Introduction

The monitoring and restoration efforts of the Middle Fork IMW are primarily focused on summer steelhead (Oncorhynchus mykiss, listed in threatened under the Endangered Species Act), spring Chinook salmon (Oncorhynchus tshawytscha), and their habitat. The main factors that limit salmon and steelhead production in the Middle Fork are:

- High summer water temperatures
- Degraded floodplain
- Altered sediment routing
- Altered hydrology
- Key habitat availability

Since 2008, over 20 habitat restoration projects have been implemented in the Middle Fork watershed to address the limiting factors listed above. The restoration projects include activities such as culvert replacement, wetland restoration, floodplain reconnection, revegetation, channel realignment, and addition of habitat complexity elements such as large wood.

Methods

In order to detect a response, monitoring of salmonids and their habitat will last at least 10 years. A variety of metrics are being tracked in order to detect change in biotic and abiotic elements of the river ecosystem. Studies are also being conducted to understand how restoration impacts the social and economic conditions of the watershed.

- Biological
  - Steelhead and Chinook salmon
  - Redds
  - Cutaneous
  - Smolt abundance
  - Pre-to-smolt survival
  - Aquatic macroinvertebrates
  - Estimates of diversity and abundance of salmon and steelhead prey

- Habitat
  - Groundwater levels
  - Stream flow
  - Bathymetry
  - Riparian vegetation
  - In-stream habitat, such as fish cover, large wood, and pools
  - Water temperature

- Socio-Economics
  - Direct effects, such as the number and dollar amounts of restoration contracts and whether or not the hired firms are local
  - Outcome measures, such as changes in land use, cropping activity in the area
  - Indicators such as per capita income

Preliminary Results

Data collection will continue until 2018, but preliminary results are already emerging.

Temperature monitoring in Big Boulder Creek, a tributary of the Middle Fork, shows groundwater influxes cause substantial cooling in the downstream sections of the creek. These data can help restoration implementers decide where to locate projects to maximize cold water refuge for fish.

Vegetation monitoring has shown certain plant species to be more susceptible to browsing by cattle, elk, deer, and other animals. For example, torrent sedge (Carex nudata) has become extremely prolific in areas where cattle grazing was eliminated.

Detecting a response in fish requires monitoring several generations of the population. While we have yet to see a significant increase in the number of spawning steelhead and Chinook in the Middle Fork, annual spawning surveys will continue to track spawning in the Middle Fork compared to the control reach in the South Fork of the John Day River.

Discussion

What we learn from the Middle Fork IMW and other IMWs across the Pacific Northwest will improve the practice of habitat restoration and monitoring. In the coming years we will share a more thorough summary of our results.

For more information, visit:
- Middle Fork IMW website: www.middleforkimw.org
- Pacific Northwest Aquatic Monitoring Partnership: www.pnamp.org/project/3133
- Oregon Watershed Enhancement Board: www.oregon.gov/OWEB/Pages/index.aspx
- Or email us at info@middleforkimw.org

Middle Fork IMW Working Group Members:
- Bonneville Power Administration
- Bureau of Reclamation
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Eco Logical Research, Inc.
- Integrated Status & Effectiveness Monitoring Program
- Malheur National Forest
- NOAA Fisheries
- North Fork John Day Watershed Council
- Oregon Department of Environmental Quality
- Oregon Department of Fish & Wildlife
- Oregon State University
- Oregon Watershed Enhancement Board
- Pacific States Marine Fisheries Commission
- The Freshwater Trust
- The Nature Conservancy
- University of Oregon

What is an Intensively Monitored Watershed?

Intensively Monitored Watersheds (IMWs) are long-term research projects designed to deepen our understanding of how fish populations respond to habitat restoration.

The guiding principle behind IMWs is to learn what works to recover salmon, steelhead, and their habitat by concentrating rigorous, coordinated monitoring efforts in specific watersheds across the Pacific Northwest. IMWs are strategically located to maximize what we can learn. In the long-term, IMWs will help communities focus stream restoration on the places and projects that provide the greatest benefit to fish.

The Middle Fork of the John Day River (Middle Fork) became an IMW in 2008.