Report on

Southern black Rockfish and Blue Rockfish STAR Panel

October 1-5, 2007

NOAA Western Regional Center

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Seattle

Washington

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***For* University of Miami Independent System for Peer Review**

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Executive summary

The southern black rockfish and blue rockfish STAR Panel met at the NOAA Western Regional Center, Seattle, from October 1-5, 2007. The Panel consisted of the SSC groundfish sub-committee and myself as the single CIE reviewer. This report presents my view of the assessments and should be read in conjunction with the STAR Panel reports.

Draft assessments were distributed electronically to meeting participants two weeks in advance of the meeting. However, for blue rockfish, the supplied document was somewhat redundant as the STAT proposed a base model which was not described in the document (the new base model used conditional age-at-length data, rather than the annual age frequencies described in the document). The documentation for southern black rockfish was adequate and relevant to the base model brought to the meeting (although the tagging estimates had been revised).

The southern black rockfish assessment was conducted using SS2 and assumed a single stock off Oregon and California. A single area was modeled with multiple fisheries (commercial and recreational within each state). The assessment data included: commercial and recreational catch history beginning in 1915 (low, high, and best estimates); CPUE from the recreational fisheries (RecFIN Oregon; RecFIN California; Oregon ORBS; California CPFV); SWFSC pre-recruit indices 2001-2006; Oregon tagging study indices 2003-2006; length data from both the Californian and Oregon fisheries; and age data from Oregon.

Two issues dominated discussions on the black rockfish assessment: the poor fit to the pre-recruit indices and the mean length-at-age data.

Early discussions centered on the poor fit to the pre-recruit indices. In the blue rockfish assessment there was a near perfect fit to the indices so the question arose as to why this was not the case for black rockfish. The black rockfish STAT investigated why the pre-recruit indices were not well fitted. He showed that that the cohorts observed by the pre-recruit indices were large enough to enter the length frequency distributions in the Californian fisheries. Because the length frequencies did not show a mode at small lengths or a shoulder on the left hand edge of the main mode they were in conflict with the pre-recruit indices. The mystery was not why they were poorly fitted in the black rockfish assessment, but why they were so perfectly fitted in the blue rockfish assessment (it turned out that the pre-recruit indices were over-weighted in the blue rockfish assessment).

The issue of the mean length-at-age data proved to be substantive. A likelihood profile on mean virgin recruitment (R_0), presented by the STAT for the initial base model, showed much “tension” between the data sets (some data sets strongly “preferred” high R_0 while others strongly “preferred” low R_0). There was little contrast in likelihood (across R_0) for any of the abundance indices but strong contrast in the likelihood for age, length, and mean length-at-age data. For mean length-at-age data to be a primary determinant of R_0

suggested that these data were being given too much weight in the base model. However, when the weight on the mean length-at-age data was reduced (by various means) the fit to the data degraded to such an extent that the STAT was concerned that the estimated growth curve was unrealistic. After discussion, the STAT and the Panel agreed to a base model which was a compromise between a good fit to the mean length-at-age data and the extent of its influence on the assessment results.

The black rockfish assessment is inherently uncertain being driven by length and age data, and model assumptions. Natural mortality was chosen as the primary dimension of uncertainty (with catch history providing some additional spread), and estimated depletion ranged from approximately 50% to 90% (base = 70%). However, both the range and the base values are dependent on how well one chooses to fit the mean length-at-age data and the range on how much uncertainty is admitted for natural mortality and the catch history.

A single stock was assessed for blue rockfish off northern and central California using SS2. The choice of stock boundary was mainly driven by the current distribution of the species (the fish off southern California were assumed to be from another stock in a highly depleted state). The assessment data included: commercial and recreational catch history beginning in 1916; CPUE from the recreational fisheries (RecFIN, CPFV); SWFSC pre-recruit indices 2001-2006; length data from recreational and commercial fisheries; and age data from the recreational fishery 1980-1984.

The base model, presented in the draft documentation, used the age data in the common formulation of annual age frequencies. It was noted in the document that the age data were very poorly fitted and that the use of these data as conditional age-at-length would be explored prior to the STAR Panel meeting. The STAT presented the results of their exploration to the meeting and offered a preliminary base model using conditional age-at-length data. However, the fits to the age frequencies (when presented in aggregate) were only slightly better than in the initial base model. Alternative formulations aimed at achieving a reasonable fit to the age data became somewhat of a focus for the blue rockfish assessment. However, the Panel had to deal with many other issues which arose for this assessment.

