Collaborative Effort Saves Mussels and Fish During Dam Replacement

Multiple agencies work together on project that was years in the making

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by Lauren Brown

The replacement of the Dunn Dam on the Donner und Blitzen River was not a project that came together easily or quickly.

Ashley Tunstall, a regional biologist with Ducks Unlimited in charge of the project, said the dam was an old derelict structure originally built in the 1950s. “It was causing a litany of problems on the Donner und Blitzen River,” she said. The fish passage system on it was inoperable and disconnected from the rest of the system. The Malheur National Wildlife Refuge was unable to use it for flood irrigation, causing about 2,500 acres of wet meadows to be dissociated from the floodplain. “The dam also had issues with really high velocity outflows that were causing bank undercutting and erosion downstream,” Tunstall continued. “If you look at old aerial imagery of it, you can see that the river had become very, very wide just downstream of that structure due to that erosion, which causes all kinds of flow issues and also sediment deposition downriver.”

Pictured: The Dunn Dam prior to its removal and replacement with a rock chute structure.

Noting these problems, the Harney Basin Wetlands Collaborative, an arm of the High Desert Partnership, and the Malheur National Wildlife Refuge, identified the Dunn Dam as a structure that would benefit from removal and reconstruction. This process started four years ago. It was delayed because of material and construction costs associated with the COVID pandemic, and because of that, a diverse suite of funding came together to make this project happen. The Oregon Department of Fish and Wildlife came through with fish passage funds. The Oregon Watershed Enhancement Board awarded the project Focused Investment Partnership funds. Senate Bill 5506 contributed to the project and a grant from the North American Wetlands Conservation Act was also secured.

A rescue operation

The removal project was finally slated to begin implementation in August and September of this year. As the deadline approached, Tunstall was contacted by staff from the refuge and the Xerces Society to see if they could accommodate an effort to save western ridged mussels and fish in the area near the dam. “They knew that there were mussel beds surrounding the old Dunn Dam structure, and with the dewatering effort in the reach of the stream where the construction was going to take place, it would cause a pretty big mortality event,” Tunstall said. “Of course, we said yes because we want to do everything we can to keep the system as healthy as possible and to benefit as many species as we can.”

According to the U.S. Department of Fish and Wildlife, the western ridged mussel is found in California, Oregon, Washington, Idaho, Nevada and British Columbia. It reaches about 5 inches in size and has a lifespan of about 30 years. They are commonly found in streams and prefer constant water flow and well oxygenated stable substrates in areas of low gradient. In 2020, the species was petitioned for listing under the Endangered Species Act. Biologists have noted that populations of western ridged mussels have been declining. Mussel populations can decline for a variety of reasons including pollution, high temperatures or invasive species. Mussels are also an indicator species. They may be some of the first animals in an ecosystem to react to hazards like pollution or temperature changes.

Western ridged mussels play a valuable role in maintaining stream vitality as they are filter feeders that siphon suspended particles from the water column. They may consume plankton, bacteria, dissolved organic matter or algae. This filtering provides an important water quality service by reducing turbidity and controlling nutrient levels, especially where there are dense mussel beds. Particles not used by the mussel are often re-formed and expelled as larger particles that are in turn used as food by other aquatic life.

The salvage operation in the Blitzen River included help from staff at the refuge, U.S. Fish and Wildlife Service Bend field office, High Desert Partnership, Xerces Society, ODFW Salem office, Burns Paiute Tribe, Ducks Unlimited, Western Beavers and volunteers from the Friends of Malheur National Wildlife Refuge. It began before the area was completely dewatered and involved using a tube to identify mussels underwater. Staff and volunteers used their hands to gently ease the mussels out of the riverbed. “If you pull them out too fast, you'll hurt them because they have a foot that is gripping down in the mud,” Tunstall said.

The operation continued for two and half weeks as the water level receded and the dam removal operation approached. Tunstall came to assist the operation when the area had been dewatered some. “It was all of us just basically sitting in the mud and the water elbow deep and trying to find these mussels and pull them out,” she said. Once the mussels were out of the ground, they were transferred to floating mesh bags to keep them from drying out until they were ready for relocation.

Transferring them from the Dunn Dam to a site 45 minutes away involved putting them in coolers with wet towels. Broadway Fitness in Burns donated 30 towels to the effort. Most of the mussels were taken to a new site in a stretch of the Blitzen River between Romaldi Bridge and Diamond Lane. “Those efforts and that extra care taken to ensure their survival was really effective,” Tunstall said. According to refuge staff, 8,154 western ridge mussels were relocated.

Part of the project also involved saving fish that would be stranded as the area was dewatered. Staff and volunteers used a technique called electrofishing, in which fish are stunned using a mild current. Once stunned, the fish were netted and transported in buckets of water with aerators and then placed in trucks to be moved away from the construction zone. More than 6,500 fish were saved, and they comprised more than 10 species, including ridge lipped suckers, red sided shiners, tui chub, speckled dace, mountain whitefish, bullhead

pumpkinseed, green sunfish among others. It should be noted that fish play an important role in the life cycle of western ridged mussels in that they act as incubators for mussel larvae.

A healthier habitat

The Dunn Dam removal was completed this fall. It was replaced with a rock chute structure, which is a system of multiple rock weirs set at certain elevations. “The engineers do their calculations to make sure that it will hold the water back in the way that the refuge needs,” Tunstall said. “It also provides perennial fish passage with a passive management option, so the refuge doesn't have to go in and pull any boards or do anything dangerous in high flow events.” It is designed in such a way that fish can move through the system year-round without any manipulation by refuge staff.

The rock chute mimics the natural stream morphology with a roughened channel. *(Pictured above.)* There is riffle-fill between each rock weir with juniper root wads that provide more habitat and refugia options for fish, which in turn will contribute to a healthier stream system.

The new system will also hopefully fix some problems that were occurring downstream. “By removing this dam and establishing those wetland benches *(Pictured to your left.)* on the downstream area, we were able to address that channel erosion and start to get the stream banks back to where they should be and try to reduce some of that sediment output,” Tunstall said.

In addition to the dam removal, the mussel salvage operation took a lot of work and cooperation, but in the end, they saved the lives of more than 8,000 western ridged mussels, a species that could soon be categorized as endangered. “Mussels are not a species that is considered flashy. They’re not what we would call charismatic megafauna, but they’re still important to the system and still a valuable part of the ecosystem,” Tunstall said.

She noted that while this project took four years to come to fruition, the commitment and collaboration between stakeholders has been gratifying to watch. “The big thing to highlight is the diversity of the funding sources, the diversity of the partnerships and everybody’s willingness to accommodate everything that we could to try to have the most multi-species benefit as possible,” Tunstall said. “This one was such a long time in development and is going to have a very big acre impact for the refuge and have a lot of really positive impacts on the ecosystem going forward.”

This article is provided by High Desert Partnership; a Harney County nonprofit convening and supporting six collaboratives including the Harney Basin Wetlands Collaborative and the Malheur National Wildlife Refuge Comprehensive Conservation Plan.

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