Upper Middle Fork John Day IMW Study Design Overview

In May of 2007 the Upper Middle Fork Working Group (UMFWG) was formed and began to develop a plan for the implementation of the Middle Fork John Day River (MFJDR) Intensively Monitored Watershed (IMW). This watershed scale effectiveness monitoring builds on a variety of collaborative restoration and monitoring projects in the basin including ODFW's existing Chinook salmon and steelhead monitoring.

Study Design

A document titled "Upper Middle Fork John Day River Intensively Monitored Watershed: Experimental Design and Implementation Plan" has been drafted and is available for viewing at: http://www.middleforkimw.org/MFIMW_Design&ImplementationPlan.pdf.

The goals of the MFJDR IMW are to improve adult and juvenile salmonid freshwater habitat in the MFJDR IMW study area using a variety of restoration actions, to assess how restoration actions alter stream habitat conditions, and to understand the casual mechanisms between stream habitat restoration and changes in salmonids production at the watershed scale. A BACI-like design will be employed to maximize spatial and temporal contrast and to account for other variables that influence fish population dynamics such as out-of-basin effects (e.g. Columbia River hydrosystem, ocean conditions, harvest, etc.) and climatic variation. To accomplish this we will compare the time series of various population performance metrics in the MFJDR to the South Fork John Day River Subbasin. At a smaller scale, there is an opportunity to compare different restoration action types at the reach level. Comparisons can be made between the major restoration actions, such as stream channel relocation, riparian planting, and instream structures, at replicate treatment and control reaches within the MFJDR.

Monitoring Activities

Temperature Modelling and Monitoring

The Heat Source™ model will be used in conjunction with current and ongoing Total Maximum Daily Load (TMDL) modeling in the MFJDR watershed to predict expected outcomes in water temperatures from restoration actions. Long-term data collection through the use of watershed wide temperature logger array along with future TIR flights will also be used to assess the actual changes. Water temperature loggers will be deployed at approximately 60 locations in the MFJDR and near the mouths of key tributary streams from April to October. Approximately 10 of these sites will be deployed year round. To assess the fine-scale changes in water temperature associated with specific restoration techniques a Fiber Optic Distributed Temperature Sensor (DTS) will be deployed before and after project implementation, and at determined intervals in the future to monitor the effectiveness of specific restoration techniques in regard to water temperatures. This fine scale temperature analysis will also allow for the calibration of the Heat Source™ model and provide a better understanding of the thermal characteristics of the river.

Groundwater Monitoring

Groundwater monitoring will include the establishment of a network of groundwater wells to monitor groundwater levels relative to restoration activities and water temperature. Monitoring wells will be installed along the three reaches of the MFJDR to determine groundwater change during data collection. Thirty-six (36) wells will be installed with a breakdown of twelve (12) wells installed at each reach preferably with six wells on each bank. Of the 36 wells, ten will be installed with equipment to continually log the groundwater data, these specific well sites will be determined in the field

Steelhead and Chinook Status and Trend Monitoring
There are four objectives associated with the steelhead and Chinook monitoring. The objectives are: 1) Estimate spawner escapement of summer steelhead and spring Chinook; 2) Estimate freshwater productivity (smolts/redd) of spring Chinook and summer steelhead populations; 3) Estimate parr-to-smolt survival of spring Chinook and summer steelhead; 4) Delineate seasonal parr rearing habitat. These four monitoring objectives, in coordination with the physical habitat monitoring and restoration actions planned in the IMW during the next ten years will provide information on the impact of the restoration actions on the status and trend of the Chinook and steelhead populations within the IMW.

PIBO Monitoring
The USFS Research Station in Logan, UT has been contracted to install monitoring sites following the Pacfish/Infish Biological Opinion (PIBO) Effectiveness Monitoring for Streams and Riparian Areas. 10 monitoring sites were installed to evaluate the removal of stream spanning log weirs installed in Camp Creek in the 1980's. In addition, 15 PIBO sites in the MF John Day River are being utilized to evaluate the watershed study area's overall habitat status and trends. Change detected from these sites can reflect the individual restoration actions and other contributing factors such as: forest management, land use changes, high water events, wild fires, etc.

Geomorphology and Physical Habitat Monitoring
The purpose of this project is to monitor effectiveness of the restoration projects on the mainstem MFJDR, in terms of geomorphology and physical habitat. This monitoring is accomplished by direct measurement of channel and habitat characteristics in the field and using high resolution aerial imagery. Specifically, we are measuring channel morphology, bed material characteristics, fish cover, channel sinuosity, and geomorphic effects of log structures in treatment and control reaches.

Macroinvertebrate Monitoring
The aquatic macroinvertebrate monitoring aims to detect changes in macroinvertebrate community condition in the IMW and statistically relate these changes to restoration activities. A set of 10 monitoring sites were randomly selected from 15 existing PIBO monitoring along the mainstem of the Middle Fork. Annual field sampling will occur annually each late summer or early fall between late August and early October. Sampling during this relatively narrow seasonal window will minimize variability in community composition introduced by seasonal turnover in taxa in the benthic community.

Streamflow Monitoring
Streamflow monitoring is performed to provide accurate inputs to the Heat Source™ model and provide ancillary information for the other monitoring projects. Discharge monitoring occurs at 12 sites along the mainstem Middle Fork and its tributaries. Gaging stations will be installed at each site in April and then removed in October before winter flows arrive. Streamflow measurements will occur throughout the season to capture the hydrograph from April to October. Rating curves will be developed as the season progresses and data will be made available on the Egnyte server.

Socio-Economic Monitoring
The purpose of monitoring the socio-economic effects of restoration in the Middle Fork watershed is two-fold: to provide tangible evidence of restoration's economic contributions and to help local citizens think about and develop new relationships to their natural resource assets. A highly participatory process was led by researchers from the Institute for Policy Research and

Innovation to develop 17 measures of socio-economic impact for this IMW. The measures include direct effects (measures of the socio-economic output from doing restoration projects), outcome measures (measures of specific changes that have occurred, that can reasonably be tied to restoration projects and related activities), and socio-economic indicators (measures of the overall socio-economic health of the community).