The issue of blue rockfish consisting of two species (as demonstrated by recent genetic studies) was discussed in terms of the conditions under which the assessment could be considered valid. The assumptions necessary are not dissimilar to those required with regard to multiple stocks being assessed as a single stock. However, in addition to experiencing comparable fishing mortality and recruitment patterns, it is necessary that the species have very similar biological parameters and population dynamics. Little is known in this regard except that the species school together and appear to have similar growth curves (from the little data that are available).

In the end, the fitting of the age data was not especially problematic. Primarily it required that recruitment deviations be estimated for cohorts that were present in the age data. In the STAT's original models, recruitment deviations were estimated from 1980 which was

the first year of age observations. After beginning recruitment deviations earlier, the fit to the age data was much improved except with regard to the plus group for males. This problem was alleviated by allowing natural mortality to be higher for males than females. However, there were still some systematic problems with the fit, due to a conflict between the age data and the associated length data – a problem with the growth curve.

The blue rockfish assessment is inherently uncertain being driven by length and age data, and model assumptions. Natural mortality was chosen as the primary dimension of uncertainty (with catch history providing some additional spread), and estimated depletion ranged from approximately 15% to 50% (base = 30%). However, this range does not adequately capture the uncertainty in the assessment (there are the stock structure and two-species issues).

The black rockfish and blue rockfish assessments were technically improved by the STAR Panel process. I consider that both assessments are technically adequate and as such represent the best available science on which to base management advice.

Background

The southern black rockfish and blue rockfish STAR Panel met at the NOAA Western Regional Center, Seattle, from October 1-5, 2007. This was the "mop up" meeting for the 2007 STAR Panels and was held in conjunction with an SSC groundfish sub-committee meeting to review rebuilding analyses (for other species).

Two revised assessments were presented at the meeting together with several rebuilding analyses (preceded by a discussion on the review role of the SCC sub-committee with regard to the rebuilding analyses). The southern black rockfish STAT consisted of a single scientist, Dr. David Sampson, and the blue rockfish STAT consisted of two scientists, Dr. Meisha Key and Dr. Alec MacCall. Earlier versions of both assessments had been presented at the Portland STAR Panel meeting. In the case of blue rockfish the Panel had rejected the ASPIC based assessment (which had been hurriedly constructed because the STAT could not get an SS2 model to work). In the case of southern black rockfish, the Portland assessment had essentially been "rejected" by the STAT because of concerns that the results were inconsistent with estimated exploitation rates from an Oregon tagging study (which was not part of the model input data).

The mop-up STAR Panel consisted of the members of the groundfish sub-committee in attendance and myself as the CIE reviewer who had attended all of the 2007 STAR Panels. As a groundfish sub-committee meeting, the meeting was chaired by the sub-committee chair Dr. Martin Dorn. Other sub-committee members who participated in the assessment reviews (to varying degrees) were: Dr. Steve Ralston, Dr. Tom Jagielo, Dr. Tom Helser, Dr. Owen Hamel, and Dr. Andre Punt. This report presents my view of the assessments and should be read in conjunction with the STAR Panel reports.

Review Activities

Pre-meeting

Meeting documents and materials were downloaded from an ftp site well in advance of the meeting (*see* Appendix 1). I familiarized myself with the assessment documents, files, and related material prior to the meeting. Paper copies of the assessment documents were also made available at the meeting, which was helpful.

Meeting

The meeting was convened at 12.30 pm on Monday, October 1, 2007 and closed Friday evening, October 5, 2007.

We began with brief round-table introductions and a short summary of the meeting agenda by the Chair. Rapporteur roles were then discussed. I indicated that I was happy

to take notes to the level required to draft formal requests to STATs, but that I would not take detailed notes usually required of a rapporteur as I wished to fully participate in discussions. There was a brief discussion and it was decided that detailed notes were not needed. The task of drafting the formal requests to STATs (and their responses, subsequent main points of discussion, and our conclusions) were assigned to Panel members. I covered black rockfish and Dr Jagielo dealt with blue rockfish.

I will only give a brief summary of the meeting activities. For both species, details of the requests to the STATs and their responses are contained in the STAR Panel reports.

