

Frazier Creek Fish Passage Design and Construction



Location: Ovando, Montana

Client: Big Blackfoot Chapter of Trout Unlimited

Key Project Elements:

- ❖ Fish Passage Analysis
- ❖ Hydraulic Analysis
- ❖ Hydrologic Assessment
- ❖ Fishway Design
- ❖ Hydraulic Structure Design
- ❖ Natural Channel Design



Project Description:

Our team provided services to the Big Blackfoot Chapter of Trout Unlimited (BBCTU) for design of a fish passage channel around a private irrigation reservoir on Frazier Creek near Ovando, Montana. This project, which reconnects a population of westslope cutthroat trout to isolated headwater reaches of the Frazier Creek, was part of a collaborative watershed scale effort to restore critical native fish habitat. Our team used design criteria outlined by BBCTU, including leap height and hydrologic guidance, to design a channel that is stable, conserves base flows over weir drops, and navigates steep terrain downstream of the reservoir dam. Through the design process, our engineers evaluated several alternatives to achieve the fish passage goals and meet cost considerations. The analysis considered the use of reinforced concrete and structural steel plates to create the fish passage steps as well as a natural channel design that utilized local rock to create the steps. This included a hydraulic design and modeling approach combining swimming ability information for the target species (westslope cutthroat trout) with detailed

hydraulic modeling of water depths and velocities. The hydraulic model also evaluated the passage channel stability. Our engineers also conducted reservoir routing analysis to specify critical design element invert elevations that control flow distributions to the reservoir outlets and the fishway entrance through the range of design flows.

The final design and alternatives analysis used a composite fish passage channel with notched weirs constructed from structural steel plates to provide passage over the design flow range. The design process identified the most feasible route through adjacent terrain that minimized impacts to vegetation and met the design criteria. The final design included forty-five 1-foot drops with an overall channel slope of 0.086 t/ft. and a total length of 650 lineal feet. The project was successfully constructed in fall 2012 and fish were observed using the channel during 2013 runoff.

