



July 16, 1999

Dr. William W. Fox, Jr.  
Director, Office of Science and Technology  
National Marine Fisheries Service  
1315 East-West Highway  
Silver Spring, MD 20910

Dear Dr. Fox:

The Center of Independent Experts has completed another review. In it, Dr. Gunnar Stefansson (Iceland) participated in a STAR Panel meeting in Newport, Oregon. The primary product of his review will be reflected in the STAR documents that are being finalized by the NWFSC. Dr. Stefansson also provided us with a more detailed review of the STAR process and gave recommendations for improvements to the process (enclosed). It is my understanding that your Office will forward the document to the appropriate places in NMFS.

Sincerely,

A handwritten signature in cursive script, appearing to read "Robert K. Cowen".

Robert K. Cowen  
Professor and Maytag Chair of Ichthyology

c: Steering Committee Members  
V. Restrepo

encl.: Review

Rosenstiel School of Marine and Atmospheric Science  
Division of Marine Biology and Fisheries  
4600 Rickenbacker Causeway  
Miami, Florida 33149-1098  
305-361-4182

## **PETRALE SOLE and CANARY ROCKFISH**

Comments on STAR Panel Meeting

by

Gunnar Stefansson, external reviewer

June, 1999

### **Background**

The STAR Panel reviewed assessment by the STAT Teams for the petrale sole and canary rockfish fisheries. The Panel's reviews are merged into reports to the Council. This review took place during the week of June 14-18, 1999 at the Hatfield Marine Science Center in Newport, Oregon. Members of the STAR Panel were Tom Barnes, (California Department of Fish and Game, STAR Chair), Gary Stauffer (NMFS Alaska Fisheries Science Center, SSC Representative), Gunnar Stefansson (Marine Research Institute, Iceland), Mark Saelens (Groundfish Management Team Representative) and Rod Moore (Groundfish Advisory Panel Representative). As an outside reviewer, the author of the current document provided input on as many topics as possible, including general assessment methodology, state and needed modifications of data sources, needed additional program runs and appropriate interpretation of the model results. This document is the sole responsibility of the author but by necessity also reflects a number of the comments in the STAR Panel reports.

### **General**

The assessments presented to the STAR Panel were quite extensive by any standards. The modelling approaches taken were of the highly detailed stock synthesis/AD Model Builder variety. In particular, these models were disaggregated by sex, fleet and "stock component". Natural mortality was in all cases modelled explicitly rather than treated as a simple "assumed" constant. In principle, these modelling approaches are certainly appropriate and need to be undertaken as a part of the evaluation of the possible utilisation of these resources. Certain problems with using only this approach will be detailed below.

The data analyses preceding the modelling efforts were also exceptionally extensive. Great care had been put into considering the nature of the data sets, the error structure to assume and so on. Naturally, some issues remain and one of the most important ones regards the weighting of the data sources used in the assessments. This was an important issue in all the assessments presented to the Panel, since different weightings could have lead to different conclusions for very many questions posed. Thus the individual data sets tried to pull the models in different directions, indicating that the data sets could not all be explained at the same time using the prescribed models. This is illustrated further below.

The panel put forth a number of requests for analyses, several of which related to issues which could be dealt with immediately and some which could be dealt with in time for

presentation of the final report to the Council. All of these were dealt with appropriately by the STAT Teams and some work was initiated for the purpose of providing additional results before the Council meeting. The latter was of an exploratory nature, believed to be unlikely to have considerable impact, but the STAR Panel was to be notified by e-mail of any changes which would have an impact on the overall conclusions drawn during the meeting. All of these concerns were therefore handled adequately.

It would seem, therefore, that the meeting itself, format of presentation, work prior to and during the meeting was all conducted in an appropriate manner, and one likely to elucidate the overall state of affairs and this is indeed the case for the most part, but there are clearly some areas where the overall procedure can be improved. There are also methodological issues which are not handled by the modelling approaches taken and there are very serious concerns regarding the data available to the assessors. These issues are for the most part brought out in the STAR Panel reports.