The assessment of blue rockfish was presented on Monday afternoon by Dr. Key with some assistance from Dr. MacCall. The focus of the presentation was on the model presented in the draft assessment. However, the STAT indicated that they had moved on from this model because the age frequency data were very poorly fitted. They now favoured a model using conditional age-at-length data. Results were presented for the new model and the fits to the age data were slightly better (but still very poor). The STAT also presented very recent results for genetic studies which demonstrated that there were actually two species of blue rockfish. The assumptions necessary for the validity of an assessment of the two-species complex was briefly discussed by the Panel. A first set of requests was drafted before the meeting closed for the evening.

On Tuesday morning the black rockfish STAT made his first presentation. Dr Sampson explained that the previous assessment, presented in May to the Portland STAR Panel, had been “unstable” because of the use of multiple areas in the model and the lack of signal in the data enabling sensible allocation of recruitment between areas. He had abandoned multiple area models and had returned to a model structure very similar to that used in the 2003 southern black rockfish assessment. As with blue rockfish, the issues that arose during the presentation lead to a set of requests for the black rockfish STAT (drafted during lunch).

On Tuesday, after lunch, the blue rockfish STAT reported on their progress on the first set of requests. After discussion, a new set of requests was drafted which was aimed at getting a preliminary base model to be used to explore ways of better fitting the age data. The remainder of Tuesday afternoon was taken up with a lengthy discussion on issues relating to the SSC review of rebuilding plans. Agreement was reached on what runs were required for each rebuilding plan and how reference years (e.g., Tmax) would be calculated.

On Wednesday morning Dr. Ralston gave an excellent presentation summarizing the definitions and relationships between the various reference years used in rebuilding analyses and the agreements that had been reached by the sub-committee the previous afternoon. This was followed by several rebuilding analysis presentations.

From Wednesday afternoon until Friday evening the meeting proceeded with (generally) alternate sessions with the two STATs as the Panel reviewed the responses to previous requests and submitted additional requests. There were occasional additional

presentations with regard to rebuilding analysis requests. Also, some time was spent by the Panel agreeing on the major points for the various sections of the blue rockfish STAR Panel report (this was perhaps thought more problematic than the black rockfish STAR Panel report – for which little time was found during the meeting).

The base model for black rockfish was not agreed until Friday afternoon. A base model had been agreed somewhat earlier but the STAT requested a change to the model given the poor fit to the mean length-at-age data – the poor fit was not noticed by the STAT until bracketing runs were being explored.

The base model for blue rockfish was not agreed until late Friday afternoon. Bracketing runs were hastily trialed and agreement was reached on Friday evening when only two members of the Panel remained in attendance at the meeting (the Chair and I).

Post-meeting

I completed my section for the black rockfish report on requests, responses, and conclusions and emailed it to the Chair. The Chair circulated draft STAR Panel reports for which I and other members of the Panel provided comments. The Chair then circulated "final" reports, without further consultation – he was keen to meet a deadline. I checked the final reports and found that the revisions were satisfactory (at least to me).

Review findings

The findings for each assessment are discussed below. For each stock, I summarize the draft assessment and the main issues that arose during the meeting. I then summarize the main uncertainties and finally summarize the merits and deficiencies of the accepted assessment.

Black rockfish (southern)

Assessment summary

The southern black rockfish assessment was conducted using SS2 and assumed a single stock off Oregon and California (a black rockfish stock, off Washington, was also assessed in 2007 and reviewed and accepted at the Portland STAR Panel meeting in May). The assessment data included: commercial and recreational catch history beginning in 1915 (low, high, and best estimates); CPUE from the recreational fisheries (RecFIN Oregon 1980-1989, 1993-2003; RecFIN California 1980-1989, 1995-2006; Oregon ORBS 1979-2006; California CPFV 1988-1998); SWFSC pre-recruit indices 2001-2006; Oregon tagging study indices 2003-2006; length data from both the Californian and Oregon fisheries 1974-2006 (not all years, not all fisheries); and age data from Oregon 1996-2005.

Two issues dominated discussions on the black rockfish assessment: the poor fit to the pre-recruit indices and the mean length-at-age data.

Early discussions centered on the poor fit to the pre-recruit indices. In the blue rockfish assessment there was a near perfect fit to the indices so the question arose as to why this was not the case for black rockfish. It was hypothesized that recent length frequencies must contain observations which were in conflict with the pre-recruit indices. The estimated growth curves and fishing selectivities were examined to see if the cohorts in the pre-recruit indices should be represented in the length frequencies. The growth curves were found to be very unrealistic for 1 and 2 year old fish (the mean lengths were too large). This was ascribed to the Amin parameter being set equal to 3 years and hence SS2 interpolating the growth curve for ages 1 and 2 (from the estimated mean length at age 3 years to the lower bound of the smallest length bin at age 0). Two fixes were suggested by the Panel.

