1998 STAR Panel Report on Pacific Ocean Perch

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Overview

The STAR panel reviewed the most recent draft Pacific ocean perch document, as submitted on June 15, 1998. An earlier, substantially similar draft was distributed to the STAR panel approximately ten days prior to the June 15 meeting. The STAT team and STAR panel unanimously agreed that the document was sufficiently complete to accept for the 1998 management cycle. The panel devoted two and one-half days of discussion to a thorough review of model data inputs, underlying model assumptions, and results of prior and requested model runs. The STAR panel commends the STAT team for producing a comprehensive and essentially complete assessment for panel review.

List of Requested Analyses

The panel evaluated the reference model and the document's five alternative models for sensitivity analyses. It's important for readers of the assessment to recognize that the five alternative sensitivity analyses models do NOT represent equally likely scenarios. They were constructed for exploratory purposes to construct optimal or most desirable reference case specifications. The following list describes the panel's recommendations regarding acceptance or modification of each alternative model. When the STAR panel directed the STAT team to modify the assessment's reference case specifications, this step necessitated re-running of all alternative models during the course of the panel meeting. The STAT team complied with all requests.

Model 1 - Reference Case. Change the selectivity pattern from variable with an apparent knife-edge selectivity during 1966-1980 to variable selectivity corrected for this knife-edge artifact. During the panel meeting a test run of this model was conducted using constant selectivity for these fishery data. This fixed selectivity run produced a very dome-shaped selectivity curve, creating an unreasonable

proportion of old individuals remaining in the population. Consequently, this alternative was rejected in favor of the above-mentioned specification. Biased fishery catch-at-age data from ages 14 and older individuals appeared to cause the knife-edge artifact, and thus were not used to tune the final reference case model.

Model 2 - Foreign and domestic fishery catch in three peak harvest years reduced by one-half. Accept as presented in document.

Model 3 - Variable survey selectivity over time. Replaced with new model examining the case of constant fishery selectivity over time. This alternative was adopted during the panel meeting. Variable survey selectivity in the original alternative produced little difference in results compared with the original reference case.

Model 4 - Broader prior distributions on survey catchability (q), natural mortality (M), and stock-recruit (S-R) steepness. After investigating the results during the STAR meeting of using uniform priors for values of M from 0.02 to 0.10, this model was accepted as presented in document.

Model 5 - Exclude fishery CPUE index. Accept as presented in document.

Model 6 - Alternative age-at-50% sexual maturity of age 7 (versus reference case of age 10). Accept as presented in document.

The panel recommended that the document include projections of future stock size and harvest at $F_{40\%}$, and a value of F more conservative than F_{msy} to evaluate a rebuilding policy. $F_{30\%}$ is approximately equivalent to current fishing levels. Additionally, projections for the next three years should include both estimates of catch quantities and female spawning biomass. The STAT team revised the decision table following critical examination of results of the Markov-Chain Monte Carlo (MCMC) analysis.

Comments on the Technical Merits and/or Deficiencies of the Document

During the STAR panel review of the reference model, the pattern of selectivity coefficients for the commercial fishery was examined. The pattern exhibited a knife-edge pattern at age 14 for years 1966 to 1980. The STAT team attributed this to aggregation of ages in a 14+ category to deal with the bias from otolith surface ages. Two alternative models were run by the team: one with constant selectivity and the other with age 14+ fish deleted from the tuning of the model, relying instead on only the data for ages 4 through 13. The independently-gathered catch-at-length data were retained in the model; as a result it was thought that little information on population performance was lost by excluding these older fish. This change eliminated the knife-edge pattern and the resulting selectivity was less domed-shaped than the constant

selectivity model. The STAR panel and the assessment author agreed that the new variable-selectivity model is preferable to the constant-selectivity model, because of the profound technological changes that have occurred in the fishery over the last 30 years. Therefore, the STAR panel recommended that the reference selectivity model be changed to the new variable-selectivity model.

The sensitivity analysis of the results from the alternative models compared to the reference model provides some insight into the applicability of the reference model results for levels of removals for 1999 through 2001. A comparison with Model 2 indicates that the accuracy of the large foreign catch is not particularly important. This model alternative was added at fishing industry request due to concerns over possible overestimation of POP catches from misidentification of other rockfish as POP. However, the panel noted that the opposite case of underestimation may also have occurred, citing Fraidenburg et al. (1978) as the basis for consideration of possible foreign under-reporting. A 50% reduction of the three highest catches did not change the harvest reference points or estimated population parameters significantly.

For Model 3 (constant selectivity) and for Model 6 (age for 50% maturity at 7 rather than 10), the 1999 harvest reference points were about 14% and 26% higher for the two models, respectively. Model 3 is believed to be relatively unlikely, as stated above. The two identified concerns about Model 6 were that visual gonad inspections (the basis of data in the 1995 assessment for age 7) may be biased, and that the histological examination-based estimate of age 10 from recent Alaska studies may not be correct for the Washington-Oregon-California POP stock in the extreme southern end of the species' range. However, an age-at-50% maturity of 10 is most appropriate until new data become available. The other estimated parameters and reference points were relatively unchanged for Models 3 and 6 compared to the reference case model (Model 1).

