

Western Water and Power Solution Bulletin

Research and Development Office — Denver, Colorado

Bulletin No. 10

May 2008

Fish Passage for Non-Salmonids

Ensure efficient water delivery and meet requirements under the Endangered Species Act

What Is The Problem?

Dams and hydroelectric facilities can disrupt fish migration routes, preventing passage or causing harm to fish. Fish migrate in order to spawn, forage and respond to changing habitat conditions. Fish passage structures are installed to allow fish to safely move through migration routes. Properly managing and protecting migratory fisheries at these passages is critical to water delivery, ecology, management of fish communities, and meeting the requirements of the Endangered Species Act.

Early fish passage structures were designed for salmonid species (salmon and trout), which are popular game fish that are considered to provide significant recreational and economic benefits. Many dams were constructed with fish passage facilities to reduce adverse impacts to these popular fish species.

More recently, decreases in non-salmonid species (sturgeons, suckers, minnows, etc.) native to the western United States have become apparent and the same fish passage designs used for salmonid species have been installed. However, these designs have proven ineffective for non-salmonids because of the significant physiological and behavioral differences of non-salmonids compared to salmonids. In general, non-salmonids are not as strong of swimmers; they prefer to stay at the bottom of the channel, and they react differently than salmonids to water flow patterns such as flow depth, velocity, and turbulence.

What Is The Solution?

Reclamation has performed extensive non-salmonid migration and fish passage studies and developed guidelines for designing fish passage structures specific to non-salmonids. Non-salmonid fish passage structures include baffled and natural fishways. Baffled fishways are constructed with reinforced concrete. Two types of baffled fishways have been developed: a standard vertical slot and a duel-vertical slot. Natural fishways are constructed using a rock channel with boulder weirs. Fishway design and construction depends on the non-salmonid species of concern as well as site conditions where fish passage is to be constructed. Based on the species of concern, design standards including fishway location, geometry and hydraulic characteristics are determined. Appropriate flow depth, velocity, and turbulence are critical characteristics for effective fish passage.

Effective fish passage helps water and power managers better operate their water delivery systems and meet requirements under the Endangered Species Act. In the absence of effective fish passage, water deliveries and power generation can be interrupted and dam removal may be considered.

Who Can Benefit?

Everyone benefits indirectly from fish recovery and river ecosystem diversity and sustainability efforts. However, when fish passage is required at a dam under the Endangered Species Act, the water and power users benefit directly by implementing a solution that achieves environmental compliance without impacting water deliveries and power generation.

Where Have We Applied This Solution?

Innovative non-salmonid fishways have been installed on the Link River at Link River Dam, on the Colorado River at Grand Valley Diversion Dam, on the Tongue River at Twelve Mile Dam, and on the Truckee River at Marble Bluff and Derby Dams. Plans are being finalized for fishway construction at the San Acacia Diversion Dam on the Rio Grande and at Intake Diversion Dam on the Yellowstone River.



Baffled fishway at Grand Valley Diversion Dam

More Information

Reports and other documents pertaining to Reclamation non-salmonid fishway designs and studies are available at http://www.usbr.gov/pmts/hydraulics_lab/bmefford/index.html.

Contact Information

Brent Mefford, Water Resources Research Laboratory
Technical Service Center
Phone: 303-445-2149 E-mail: bmefford@do.usbr.gov

Collaborators

Reclamation's Science and Technology Program; Reclamation's Klamath Basin, Western Colorado, Montana, Albuquerque, and Lahontan Basin Area Offices; Colorado, Montana, Nevada and Oregon Game and Fish Departments, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service