The first idea was based on the observation that no 1 and 2 year old fish were present in the age data, and it was suggested that the fishing selectivity be set equal to 0 for ages 1 and 2 years (in all fisheries). This would stop the un-realistically large (but young) fish from showing up in the predicted length frequencies (SS2 uses selectivities which are a product of age and length components). However, there were no age data from California, so it was not known how old the California-caught fish actually were – the fish were smaller than those caught in Oregon and this could have been because they were younger. An alternative idea was to set Amin to a lower value and to modify the length bins so that the growth curve was realistic for young fish.

The second approach was adopted by the STAT who then investigated why the pre-recruit indices were not well fitted. It was shown that, even with the realistic growth curve, the cohorts observed by the pre-recruit indices were large enough to enter the length frequency distributions in the Californian fisheries. Because the length frequencies did not show a mode at small lengths or a shoulder on the left hand edge of the main mode they were in conflict with the pre-recruit indices. The mystery was not why they were poorly fitted in the black rockfish assessment, but why they were so perfectly fitted in the blue rockfish assessment (see blue rockfish below).

The issue of the mean length-at-age data proved to be substantive. A likelihood profile on R_0 presented by the STAT for the initial base model showed much tension between the data sets. There was little contrast in likelihood (across R_0) for any of the abundance indices but strong contrast in the likelihood for age, length, and mean length-at-age data sets. The influential aspect of the mean length-at-age data was of great concern to me as these data cannot (in reality) have any useful information on abundance. The link to abundance is, of course, through the influence on the growth curve and subsequent fits to the length frequencies – but for mean length-at-age data to be a primary determinant of R_0 suggested that these data were being given too much weight.

The mean length-at-age data were input for the Oregon ORBS survey for three years: 2003, 2004, and 2005. The STAT had chosen these three years of data from the nine available years because they contained the majority of the samples. He didn't use all of

the data because he was just trying to “give the model a helping hand” to determine growth. The better option of using conditional age-at-length data he considered as “something for the future”. Unfortunately, the mean length-at-age data were having a strong influence on the assessment results.

Alternative options for using the mean length-at-age were explored: 2004 data only; 2003 data only; all three years combined and entered in 2004. We were looking for an option which reduced the influence of the mean length-at-age data in terms of contrast across R_0. This did occur but only after tuning (of data-set variances and effective sample sizes) which resulted in the down-weighting of the mean length-at-age data. Of course, the reason the data were being down-weighted was because they were being poorly fitted. This defeated the objective of including the data to “inform” with regard to growth.

The STAT and the Panel agreed that a partially tuned model would be used as the base. This was a compromise between having a good fit to the mean length-at-age data and substantially reducing the influence of the data on the assessment results. As a sensitivity to the base model a run with a weight of 0.1 (rather than 1) was applied to the likelihood component of the mean length-at-age data. This sensitivity gave results very similar, in terms of depletion, to the “low” model in the bracketing runs.

The black rockfish assessment is inherently uncertain being driven by length and age data, and model assumptions. Natural mortality was chosen as the primary dimension of uncertainty (with catch history providing some additional spread), and estimated depletion ranged from approximately 50% to 90% (base = 70%). However, both the range and the base values are dependent on how well one chooses to fit the mean length-at-age data and the range on how much uncertainty is admitted for natural mortality and the catch history.

Primary sources of uncertainty

The major sources of uncertainty in the black rockfish assessment are natural mortality, catch history, and “data weighting” (especially the weight assigned to the mean length-at-age data). The assessment is inherently uncertain being driven by length and age data, and model assumptions.

Strengths and weaknesses of current approach

The current assessment is adequate in terms of capturing the nature of the assessment uncertainty. A better assessment could be produced using full Bayesian methods but that is not possible with the current process and technology.

Merits:

- SS2 was used and as such brings the advantages of a standard and well tested package.
- Extensive research went into the preparation of the catch history including the construction of low, high, and “best guess” estimates.

- Good efforts were made to explore the available data before embarking on the model fitting. This is especially true of the age data where a “standard” group of readers was identified.

Deficiencies:

- Mean length-at-age data were used to provide information on growth but use of conditional age-at-length data is preferable.

