primarily harvested by commercial hook and line, set net, and trawl fisheries. Over 90% of blackgill rockfish landings are taken in the Conception and Monterey areas. The majority of the stock biomass in U.S. waters, based on research surveys, is distributed between the Mexican border and Eureka, California. Landings data for blackgill rockfish in California were obtained from CALCOM, while landings in Oregon and Washington were obtained from the PacFIN database. Catches of blackgill rockfish from the Conception and Monterey INPFC areas are estimated for 1978–2004, while historic catches (1950–77) are extrapolated based on a ratio of blackgill rockfish to total California rockfish landings. Three indices were considered for the assessment: a) the Alaska Fisheries Science Center slope survey; b) the AFSC (triennial) shelf survey; and c) the Northwest Fisheries Science Center (NWFSC) Combined Survey. Data on most slope rockfish, including blackgill, were not collected during the 1998 NWFSC Combined Survey.

## Analyses requested by the STAR Panel

### 1.) Was RecFIN examined to determine if there are recreational catches of blackgill?

There are no records of blackgill in RecFIN.

### 2.) Is there a need for a more spatially-explicit model?

The STAT provided trawl length-frequencies for the Monterey and Conception INPFC areas, and showed that there were no major differences between these, possibly because the data have insufficient power to address this issue. The issue of a more spatially-explicit assessment should be evaluated in the future.

### 3.) The sample sizes for the NWFSC survey are low and there are many zero hauls. The STAR Panel requested the STAT to examine the sensitivity of removing this index and its length-composition information from the assessment.

The length-frequency data for the NWFSC Combined Survey differed substantially from that for the other surveys, and removal of the length-frequency data and indices for the NWFSC Combined Survey led to a more realistic survey selectivity pattern. There are only two years of length-frequency data for the NWFSC Combined Survey. The 2004 data suggest a very strong 1997 year-class which is not as evident in the length-frequency data for the AFSC surveys. The final base-case model excluded the NWFSC Combined Survey. The Panel recommends that the inclusion of these data in the assessment be reconsidered when the stock is next assessed.

### 5.) The growth curve was pre-specified in the draft assessment based on published information. The growth curve could be biased because of selectivity effects on sampling.

**The STAR Panel therefore requested that the 1998 triennial survey age data be included in the assessment model as conditional age-at-length information and the growth curve estimated within the model.**

Including the age-at-length data in the model and estimating the growth curve and  $M$  led to better fits to the length-composition data and a lower length at age 2, as would be expected if there is a selectivity bias effect. The estimated growth curves remained consistent with the length-at-age data on which the original growth curve was based. The final base-case model estimates the parameters of the growth curve, and includes the age-at-length data.

**6.) The draft assessment set the effective sample sizes for the length composition data to the number of trips sampled. The STAR Panel requested that the effective sample sizes be balanced by regressing the input sample sizes on the model-estimated effective sample sizes.**

The STAT made this change and it is included in the final base-case model.

**7.) The draft assessment estimated recruitment from 1970–2004. The STAR Panel requested that the asymptotic standard deviations for the recruitment deviations be reported to evaluate this choice of years.**

The STAT provided the requested plot. The STAR Panel agreed that recruitment deviations should be estimated for the years 1970–2004 after considering the plot and the results of assessments based on a variety of alternative ranges of years over which to estimate recruitment deviations.

**8.) The draft assessment assumed that blackgill constituted 2.2% of the California rockfish catch before 1978. The STAR Panel noted that the fishery moved progressively offshore over time so the percentage of blackgill in the California rockfish catch should increase over time.**

The STAT provided results based on the percentage of blackgill in the California rockfish catches increasing from 0 to 2.2% between 1950 and 1977. The STAR Panel endorsed this change, and it is included in the final base-case model.

**9.) Length data for the hook and line and setnet fisheries for 1983–5 were made available during the meeting. The STAR Panel requested that the utility of these data be examined.**

The STAT conducted sensitivity tests including these data. However, the data did not fit well, the sample sizes are small, and it is unknown how the data were collected. The STAR Panel and STAT agreed that these data should not be included in the present assessment.

**10.) The STAR Panel requested that the catches south of Point Conception be presented by gear-type and port complex.**

This was not completed during the meeting, but may be included in the report if confidentiality is not an issue.

**11.) Fishery age-composition data for 1985 were provided during the meeting. The STAR Panel requested that the impact of including these data in the assessment be examined.**

The model did not fit these data well. However, the sample sizes are small, and it is unknown how the data were collected. The STAR Panel and STAT agreed that these data should not be included in the present assessment.

**12.) The STAR Panel requested that the STAT determine the value of  $M$  for inclusion in the assessment by profiling on  $M$  using a model formulation in which a) the NWFSC survey data are excluded, b) the 1998 age-at-length data are included in the assessment, and c) the final selectivity parameters are freely estimated.**

The estimate of  $M$  was  $0.04\text{yr}^{-1}$ . The STAT and STAR Panel agreed that this would form part of the base-case model.

**13.) The STAR Panel requested a decision table based on the states of nature selected to capture the uncertainty in the 2005 depletion. The projections should be based on the 40:10 rule and current catches.**

The STAT reported that values of  $M$  of 0.03 and  $0.05\text{yr}^{-1}$  corresponded roughly to upper and lower 12.5% confidence intervals for the 2005 depletion based on the asymptotic normal approximation. These two values for  $M$  and the base-case model provide three states of nature. The STAT provided the STAR Panel with the requested decision tables. The catches for 2005 and 2006 in the projections were set equal to that for 2004 and split to fleet based on the 2004 exploitation rates.

