

MODEL EVALUATION WORKGROUP REPORT ON 2011 SALMON METHODOLOGY REVIEW

Members of the Model Evaluation Workgroup (MEW) attended the Salmon Methodology Review meeting in October and offer comments on the following topics:

- 1) Abundance-based management framework for Lower Columbia River tule fall Chinook; presented by Ray Beamesderfer.
- 2) Cohort reconstruction and harvest impact model for Sacramento Winter run Chinook; presented by Mike O'Farrell.
- 3) Application of bias-corrected methods, for estimating mortality in mark-selective fisheries, to coho Fishery Regulation Assessment Model (FRAM); presented by Bob Conrad.
- 4) Causes and effects of bias in anticipated mark rates in mark-selective fisheries for coho salmon; presented by Robert Kope.
- 5) Update on potential use of a Visual Studio version of FRAM for 2012 pre-season modeling; presented by Andy Rankis.

Lower Columbia River tule fall Chinook Abundance Based Management

The tule Fall Chinook component of the Lower Columbia Chinook ESU is spread over a wide geographic area, spawning in small to large rivers. The status of individual populations varies widely, as does the data available for analysis. The report from the Tule Chinook Workgroup (TCW) acknowledges these data limitations and relies upon the aggregate abundance of hatchery and wild production to evaluate the merits of an Abundance Based Management for this ESU. The report describes fishery management plans for coho and Chinook stocks for which the Council is already using variable exploitation rates (ER) responsive to stock abundance levels. This approach provides additional protection at low abundances and allows for higher harvest levels when the stocks are more abundant. The MEW endorses this management approach. The exploitation rate (ER) values modeled by the TCW provided a reasonable range to evaluate the relative stock risk and fishery benefits from a variable ER approach compared to the current fixed ER approach (37 percent in 2011).

Cohort reconstruction and harvest impact model for Sacramento Winter run Chinook

The cohort reconstruction and harvest model presented at the Methodology Review was well documented, had technical merit, and used available data in an appropriate manner. The MEW supports this work.

Application of mark-selective fisheries bias-corrected methods, for FRAM estimation of coho mortalities

Work on this topic has been presented at the Methodology Review for several years now, demonstrating that bias exists in FRAM estimation of unmarked mortality levels associated with coho mark-selective fisheries (MSF). This year's report is unique in presenting results from a practical application of bias correction methods appropriate for the FRAM model. The work was done using Excel spreadsheets populated with detailed FRAM output for the 2009 and 2010 pre-season coho models. The bias correction equations were applied to each unmarked stock's mortality through all Time Steps. The cumulative bias in total exploitation rates was demonstrated to be less than the earlier theoretical approaches indicated. The effect on individual stock ERs varied, dependent upon each stock's migration patterns through areas implementing MSF and full retention (non-MSF) fisheries. The MEW agrees that the bias correction algorithms developed during this multi-year analysis properly account for the bias in unmarked coho mortalities that MSF introduced to FRAM calculations. At this time Jim Packer (Washington Department of Fish and Wildlife) is coding these equations into a version of FRAM for further evaluation, potentially for use in 2013 Council area coho FRAM modeling.

Causes and effects of bias in anticipated mark rates in mark-selective fisheries for coho salmon

Mark rates in Council area mark selective coho fisheries were compared between the rates in FRAM pre-season model runs and the observed mark rates for 2000 to 2010. In general, the modeled mark rates were shown to be biased high, indicating that in the actual fisheries there were more unmarked coho for each marked coho than what the model had predicted. This report suggested that the underestimation of wild coho abundance is likely contributing to the biased modeled mark rates. It has been hypothesized that the relatively consistent underestimation of the number of unmarked coho present in Council area fisheries is the compounded result of errors in stock enumeration and consequently forecasts of the naturally produced component of coho subject to these fisheries.

The report noted that observed coho mortality in ocean MSF fisheries (recreational combined with commercial) was less than modeled pre-season and consequently the number of unmarked mortalities has been less than predicted. But we should not ignore that if the MSF fishery quotas were reached then the unmarked mortalities would be greater than modeled.

Additional sources of the mark rate bias were also discussed. Further analysis to identify the specific reasons for the mark rate bias could involve more refined run reconstruction methods and/or comparisons of genetic stock identification with FRAM based stock composition estimates. A closer look at stock specific Base Period wild and hatchery stock contribution rates to the individual ocean fisheries was also mentioned as relevant to this issue. Identifying the causes of the mark rate bias may be difficult considering the annual variability in survival/productivity of hatchery and natural stocks in Council fisheries.

Update on potential use of a Visual Studio version of FRAM for 2012 pre-season modeling

The FRAM has been recoded from a Visual Basic (VB) application into a Visual Studio (VS) program for both coho and Chinook fishery modeling. The FRAMVS uses a Microsoft Access database to hold model input and output values, rather than an assortment of independent text files that supported the older version. The goal is to use the new VS version for 2012 Council area modeling. The FRAM modelers are still testing the new version, as they learn to use it. Although the VS version is potentially a better modeling tool, the modelers need to be confident in the new version and in their collective ability to use this version. If progress is slower than expected, then the FRAMVB version could be used for 2012 modeling. However, present and future changes to the FRAM model are being applied only to the VS version.

PFMC

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