Blue rockfish

Assessment summary

A single stock was assessed for blue rockfish off northern and central California using SS2. The choice of stock boundary was mainly driven by the current distribution of the species (the fish off southern California were assumed to be from another stock in a highly depleted state). The assessment data included: commercial and recreational catch history beginning in 1916 (best estimates only); CPUE from the recreational fisheries (RecFIN 1980-1989, 1993-1996, 1999-2006; California CPFV 1987-1998); SWFSC pre-recruit indices 2001-2006; length data from recreational and commercial fisheries 1979-2006 (not all years, not all fisheries); and age data from the recreational fishery 1980-1984.

The base model, presented in the draft documentation, used the age data in the common formulation of annual age frequencies. It was noted in the document that the age data were very poorly fitted and that the use of these data as conditional age-at-length would be explored prior to the STAR Panel meeting. The STAT presented the results of their exploration to the meeting and offered a preliminary base model using conditional age-at-length data. However, the fits to the age frequencies (when presented in aggregate) were only slightly better than in the initial base model. Alternative formulations aimed at achieving a reasonable fit to the age data became somewhat of a focus for the blue rockfish assessment. However, the Panel had to deal with many other issues which arose for this assessment.

A reasonable effort had been made to construct a full catch history. However, only “best guess’” estimates had been determined with no attempt to bracket catch streams with a low and high scenario. Also, the input from fishers on historical catches was completely ignored (whereas, in the May assessment, this had been used to provide some alternative catch histories). After much discussion, the existing catch history was accepted with minor modification and “half” and “double” scenarios (over part of the history) were used to bracket catch history uncertainty.

There was some discussion on how length and age frequencies were constructed. In the main, raw data had been used without scaling of samples to catches and then to strata. In the case of the age data the sampling design was not even known. The Panel investigated this to some extent and could not find any obvious problems with the age data. In the case

of length frequencies, an extract of weighted length frequencies was obtained from RecFIN and used in a sensitivity run, which gave very similar results to the comparative run. This provided some reassurance, but the preparation of data prior to model fitting is still a concern to me for blue rockfish (and for other west coast assessments).

The STAT developed a relationship for fecundity-at-length from two points in a CDFG publication. They stated that this was used in the calculation of depletion, but Dr Hamel noted that their control file actually specified female spawning biomass rather than spawning output. The control file was corrected and because of the relatively steep slope in the length-fecundity relationship depletion estimates were reduced (in two comparative runs, the use of the fecundity relationship dropped estimated depletion from 33% to 24%)

The initial and revised base models presented by the STAT to the Panel showed a near perfect fit to the pre-recruit indices. They stated this was because "there is essentially no available data to conflict with the survey predictions of year class strength". The Panel did not question this statement until the black rockfish STAT showed why their pre-recruit indices were not well fitted. It then became clear that the blue rockfish pre-recruit indices should not be exactly fitted because recent length frequencies could not be entirely consistent with the pre-recruit indices. It was revealed that the blue rockfish STAT had used the estimated CVs from the ANOVA analysis used to construct the pre-recruit indices. These were very small, and indeed the STAT had increased the weight on the pre-recruit indices during tuning. The Panel recommended that CVs of 35% be used for the pre-recruit indices. The fit was then less than perfect and entirely reasonable.

In the end, the fitting of the age data was not especially problematic. Primarily it required that recruitment deviations be estimated for cohorts that were present in the age data. In the STAT's original models, recruitment deviations were estimated from 1980 which was the first year of age observations – hardly surprising that they were not well fitted. After beginning recruitment deviations earlier, the fit to the age data was much improved except with regard to the plus group for males. This problem was alleviated by allowing natural mortality to be higher for males than females. However, there were still some systematic problems with the fit, due to a conflict between the age data and the associated length data – a problem with the growth curve.

The STAT (and some members of the Panel) were very concerned about potential temporal changes in growth. The STAT presented data demonstrating that there was probably much spatial variation in growth; and other data suggesting temporal changes. They found the data supporting a temporal change compelling. I did not, because of small sample sizes and spatially restrictive samples. They investigated some alternative models with two blocks of growth parameters but never obtained any runs that they were willing to defend.

The issue of blue rockfish consisting of two species was discussed in terms of the conditions under which the assessment could be considered valid. The assumptions necessary are not dissimilar to those required with regard to multiple stocks being assessed as a single stock. However, in addition to experiencing comparable fishing mortality and recruitment patterns, it is necessary that the species have very similar

biological parameters and population dynamics. Little is known in this regard except that the species school together and appear to have similar growth curves (from the little data that are available).