The results from Model 4 (broad priors for M, q, and S-R steepness) and Model 5 (deleted 1956-73 CPUE data) suggest that 1999 harvest reference points are 25% and 32% lower than results for Model 1, respectively. Broader prior distributions for M, survey q, and S-R steepness resulted in a higher point estimate for M and lower estimates of q and steepness. The parameter estimates for Model 5 are unchanged from Model 1. These results suggest the importance of re-examining the earlier analysis of CPUE time series and the need for measuring the q for the triennial bottom trawl survey for POP. Although these models provide more conservative harvest projections for 1999, Model 1 is preferred .

The panel felt it would be worthwhile to review how the domestic trawl fishery CPUE dataset was calibrated . This dataset spans a time period of 1956-73 when fishing technology was relatively stable, thus it's appropriate to use these data in the model. More recent domestic fishery CPUE data, on the other hand, would be confounded by profound technological improvements (Loran A/C, plotters, net sounders, net configurations, etc.), as well as a bycatch trip-limit regime.

The STAR panel and STAT team discussed the appropriateness of the discard rate estimate of 16% derived from the study by Pikitch et al. (1988). The group acknowledged that this value may not be accurate under recent regulations and fishery practices, but more accurate, near-term information is unavailable to supplant the value used in the assessment.

The panel discussed employing only the more recent recruitment values for yield models since the current model projections allow for a year class that was produced by very large historically-early biomass levels (~100,000 MT). The STAT team stated that the model was in fact already operating in this manner.

Areas of Disagreement

No major areas of disagreement arose during the panel meeting.

Unresolved Problems and Major Uncertainties

The differences between the expected reference points from the forward projection age-structured model and the full Bayesian integration analysis using the Markov-Chain Monte Carlo (MCMC) algorithm are somewhat troubling because they suggest quite different spawning stock levels for B_{msy} and for year 2009. The MCMC integration algorithm is a more explicit treatment of the uncertainty about the model's harvest projections than the "point estimates" traditionally used in westcoast groundfish management, and the MCMC expected value is a more accurate reflection of future stock sizes. Simulation studies to explore the characteristics of probability distributions of estimates for various reference points should be encouraged for future stock assessments for Pacific ocean perch and other species. We expect that future efforts to develop a rebuilding plan for POP should be based on the full integration analysis. The 1999 through 2001 harvest projections for harvest reference points are nearly identical for the two modeling approaches. The current harvest levels, given the Council's management objective for a bycatch only fishery, are nearly equivalent to the $F_{30\%}$ level. To provide for any rebuilding, future harvest levels will need to be reduced to exploitation rates closer to F_{msy}, which will likely be difficult to attain, given the multi-species nature of the trawl fishery.

Recommendations for future research and data collection

The Star panel recommends the following:

First Priority

Collaborate on a stock-wide assessment including the Canadian INPFC Vancouver Area data with the present U.S. Vancouver Area and Columbia Area analyses. Resulting fishery yields would then be allocated between the two countries in an operational manner similar to that employed for Pacific whiting.

Resume the collection of age structures from the fishery in areas where POP are landed.

Conduct histological studies to determine the most appropriate age at sexual maturity for the Vancouver/Columbia Area population.

Review the standardization of domestic fishery logbook data from 1956-1973 by D. Gunderson to determine how the CPUE data were calibrated. Determine if these data are retrievable to redo the CPUE analyses.

Second Priority

Investigate ways to improve the precision of the NMFS triennial survey catchability coefficient (q). NMFS staff could examine gear effects on catchability, such as herding of POP by trawl doors and escapement under the trawl footrope. In addition, analyses of survey data should continue on the implications of area-swept expansions onto untrawlable grounds.

Examine field observation data from the Oregon Trawl Commission for potential insights on the appropriateness of a 16% discard rate for POP since the discard study of Pikitch in the late 1980s.

Re-age the pre-1983 historical-fishery age structures using the break-and-burn technique.

Since extensive trawl fishery logbook collections are available and questions remain about the occurrence of targeting behavior, the STAT team and STAR panel recommend that questions about POP fishing be incorporated in the NMFS Port Interview Program (PIP) questionnaire.

Detailed investigations into the Soviet survey data from the 1960s and 1970s should be continued, particularly regarding their use as an independent historical abundance index. As mentioned in the assessment document, if rockfish species identifications were credible, these data may provide insights into changes in relative species abundance over time for a variety of rockfishes.

Literature Cited

Fraidenburg, M.E., J.E. Smith, W.H. Barss, and T. Jow. 1978. Minimum estimates of all nations removals, North American trawl species composition, and CPUE for "other

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