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## **FISHERY HABITAT MODEL DEVELOPMENT AND USE**

From the EDT website: *“The Ecosystem Diagnosis and Treatment (EDT) method provides a practical, science-based approach for developing and implementing watershed plans. EDT helps planners develop working hypotheses as a basis for moving forward with watershed protection and restoration activities.*

*EDT can be thought of as a database and an expert system. Once baseline watershed and population information is entered into the database, the expert system translates this information into population performance parameters (abundance, productivity, and diversity).*

*EDT has been used extensively for watershed planning in the Pacific Northwest.”*

The EDT model is being used to develop an estimate of the number of fish that may be produced from the different alternatives in the Yakima River Basin Water Storage Feasibility Study (Storage Study). These estimates may not be the actual numbers that are produced as there are many variables which cannot be accurately predicted such as ocean habitat impacts. The EDT model will provide a method to compare alternatives with each other and to the no action and unregulated alternatives.

In the past, the EDT model was used to estimate impact of actions on streams and rivers without a lot of empirical data such as water temperature, sediment movement, flow changes and the other parameters which the EDT model uses to calculate results. That is because the data has not been available. Expert opinions of the habitat changes were put into the EDT model which then calculated the change in fish habitat.

To provide better data for the EDT model, Reclamation is coordinating the development of several computer models to estimate some of the 45 parameters which the EDT model uses to estimate fish production. The computer models being developed will estimate temperature, sediment movement, flow parameters (depth, velocity), and habitat parameters (how much spawning, rearing and resting habitat) may be available with each alternative.

Reclamation is gathering data on the Yakima River to develop these models. Bathymetric information has been collected on approximately 120 miles of the river. Bathymetric data is what the streambed looks like under the water. Reclamation collected this information using boats and aerial flights. The aerial flight method uses a technology not applied to streams or rivers before 2004. The aerial flying method saved much time and effort in gathering the stream bed information.

The streambed information will be used to develop the temperature and sediment models. Temperature is one of the most important parameters in the EDT model for fish survival and production. Salmon are very sensitive to temperature changes. The sediment movement is important because it can impact spawning habitat and habitat for the food sources for the salmon.



The fishery technical working group comprised of biologists from Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, irrigation districts, counties, the Yakama Nation, Washington Department of Fish and Wildlife, and others, meet on a regular basis to discuss this modeling effort. They are kept informed, through email and meetings, of how the data gathering has been accomplished and have helped supply information and data. The entities responsible for gathering the information and preparing the models include Reclamation's Denver Office and Upper Columbia Area Office staff, U. S. Geological Service's (USGS) Columbia River Research Laboratory, Fort Collins Science Center, and Tacoma office staff, and Mobrand – Jones & Stokes staff. Mobrand is the company that developed the EDT model and has been contracted to assist in automating the inputs to the model and changing the model to accommodate real data inputs. The Washington Department of Fish and Wildlife and National Marine Fisheries Service are performing analyses on the EDT model to verify its accuracy and sensitivity.

Each model in the chart, whether it is the RiverWare model developed by CADSWES from the University of Boulder Colorado, the IHA model developed by Nature Conservancy, the two-dimensional models used by USGS or the temperature and sediment models, can be used to evaluate an alternative but only for the parameter specific to that model. The RiverWare and IHA models, which are operational, were used to prepare the hydrographs shown in the Black Rock Appraisal Assessment. In the fall of 2005, the Yakima Basin Alternatives will be analyzed with these two models to compare them to the unregulated flows and the Black Rock alternative.

The other models, which are still being prepared, will be used to evaluate the alternatives as soon as they are operational. Then the EDT model, using the outputs from those models, will evaluate the alternatives for 45 parameters and provide an estimate of the increase in fish production for that alternative. The alternatives which can provide positive impacts on fish production as well as provide the irrigation and municipal water needs for the Yakima River basin will be considered for the feasibility phase of the Storage Study.

For further information regarding the Yakima River Basin Storage Study, visit [www.usbr.gov/pn/programs/storage\\_study/index.html](http://www.usbr.gov/pn/programs/storage_study/index.html).

# Support Models

# Assessment Model