The blue rockfish assessment is inherently uncertain being driven by length and age data, and model assumptions. Natural mortality was chosen as the primary dimension of uncertainty (with catch history providing some additional spread), and estimated depletion ranged from approximately 15% to 50% (base = 30%). However, this range does not adequately capture the uncertainty in the assessment.

Primary sources of uncertainty

The major sources of uncertainty in the blue rockfish assessment are assumed stock/species structure, natural mortality, and catch history. The assessment is inherently uncertain being driven by length and age data, and model assumptions.

Strengths and weaknesses of current approach

It is difficult to imagine that sufficient data will ever be available to assess two species of blue rockfish, and hence the two-species nature of the assessment will remain as an intrinsic uncertainty. If the issue of two species is set aside, there still remain stock structure issues which need to be considered in future assessments – and which should not have been ignored in this one.

The assessment brought to the meeting was far from complete. Data had not been fully prepared and analyzed before model fitting. The models were not adequately documented and in part had been incorrectly implemented (e.g., female spawning biomass instead of spawning output). Also, some poor modelling choices had been made (e.g., estimating recruitment deviations from 1980 when that was when the age data started). Although many corrections/improvements were made to the assessment during the STAR Panel meeting, I am not sure that we found all of the mistakes. Nevertheless, I do believe that the assessment is technically adequate.

Merits:

- SS2 was used and as such brings the advantages of a standard and well tested package.
- The use of conditional age-at-length data is technically superior to the common practice of using dependent length and age frequencies (i.e., where the length data have been sub-sampled for age).
- A reasonable attempt was made to construct a full catch history.

Deficiencies:

- The uncertainty associated with the historical catch history was not fully explored.
- Insufficient attention was paid to data preparation and analysis.

- The assessment was not as well developed as it should have been prior to review and it is not clear that all of the deficiencies have been addressed.

Conclusions and Recommendations

The black rockfish and blue rockfish assessments were technically improved by the STAR Panel process. I consider that both assessments are technically adequate and as such represent the best available science on which to base management advice.

The black rockfish assessment brought to the meeting was reasonably sound and complete. A number of changes were made to the assessment during the meeting, but none of these had a major impact on the assessment results. A troubling aspect of the assessment is the dependence of the results on the weight given to the mean length-at-age data. This demonstrates an innate conflict in the data sets in particular with regard to growth. As in many assessments, age and length data rather than biomass indices are driving the assessment results. This suggests that the results are very dependent on model assumptions.

The blue rockfish assessment brought to the meeting was not as complete as it should have been. Numerous issues arose with regard to the assessment, many of which would have been avoided with a better prepared assessment. Nevertheless, the final assessment is no worse than many that have been accepted. It is intrinsically more uncertain than many because blue rockfish appears to be a two-species complex. As with black rockfish, age and length data rather than biomass indices are driving the assessment results and this suggests that the results are very dependent on model assumptions.

I support the recommendations given in the STAR Panel reports many of which are repeated below. I have made similar recommendations in my other 2007 reports.

Generic (all groundfish)

- Establish a *meta* database of all data relevant to groundfish stock assessment. The database should include enough detail about the nature and quality of the data that a stock assessment author can make a well informed decision on whether it could be useful for their stock assessment.
- Establish *accessible* online databases for all data relevant to groundfish stock assessment, so that assessment authors can obtain the *raw* data if required.
- Establish a database for historical groundfish catch histories, “best” guesses and estimates of uncertainty (and processes for updating and revising the database). There must be a coordinated and comprehensive approach to developing this database (it must *not* be a compilation of individually constructed catch histories.)
- Develop a concise set of documents that provide details of common data sources and methods used for analyzing the data to derive assessment model inputs.

- For “hook and line species” which are not suitably sampled by trawl surveys, develop fishery independent time series using fixed sites and volunteer fishers properly supervised using standard protocols.
- Publish a full descriptive analysis of the recreational fisheries and fleets for CPUE interpretation (not limited to “groundfish trips” – interactions with other target species are important).
- Develop standard and validated methods for producing recreational CPUE indices which deal with the peculiarities of the recreational data and regulation changes. (The method of Stephens and MacCall for filtering recreational fishing trips is promising but remains largely unvalidated. Repeated use does not constitute validation.)
- Develop standard and appropriate methods for modeling age and length data, including choice of distribution, initial variance assumptions, and tuning methods (current methods can and should be improved).
- Routinely produce and present supporting documentation and diagnostics for any derived indices or inputs which are included in a stock assessment model (e.g., GLMM derived trawl survey abundance indices; informed priors on steepness).

