SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON THE SUPPLEMENTAL NATIONAL MARINE FISHERIES SERVICE REPORT

Dr. John Stein summarized for the Scientific and Statistical Committee (SSC) the document "Comments on the Klamath River Fall-Run Chinook Salmon Fisheries Management Plan Escapement Floor." It was prepared primarily by biologists from the Northwest and Southwest Fisheries Science Centers who are not directly involved with the Council process and, as such, represents an outsiders' look at the Klamath fishery management situation. The impression of the SSC was that the document was prepared quickly and, as a result, was uneven in its coverage, leaving opportunities for further analysis and integration. However, the document provides considerable background material and discusses diversity, disease, hatcheries, forecast and model uncertainty, offers a risk assessment, and discusses expectations for 2007 and 2008.

A major focus of the SSC discussion, in response to guidance from the Council, was on the risk assessment. First, this report is one of the few presentations we have seen of uncertainty relative to proposed salmon harvest regimes. We commend the report authors for taking this first step and hope to see similar statistics for a broader range of salmon stocks and fisheries in the future. The SSC replicated the stock-recruit analysis (Salmon Technical Team Model 2) and risk analysis, and found them to be technically correct. However, the analysis presented in the report was incomplete, and deserves a fuller treatment. The intention of the risk analysis, based on the stock-recruit model, was to put boundaries on possible outcomes of the three fishery options under consideration for 2006. To do this the authors chose as a benchmark the lowest historical recruitment, under conditions of the mean and the lowest observed early-life survival rates. Because the lowest observed survival rate value (for the 1989 brood-year) was 6-fold lower than the next lowest, the SSC considers use of this parameter value as being unnecessarily pessimistic. This may be balanced by the use of the lowest historical recruitment, which is a low standard for assessing risk to the populations.

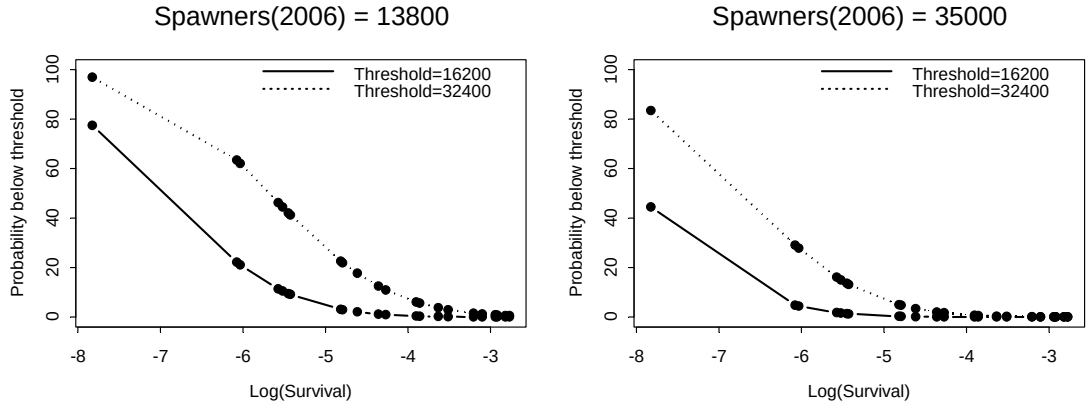

Figure 1. The relationship between risk (the probability of being below two recruitment thresholds, 16,200 and double that amount, or 32,400) is shown as a function of the survival rate for two spawner escapement levels, the escapement floor (right panel) and the Option 1 projected escapement (13,800, left panel). The large dots show observed levels of early-life survival.

The SSC explored the effects on risk of the chosen recruitment threshold and the number of parental spawners, where risk is expressed as the probability of being below the threshold over the range of observed survival rates (Figure 1). The left-most point on the solid line in the left panel corresponds to the most pessimistic early-life survival rate in the report. Risk in this scenario drops rapidly with increasing survival rate. Doubling the recruitment threshold (the dotted line) results in a considerable increase in risk, which stays high over a wider range of survival rates. The right-hand panel shows that the risks are lower if the parental spawning escapement remains at the current floor, compared with the escapement projected for Option 1.

Diagnostic plots of the residuals from the stock-recruit model suggest possible violation of the assumption that the logarithm of recruits-per-spawner follows a normal distribution. The implications of this to the risk analysis results are unclear beyond the additional uncertainty involved.

The population structure and biological diversity issue was of interest to the SSC. It appears, from the presentation in the report, that Klamath River Fall Chinook are made up of several distinct populations and that several of these populations had spawner escapements in 2004 that raise conservation concerns. The document points out the issue of inbreeding depression (reduced survival due to lack of genetic diversity) and demographic risk (chance events that, at low population size, can cause a population to disappear). There was also concern that the presence of large numbers of hatchery fish in the basin could be masking declines of wild spawners. The report does not attempt to assign risk levels to wild populations based on genetic or demographic effects of low escapements. The problems appear to be real, but it was not clear to the SSC how the aggregate 35,000 fish escapement floor is connected to the status of the separate populations. Smaller populations would be at greater risk if lower escapements were allowed.

The Summary and Conclusions of the report includes a discussion of expectations for the future. The current problem in the Klamath River is attributed, partly, to recent low flows and high water temperatures. These conditions persisted through 2004, affecting survival for fish that will return in 2006 – 2008. Additional pressure has been placed on the stock by recent ocean exploitation rates that were higher than expected due to unusual distributions of fish that resulted in anomalously high contact rates. Even with improved flows in the Klamath, the first return year with the potential for substantially higher escapement is 2009.

The situation in the Klamath River is dire. The risk to the fish is that several consecutive years of very low escapements may reduce the stock diversity, productivity, and resilience, potentially leading to greater problems in the future.

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