#### **Final base-case model and quantification of uncertainty**

The final base-case model differed from the base-case model in the draft assessment document as follows:

- a) The effective sample sizes are based on regressing effective sample on input sample size and iterating until convergence.
- b) The pre-1978 catches are calculated by multiplying the catches of rockfish off California by a percentage that increases from 0 in 1950 to 2.2% in 1977.
- c) The indices and length-frequency data for the NWFSC Combined Survey data are excluded.
- d) The 1998 length-composition data for the AFSC Shelf Survey are excluded and the 1998 age-at-length data are included in the model.
- e)  $M = 0.04\text{yr}^{-1}$  (fixed).
- f) The parameters of the growth curve are estimated in the model.
- g) The descending limbs of the selectivity patterns for the fisheries are estimated rather than being fixed equal to 0.5, and the selectivity pattern for the AFSC shelf and slope surveys is assumed to be asymptotic and equal.

Models based on fixed values for  $M$  of 0.03 and  $0.05\text{yr}^{-1}$  corresponded roughly to upper and lower 12.5% confidence intervals for 2005 depletion based on the asymptotic normal approximation. The Panel assigned the base-case model a probability of 0.9 and  $M=0.03\text{yr}^{-1}$  and  $0.05\text{yr}^{-1}$  a probability of 0.05 each.

#### **Technical merits and/or deficiencies in assessments**

The STAR Panel concluded that the STAT did an excellent job of preparing the assessment and of responding to STAR Panel requests, including those posed via e-mail prior to the meeting. The STAR Panel agreed that the assessment satisfied the requirements for a full assessment. It did not examine the deficiencies with regard to the previous assessment conducted in 1998.

### **Areas of disagreement regarding STAR Panel recommendations**

There were no areas of significant disagreement regarding the STAR Panel recommendations.

### **Unresolved problems and major uncertainties**

As with most of the west coast rockfish species, there remains a rather high degree of uncertainty associated with historic landings of blackgill rockfish. In addition, U.S. flagged vessels presently fish in Mexican waters and land in the U.S., but it is uncertain whether these landings are excluded from those included in CALCOM and PacFIN. Furthermore, the relationship between blackgill found and harvested in Mexico and those found and harvested in the U.S. is unclear. It is possible that blackgill in both countries are part of the same biological stock.

Knowledge of individual growth, natural mortality and selectivity on older/larger fish is central to an adequate assessment of blackgill. These quantities are confounded in the absence of sufficient data. The present assessment includes a small sample of age-at-length information from a single year. There were age data for 1985, but the sample sizes are small and the method of sample selection is unknown.

Blackgill has been harvested for many years. However, all of the information included in the assessment is from recent years. For example, the first index of abundance is for 1995.

### **Recommendations for future research (in rank order)**

#### *Specific to blackgill rockfish*

- A) A study of contemporary age and growth of blackgill rockfish needs to be conducted. Samples have already been collected but not aged, and differences by sex, area, and perhaps time should be re-investigated to determine if these partitions need to be explicitly accounted for in the assessment model. If results of this study are promising, this species should be considered for inclusion in the production ageing cycle.
- B) The bulk of the U.S. population of blackgill is found within the Conception and Monterey Areas. However, an unknown fraction of the population resides in Mexican waters. The next assessment should attempt to document catches in Mexican waters by both U.S. and Mexican fishers and consider the implications of blackgill being a shared stock. Application of genetic techniques for the identification of rockfish larvae taken in CalCOFI-like surveys has the potential to further elucidate the distribution of the resource.
- C) The data from NWFSC Combined Survey are likely to be the foundation of any future assessment. Information contained in the tows made in <100 fathoms needs to be investigated to determine if they contain any useful information with regard to the abundance and distribution of blackgill rockfish.
- D) The triennial survey will likely be discontinued in 2006 and so it is desirable to determine whether it is possible to calibrate the triennial survey indices with those from the NWFSC Combined Survey.
- E) Discard rates for blackgill in the fixed gear sector were not available for this assessment. Sablefish longline catch was highlighted as one of the sectors that may be contributing significantly to discards. The WCGOP is increasing its sampling of the fixed gear sector, and estimates from this program should be included in the next assessment.

- F) There is little available information to describe the fecundity of blackgill, either in time or space. This needs to be investigated.
- G) Any work that would help identify the habitat associations of the largest/oldest fish may assist with determining which gear (if any) is most likely to have asymptotic selectivity. Increasing the certainty of the descending limb of the selectivity pattern for one gear type, for instance the trawl survey, may help define this parameter for the remaining gear types.
- H) An effort should be made to evaluate how port samples are being taken to determine if they are in fact representative of the commercial catch. Although a seemingly effective effort was made within the assessment to post-weight the available lengths, it would be informative to know the sampling protocol used to determine whether any adjustments to this method need to be made. Species identification between darkblotched and blackgill should be addressed in the port samples.
- I) Separate Conception and Monterey models for blackgill should be investigated. However, it was recognized that this would be hampered by low sample sizes for most of the available data sources.

#### *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)<sup>1</sup> 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

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<sup>1</sup> Rogers, J.B. 2003. Species allocation of *Sebastes* and *Sebastes* sp. Caught by foreign countries of Washington, Oregon, and California, U.S.A. in 1965-1976. NMFS, Northwest Science Center.

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.
- 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.