Black rockfish (southern)

This should be aimed towards a fully Bayesian assessment when the process and technology allow.

- An informed prior needs to be constructed for the Oregon tagging study q – without it the data have no influence on the assessment except indirectly with the estimated q as an “informal diagnostic” (which is unreliable without an informed prior)
- Conditional age-at-length data needs to be used instead of arbitrarily weighted mean length-at-age data.
- Age data from Californian fisheries is needed to supply information on growth and fishing selectivities.
- Further work is needed on age-reading comparisons and validation.

Blue rockfish

This assessment is not as far advanced as a number of others. There are intrinsic difficulties given the two-species issue but some of the groundwork for a single species assessment has not been fully completed. It is difficult to know how much effort should be expended on the two-species issues. The following recommendations are aimed at assessing the species complex.

- A full stock structure review is required.

- Subsequent to the stock structure review an appropriate number of stocks should be assessed (e.g., based on justifiable stock structure assumptions rather than current distribution).
- In each assessment, fully capture the uncertainty in historical catch. At least three alternative catch histories should be constructed: a “best guess”, an upper bound and a lower bound. Alternative assumptions in the timing of small and large catches could also be explored.
- Conduct a descriptive analysis of all available data aimed at understanding spatial and temporal patterns in the data.
- Armed with an improved appreciation of the key aspects of the data develop abundance indices and appropriately scaled length and age frequencies (and conditional age-at-length) for use in model fitting.
- Full Bayesian assessments could be done when the technology and the process allow.

Appendix 1: Bibliography of supplied material

A. Draft Agenda
B. Estimation of black rockfish (*Sebastes melanops*) population parameters from recreational fisheries mark-recovery data off Newport, Oregon. Troy V. Buell, Robert W. Hannah, and Steven J. Parker. August, 2007.
C. STAR Panel Report for Black Rockfish (Southern). May 21-25, 2007.
D. The status of black rockfish off Oregon and California in 2007. David B. Sampson. STAR Panel Review draft 17 September, 2007.
E. STAR Panel Report for blue rockfish. May 21-25, 2007.
F. Age and growth of blue rockfish (*Sebastes mystinus*) from central and northern California. Thomas E. Laidig, Donald E. Pearson, and Lorraine L. Sinclair. Fisheries Bulletin 101: 800-808.
G. Assessment of blue rockfish (*Sebastes mystinus*) in California. Mop-up STAR Panel draft 18 September, 2007.

Appendix 2: Statement of work

September 28, 2007

General

The Stock Assessment Review (STAR) meeting is a formal, public, multiple-day meeting of stock assessment experts who serve as a peer-review panel for one or more stock assessments. External, independent review of West Coast groundfish stock assessments is an essential part of the STAR panel process that is designed to make timely use of new fishery and survey data, analyze and understand these data as completely as possible, provide opportunity for public comment, and assure the best available science is used to inform management decisions.

The stock assessments will report the status of the southern black rockfish and blue rockfish resources off the west coast of the United States using age and/or size-structured stock assessment models. Specifically, the information includes a determination of the condition and status of the fishery resources relative to current definitions for overfished status, summaries of available data included in the models, and impacts of various management scenarios on the status of the stocks. The information is provided to the Pacific Fishery Management Council and NOAA's National Marine Fisheries Service to be used as the basis of their management decisions, which are subsequently approved and disseminated by the Secretary of Commerce through NOAA and NMFS.

The consultant will participate in the Stock Assessment and Review (STAR) Panel of the Pacific Fishery Management Council (PFMC) for the review of the blue rockfish and southern black rockfish, as well as rebuilding analyses for seven overfished rockfish.

The consultant should have expertise in fish population dynamics with experience in the integrated analysis type of modeling approach, using age-and size-structured models, use of MCMC to develop confidence intervals, and use of Generalized Linear Models in stock assessment models. The Pacific Fishery Management Council's Scientific and Statistical Committee requests that "all review panelists should be experienced stock assessment scientists, i.e., individuals who have done actual stock assessments using current methods. Panelists should be knowledgeable about the specific modeling approaches being reviewed, which in most cases will be statistical age- and/or length-structured assessment models" (SSC's Terms of Reference for Stock Assessments and STAR Panel Process for 2007-2008)

Documents to be provided to the consultants prior to the STAR Panel meeting.

Specifics

Consultant's duties should not exceed a maximum total of 14 days: several days prior to the meeting for document review; the 5-day meeting; and several days following the meeting to complete the written report. The report is to be based on the consultant's findings, and no consensus report shall be accepted.