### **Problems - procedural issues**

The assessments are triennial and are therefore quite extensive every time they are conducted. In other parts of the world the term "comprehensive assessment" has been used for assessments where every detail of the biology is considered. This approach is taken in the present circumstances, since a new assessor sees a new set of problems and starts to model them from scratch. There is, in fact no continuity in the assessment process and each assessor may never have assessed the resource before. This would seem the correct procedure for research but not necessarily appropriate for resource monitoring where some consistency can be quite useful.

The triennial nature of the assessments implies that no individual or group is tracking whether predicted yearclasses actually appear. The lack of assignment of a species/complex to an expert implies that there is no researcher in the position of monitoring regularly all the sampling from a stock/species/complex. One result of this is a hectic scramble every three years to find all the data needed for the assessment, since there is no routine data summary protocol or even a routine age reading protocol for these species.

### **Problems - data issues**

The single most important issue is the lack of data.

- The triennial nature of the shelf survey makes it very hard indeed to make any sensible comparisons, track yearclasses etc.
- The lack of protocol for data collection means that data are sporadic and may be completely missing, even for entire years, entire stock components or entire regions.

- The lack of joint protocol for age readings (treatment of otoliths and definitions of rings) means that data in the available data bases are inconsistent and these differences need to be modelled, implying much more modelling work and much less precise results.
- The lack of consistent data treatment (e.g. reading the otoliths which have already been collected) implies that there could but does not exist important information for use in the assessments. An important example is that for canary rockfish age readings have not been undertaken on otoliths collected in 1993 or 1998. When the available age data is considered (using 3-age\*3-year aggregate blocks), there appear to be some important yearclass signals in the survey but these missing years would provide the definitive proof of whether these conclusions are reliable or not.
- The lack of synchronisation between states implies that data is collected and analysed inconsistently and data bases are inconsistent in definition and access.

In all, these various concerns indicate the situation with modelling efforts which are unusually extensive (and of a world-class standard) but that the routine assistant-level data collection and analyses are far below average for important resources.

### **Problems - analysis issues**

Although the analyses presented were extensive and unusually thorough by usual world-wide standards, there remain a few issues which need to be mentioned. These issues relate to the protocol which is mentioned above, i.e. the triennial nature of the assessments and correspondingly comprehensive models.

Since the modelling efforts are concentrated towards comprehensiveness and completeness, the attempt was to incorporate all important processes into a single model in each case. Thus, growth is modelled internally in each assessment, in addition to changes in numbers. The models must predict not only survey indices and age compositions of catches, but also length compositions for each available fleet and so on.

Further, since the data are so scant, there is a reluctance on the side of the assessors to form overall measures such as annual catches in numbers at age from one single age-length key. Rather, the approach taken is the traditional (and formally correct) statistical approach to try to explain the actual data, as collected, by the model.

On the positive side, there is no doubt that this approach can be used to explain and accommodate a variety of data problems and attributes of the biology of the species.

On the negative side, this leads to extremely complex models which have somewhat unpredictable behavior. In particular, the inconsistencies in the different data sets (both species) imply that there may be some components in the models which are too rigid with unforeseen consequences. For example, an incorrect assumption in a growth model may sway the estimated population numbers away from the "truth". When the sole approach is to view all the data through a single model, these effects are very hard to distinguish. To their credit, the STAT Teams did some analyses to investigate such factors, but the fact

remains that when the data sets are viewed through the complex models alone, there appear to be inconsistencies in the data sources (of course a more appropriate interpretation is that the models do not fully explain all the data sources simultaneously).

There is a need to sway a bit away from the formal statistical approaches in order to verify some of the assumptions of these complex models. A simple way forward would be to aggregate all age-length data into a single age-length key (for each species) and use this key to obtain catches in numbers at age which can then be modelled using any of a large suite of assessment methods (catch curves as in Beverton and Holt, VPA of Gulland, cohort analysis of Pope, time series analysis of Gudmundsson or Ianelli etc). If the simple methods imply similar broad trends in the populations, then there is no problem. If there are differences, then these need to be explained.

In all, the present approach is sound and should be used, but simple approaches should also be considered in order to verify the complex models.