Collaborative Fish Screen Design: Crabtree Creek in Linn County, Oregon

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Introduction:

Irrigation and hydro-power diversions are common on most rivers and streams in the Pacific Northwest. In Oregon alone, there are between 60,000 and 70,000 diversions and only about 10% of those diversions have fish screens on them. The issues associated with designing and installing fish screens are numerous. Designs that satisfy both diverters and agencies can be difficult to achieve. Collaborative design processes are an effective method for achieving a common vision, especially if that common vision is viewed from very different perspectives.

Lacomb Irrigation District operates a combined irrigation and hydro-power diversion on Crabtree Creek, a tributary to the Santiam River in Linn County, Oregon. The diversion had a large settling basin followed by an old rotary drum screen that no longer met criteria and that required constant maintenance. In late 2005, a group of individuals representing the following organizations met to begin a collaborative design process to replace the fish screen: Oregon Department of Fish and Wildlife, US Fish and Wildlife, National Marine Fisheries Service, Lacomb Irrigation District, and Farmers Conservation Alliance.

Site Concerns:

- High organic debris loads
- High sediment loads
- Wide flow fluctuations
- Predation
- Multiple species present including: Upper Willamette Winter Steelhead, Coho Salmon, Chinook Salmon, Pacific Lamprey, Cutthroat Trout, and Sculpin
- Remote site (difficult for operation and maintenance) with no available power
- Wide range of diverted water volumes (18 CFS to 65 CFS)

The objectives of the project were defined through a collaborative process:

1. To reduce predation issues associated with the existing intake and settling pond.
2. To eliminate entrainment of aquatic species in the Lacomb Irrigation District conveyance canal and delivery system.
3. To provide a quick and safe return to the river channel for any fish that enters the diversion.
4. To meet NMFS criteria for fish screening and passage.
5. To provide a fish screen with minimal operation and maintenance requirements.
6. To eliminate regular sediment removal and subsequent harm to aquatic species.

Settling pond and old screen

Methods:

A collaborative design process was utilized to create a project that met the needs of all stakeholders. Design meetings were held over a 6 month period. The engineering plans were reviewed by engineers from the following entities: NRCS, ODFW, NOAA/NMFS, and Anderson Perry & Associates.

A horizontal Farmers Screen was chosen as the fish screen technology and an open fish return channel was chosen due to the wide flow ranges to be accommodated.

A complete fish salvage of the settling basin was planned prior to the beginning of construction. Use of a temporary by-pass pipe around the construction area was chosen to deliver water to the existing fish screen during construction.

Hydraulic testing of the screen was planned by ODFW and FCA to confirm compliance with NMFS criteria.

During construction

Results:

- 1,358 organisms salvaged including 7 different species
- Successful project isolation from Crabtree Creek
- 220 yards of concrete poured without incident
- Screened water supplied to irrigators for the length of the project
- Finished screen tested for and met NMFS criteria
- Sediment management greatly improved (no annual maintenance)
- Fish passage supplied through the screen structure
- Low operation and maintenance costs
- Salmonids at all life stages protected
- Hydro-power production optimized

Celebration held for screen completion

Conclusions:

- A collaborative design process can lead to a project that meets the needs of both the water user and natural resource agencies
- Good detailed planning leads to smooth construction projects
- Water diversions can entrain a surprising number of aquatic organisms
- Fish screens can benefit both fish and water users

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