The consultant's tasks consist of the following:

1) Become familiar with the draft stock assessments and background materials.
2) Actively participate in the STAR Panel to be held in Seattle, Washington, October 1-5, 2007. Participants are strongly encouraged to voice all comments during the STAR Panel so the assessment teams can address the comments during the Panel meeting.
3) Comment on the primary sources of uncertainty in the assessments.
4) Comment on the strengths and weaknesses of current assessment approaches.
5) Recommend alternative assessment model configurations or formulations as appropriate during the STAR panel.
6) Additional tasks related to the review of the rebuilding analyses are not requested of the CIE consultant given that the SSC groundfish subcommittee is responsible for conducting the reviews (as opposed to STAR panels reviewing stock assessments). However, the consultant may participate (and is encouraged to do so) in the discussion of the rebuilding analyses.
7) Complete a final report after the completion of the STAR Panel meeting.

No later than October 19, 2007 submit a written report consisting of the findings, analysis, and conclusions (see Annex I for further details), addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Die, via e-mail to ddie@rsmas.miami.edu, and to Mr. Manoj Shivlani, via e-mail to mshivlani@rsmas.miami.edu.

Submission and Acceptance of Reviewer's Report

The CIE shall provide via e-mail the final reports of the consultants in pdf format to Dr. Lisa L. Desfosse for review by NOAA Fisheries and approval by the COTR, Dr. Stephen K. Brown by November 2, 2007. The COTR shall notify the CIE via e-mail regarding acceptance of the report. Following the COTR's approval, the CIE shall provide the COTR with pdf versions of the final report with digitally signed cover letters.

ANNEX 1: Contents of Panelist Report

1. The report shall be prefaced with an executive summary of findings and/or recommendations.

2. The main body of the report shall consist of a background, description of review activities, summary of findings (including answers to the questions in this statement of work), and conclusions/recommendations.

3. The report shall also include as separate appendices the bibliography of all materials provided by the Center for Independent Experts and a copy of the statement of work.

Draft Agenda

Stock Assessment Review (STAR) Panel for Southern Black Rockfish, Blue Rockfish, and Rockfish Rebuilding Analyses

NMFS Alaska Fisheries Science Center
Jim Traynor Seminar Room
7600 Sand Point Way NE
Seattle, Washington 98115

October 1-5, 2007

Monday, October 1, 2007

12:30 pm	Introductions Review the Draft Agenda Review the STAR panel Terms of Reference
1:00 pm	Stock Assessment Team Presentation of Blue Rockfish Assessment (Meisha Key, Alec MacCall)
3:00 pm	Coffee Break
3:15 pm	Q&A session with the Blue Rockfish STAT Panel develops list of model runs / analyses for the STAT
5:00 pm	Adjourn

Tuesday, October 2, 2007

8:30 am	STAT Presentation of Southern Black Rockfish Assessment (David Sampson)
10:00 am	Coffee break
10:15 am	Q&A session with the Black Rockfish STAT Panel develops list of model runs / analyses for the STAT
Noon	Lunch break
1:00 pm	STAT presentation of requested model runs / analyses for Blue Rockfish, next set of requests
3:00 pm	Discussion of general issues pertaining to SSC review of rebuilding plans
3:30 pm	Canary rockfish rebuilding analysis (Ian Stewart)
5:00 pm	Adjourn

Wednesday, October 3, 2007

8:30 am	Darkblotched rockfish rebuilding analysis (Owen Hamel)
9:30 am	Cowcod rockfish rebuilding analysis (E.J. Dick)
10:30 am	Widow rockfish rebuilding analysis (Xi He)
Noon	Lunch break
1:00 pm	Presentation of model runs / analyses for black rockfish and blue rockfish, next set of requests
5:00 pm	Adjourn

Thursday, October 4, 2007

8:30 am	Pacific Ocean perch rebuilding analysis (Owen Hamel)
9:30 pm	Yelloweye rockfish rebuilding analysis (John Wallace)
10:30 am	Bocaccio rockfish rebuilding analysis (Alec MacCall)
Noon	Lunch break
1:00 pm	Presentation of model runs for black rockfish and blue rockfish, identify preferred models and bracketing model runs
5:00 pm	Adjourn

Friday, October 5, 2007

8:30 am	Consideration of remaining issues as needed, panel report preparation
Noon	Lunch break
1:00 pm	Continue drafting report (if needed)
5:00 pm	Panel Adjourn