Non-Discretionary Project Results For FY 1998

Project 97-002-00: PATH - UW Technical Support - University of Washington

BPA Contact: Jim Geiselman

FY99 Forecast: $302,289

FY98 Funding: $265,116

AND

Project 98-006-00: Technical Support For PATH - James Anderson Consulting

BPA Contact: Jim Geiselman

FY99 Forecast: $50,000

FY98 Funding: $50,760

Project Requirements: These two contracts provide independent scientific support to the regional PATH process in the identification and assessment of key alternative hypotheses and proposed management actions relating to salmon stock recovery and rebuilding in the Columbia River ecosystem. These projects provide participation in PATH work groups and provide tools and analyses for the PATH evaluations of management actions. This support includes the development and use of statistical and mechanistic models of salmon life-cycle stages in various habitats including the mainstem (juveniles and adult passage), tributaries, estuary, and ocean. The contracts provide critiques and evaluations of the suitability of the mathematical frameworks on which the biological and ecological mechanisms of PATH hypotheses are formulated. Anthropogenic and environmental factors at each salmon life stage are approached in a multi-faceted approach involving qualitative descriptions, statistical data analysis, Bayesian maximum likelihood estimation techniques, and mechanistic models. Alternative hypotheses are tested according to their mathematical rigor, the realism of their ecological mechanisms and their ability to fit available data and data patterns. Direct participation is provided by Dr. James Anderson and several other scientists at the University of Washington in PATH working groups and through review of PATH products.

Passage Model Analysis (1.0)

The passage model CRiSP was applied to both spring and fall chinook analysis in PATH. Specific accomplishments are listed below and include development of new theory, calibration and analysis.

A ÒsimplifiedÓ version of CRiSP was developed to demonstrate basic principles underlying the model, and pointing up the differences between CRiSP and FLUSH. This was used in the essential PATH hypotheses document

Detailed analysis of survival and travel time data provided by the 1993-1997 PIT-tag studies was completed in this quarter and is intended to serve as a component in the ÒWeight of EvidenceÓ reports.

Staff participated in the fall chinook passage model work group. In several meetings in Portland, the group discussed travel time, dam passage, survival and predation data to be used in passage modeling. CRiSP 1.5 has been calibrated with the latest (95-97) fall chinook survival study data.

The theory of passage survival was evaluated from first principles and a new formulation was developed relating survival to both travel time and distance traveled. The model was calibrated with spring chinook pit tag data.

Transportation effectiveness

A transportation effectiveness analysis was completed relating T/C data to transportation effectiveness (D). The analysis illustrated that transport effectiveness covaried with the descaling of fish in collection. A hypothesis was developed for inclusion in PATH. A document was prepared.

Spring chinook prospective analysis (1.1.2)

Diagnostic values were completed and distributed to the PATH work group. Concerns over differences between the way FLUSH and CRiSP represent pool mortalities in different parts of the system were resolved.A mixed hypotheses for extra mortality was developed that included impacts of flow, climate, hatcheries the hydrosystem and estuarine predators.

Fall chinook retrospective analysis (1.2.3)

Fall chinook retrospective analysis was completed including calibration of travel time and survival of fall chinook. Hypothesis on survival under drawdown were defined and implemented.

Water Quality (1.3)

Collection of temperature data and refinement of the description of temperature in CRiSP is an ongoing effort; substantial recent records for Snake and Clearwater basins were obtained for use in PATH and other modeling efforts.

TDG (1.3.1)

CRiSP1.6 computation time has been improved to a sufficient level and the gas model calibrated to forebay gas levels.A vitality based equation relation mortality to gas levels

and fish length was developed and prepared for publication and included in the CRiSP 1.6.

Temperature (1.3.2)

Data for the last 2 years from USGS Stations at Peck and Anatone were obtained to complete the records for 1970-1997. This data was processed and formatted for inclusion into CRiSP data files as headwater temperatures.

Critiques

The PATH essential hypothesis were analyzed and paper developed describing the 12 essential hypotheses. This was submitted to PATH and posted on our web page.

Upstream migration (4)

A model relating suspended sediment levels and the conversion rate for migrating adult salmon has been developed and is being used in PATH to define the immediate effects of drawdown on migration.

Spawning (5)

The HEC 6 sediment transport model and data files have been acquired and analysis of the time history of required for redd creation and for the distribution of suspended sediments has been developed. This model is being used to assess aspects of drawdown on redd creation and on adult salmon migration

Ocean and Climate (4)

A literature survey was conducted on ecological factors contributing to the coupling between stock recruitment and ocean conditions and the distribution of smolt marine predators. Physical oceanography factors that relate to early ocean survival have been investigated. This work is seeking to establish possible oceanographic mechanisms for extra mortality.

Disease (5)

A literature survey was conducted the impact of BKD on smolt survival. The conceptual framework of a model relating disease to temperature and bacterial growth has been on developed

Documents

The following documents were posted on the PATH chinook web page:

1) Critique of delayed mortality by Anderson

2) Twelve essential hypotheses of PATH by Anderson

3) Release distributions for Snake River fall chinook passage model runs by Zabel

4) Transportation Operations Used In Fall Chinook Retrospective CRiSP Modeling by Hayes

5) A Simple Spreadsheet Model for Evaluating Recovery Strategies for Snake River Fall Chinook Salmon by Norris

6) Defining Equivalent Exploitation Rate Reduction Policies by Norris

7) Ocean Distribution Of The Columbia River Upriver Bright Fall Chinook Salmon Stock by Norris and Hyun

8) Fall Chinook PIT tag data for travel time analysis by Zabel and Van Holmes

9) Brief Description of the CRiSP Model (from the manual)

10) Effects of the Ocean and River Environments on the Survival of Snake River Stream-Type Chinook Salmon - Abstract by Hinrichsen, Anderson, Matthews, and Ebbesmeyer

Meetings

Numerous conference calls on PATH and Hydro projects were held.

A number of PATH meetings were also held in Portland, Oregon, which required some travel times from Josh Hayes, Jim Norris, Rich Zabel, and Jim Anderson.

PATH meetings for this quarter are listed below:

01-15-98, Rich Zabel, Portland, Oregon.

02-11-98, Rich Zabel, Portland, Oregon.

02-17-98, Jim Anderson, Portland, Oregon.

03-03-98, Rich Zabel, Portland, Oregon.

03-12-98, Rich Zabel, Portland, Oregon.

0n February 27, 1998, Anderson and Shaw attended a meeting with Dgas group at COE district office in Portland to review status of the numerical models.