

## **Salmon Technical Team Comments on the Methodological Review of Revisions to the Klamath Ocean Harvest Model and the Coho Fishery Regulation Assessment Model**

### **KOHM**

A complete revision of the Klamath Ocean Harvest Model (KOHM) is not yet available for review. Substantial effort will be required over the next few months to complete remaining technical analyses and prepare an operational version of the revised KOHM. Presuming that the remaining tasks are completed, the Salmon Technical Team (STT) recommends that the revised KOHM be applied beginning in 2002. However, the completed model should be reviewed in February 2002 before the revised KOHM is implemented for planning 2002 seasons.

Based on a review of the progress to date, the STT believes that the methods reflected in the effort to revise the KOHM represent a thoughtful, well-reasoned approach that can be expected to substantially improve the capacity of the Council to evaluate the impacts of fishery regulatory impacts on Klamath fall chinook. The revised model represents a significant improvement from the existing KOHM in several important ways, including:

- Available data and information regarding Klamath fall chinook from a variety of sources are integrated into a cohesive form with a sound theoretical basis.
- A new historical database has been created which contains CWT data, catches, effort, and escapements necessary to parameterize the KOHM.
- The fishery-time strata employed in the revised KOHM model provide for separate assessment of troll and sport fisheries and refinement of management areas. These stratifications and changes in parameterization improve visibility of the assumptions employed in the estimation of fishery impacts.
- Cohort analysis procedures have been modified to provide consistency with algorithms used in model projections, including incorporation of drop off mortalities and new release mortality rates.
- Cohort analyses have been performed on five components of Klamath fall chinook production.
- The structure of the KOHM and data employed for parameterization is now more transparent:
  - ❖ Methods, assumptions, and algorithms have been documented, improving understanding the components that affect impact predictions and the significance of key model parameters.
  - ❖ The KOHM has been coded in a procedural programming language, improving the ability to understand and modify algorithms and identify interrelationships between model parameters.
  - ❖ Visibility of underlying data has been improved.
  - ❖ The new structure uses all historical data as well as provides for incorporating future data and parameters that may improve the prediction of fishery impacts.

Two primary tasks remain before the revised KOHM can be considered to be ready for application in Council planning processes: (1) remaining technical development must be completed; and (2) the model must be validated.

Some issues remain regarding the appropriate representation of components of Klamath fall chinook production, estimation of contributions of non-Klamath stocks to total ocean catches, and effort assumptions relating to proposed season structures..

The STT recommends that validation testing be principally based on an evaluation of model structure and parameterization and on results of backcasting. The information presented at the November SSC-STT meeting provides a sound foundation for understanding the model structure and parameterization. Backcasting would consist of inputting actual observed values of effort and abundance into the KOHM and comparing model estimates of harvest rates, escapements, and allocations with observed historical data.

The determination of whether or not the revised KOHM should be applied should not be based on a comparison of results with the existing KOHM. It is likely that results of the revised KOHM will differ from those of the current KOHM in several ways due to differences in structure, databases, and parameterization. A comparison of old and new versions of the KOHM may provide users with some insight into model behavior, but would not provide useful information regarding the performance of the revised KOHM in accurately estimating fishery impacts.

### **Coho FRAM**

The STT recommends that the Council approve the use of the new base period dataset for Coho FRAM, provided that remaining tasks are satisfactorily completed in time for implementation for the 2002 management season.

An operational version of the new Coho FRAM is not yet available for review. However, no changes in algorithms or functional structure from the current Coho FRAM are involved. Proposed changes center about input data, specifically the development of a new base period data set. Estimation methods for the generation of base period data rely upon the Mixed Stock Model (MSM) supplemented by other data (e.g., escapements), estimation methods, and models. These methods have largely been previously reviewed so the development of the new base period data primarily involves the application of approved methods to a specific set of data.

There are trade-offs involved in changing base period data sets. The current base period for Coho FRAM reflects exploitation patterns observed from 1979-1981. Fisheries during this period were consistent, occurred over an extensive geographic area, and were intensive so that CWT recovery data were of high quality. However, tagging of stocks contributing to fisheries during this period was incomplete so that data were not available to directly estimate base period impacts for some populations of concern.

The proposed new base period covers the years from 1986-1991. CWT releases for many more groups of fish contributed to fisheries during this time period, but fishing patterns were inconsistent. As management attention focused on the protection of individual stocks, uncertainty over estimates of fishery impacts increased as harvest rates were reduced and fishery regimes became more variable.

For the new base period, agencies were consulted extensively to ensure that representative CWT groups were selected and that the correct data were employed for development of new base period data. The methods employed to generate the new base period data attribute all catch to modeled stock groups, and eliminate many ad-hoc data manipulations and terminal fishery calculations that had to be done outside the model in the past.

Considering these trade-offs, the STT believes that the new 1986-1991 base period database represents a substantial improvement over the 1979-1981 base period data currently used by Coho FRAM.

Changes in fishery and stock stratifications resulting from the use of a new base period are summarized in the following table:

|                                     | <b>Current Data Set</b>           | <b>Proposed New Data Set</b>     |
|-------------------------------------|-----------------------------------|----------------------------------|
| Base Period Catch Years             | 1979-1981                         | 1986-1991                        |
| Stocks                              | 37                                | 128                              |
| Fisheries                           | 66                                | 247                              |
| Time Periods                        | 13 (Dec-Dec)                      | 4 (Jan-June, July, Aug, Sep-Dec) |
| CWT Groups in Base                  | 380 (10.8 million tags)           | 2500 (44.2 million tags)         |
| Stocks without CWT data during base | 3 (Skagit, Grays Harbor, Willapa) | None                             |

Several tasks remain to be completed before the new Coho FRAM model will be ready for use in the 2002 preseason process. Methods for combining data from individual base period years must be developed, abundance forecasts will be required for a greater number of stocks, serviceable formats will be needed for reporting model results, and support programs for generating model inputs (e.g., effort predictors) must be prepared. Testing of Coho FRAM with the new base period is expected to be completed by the end of December and be available for distribution in January 2002.

The STT strongly recommends that WDFW move quickly to initiate efforts to familiarize co-managers and users with changes resulting from the use of a new base period for Coho FRAM. Model users will need to feel comfortable with revised stock and fishery strata as well as the ability of Coho FRAM to accurately estimate impacts using the new data set. Coho FRAM is seminal to the capacity of various interests to reach agreement on coho management coastwide during preseason planning processes. Controversy surrounding the results of old versus new Coho FRAMs cannot help but increase the difficulty of developing fishery regulatory packages in a timely manner. The STT notes that it will not be possible to run two versions of Coho FRAM in parallel, given the differences in stock and fishery stratifications between the current and new base period data sets.