

Dams

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In the McKenzie Watershed

THE ISSUE

The McKenzie River is 90 miles long and located in the Willamette Basin of Oregon. It begins with cold underwater springs in the High Cascades and travels through the Western Cascades to its confluence with the Willamette River just north of Eugene. These waters then flow into the Columbia River where they then travel to the Pacific Ocean. Over 200,000 people get their drinking water from the McKenzie River, and the watershed is hailed as a place of unmatched beauty and endless recreation opportunities. The watershed attracts fisherpeople, boaters, hikers, hot springs enthusiasts, and mountaineers. Despite its scenic beauty, the McKenzie River is a river at work, and the primary tools for harnessing its power have been dams. My research explored the environmental effects of these dams on the watershed. I looked at the environmental impacts the Cougar Dam has on the McKenzie Watershed, especially its native fish populations.

STUDY SITE

The US Army Corps of Engineers (USACE) owns and operates two dam systems on the McKenzie River. The Cougar Dam, the tallest dam in Oregon, was built in 1963 on the South Fork of the McKenzie River. The USACE also built the Blue River Dam on the Blue River tributary. These dams are rockfill structures and were built for flood control. The Cougar Dam has saved over \$450 million in flood damages (USACE Portland District). The large reservoirs of these dams store water in the winter and spring and release water in the late summer and fall. The Cougar Dam mainly affects watershed health due to its massive reservoir size of 219,000 acre feet and height of 519 feet (USACE). The Cougar Dam is a fish passage barrier for smolts, the young salmon, migrating downstream to the ocean and adult salmon traveling upstream to spawn. To mitigate this, the Cougar Dam has a temperature control tower, a portable floating fish collector, trap-and-haul collection, and plans for further development to aid in fish passage.

The Eugene Water and Electricity Board (EWEB) owns and operates the other two dam systems on the McKenzie, the Leaburg Dam and the Carmen-Smith-Trail Bridge complex. These two projects were both built to provide hydroelectric power. The Carmen-Smith-Trail Bridge complex begins with the Carmen Reservoir, where water is diverted to the Smith Reservoir by an 11,380-foot tunnel (USDA Forest Service). Water is then sent through another tunnel to the Trail Bridge Reservoir, where water goes through the dam's turbines to generate power. The Carmen-Smith-Trail Bridge complex has no fish ladders, but there is only less than a mile of fish habitat above the Trail Bridge Dam (Mital 2019 pers. comm). EWEB also maintains a salmon spawning channel below Trail Bridge. The Leaburg Dam, a run-of-the-river dam with no water storage, has fish ladders and limited fish passage infrastructure.



Photo by Nicole Long



The temperature control tower was built in 2002 by the USACE to mitigate the cold temperatures of the water being released by the Cougar Reservoir. The tower mixes water from different depths to create temperatures better for salmon.

This is an aerial photo of Cougar Dam. Using GIS software, I analyzed fish habitat that is blocked by dams. The bright blue line in this photo indicates all upstream habitat that is blocked by the dam.

METHODS

For ENV5 410: Understanding Place, we went on seven all-day field trips to locations including the Trail Bridge Dam and salmon spawning channel, the Cougar Dam, the McKenzie Fish Hatchery, and the Leaburg Dam. At these sites, I was able to observe, take notes, and photos. At the Trail Bridge Dam, Mike McMann, the Electric Generation Manager of EWEB provided a tour of the facility. As part of my research, I conducted a literature review and two semi-structured interviews that explored issues of the environmental impacts of the dams on the McKenzie Watershed, specifically the Cougar Dam. I interviewed a McKenzie River Guide to obtain the perspectives of those who rely on the river for their income. I also interviewed Jennifer Weber, the Project Coordinator of the McKenzie Watershed Council who coordinates restoration projects that work to mitigate the effects of the dams. These interviews lasted an hour each and I obtained informed consent to record the interviews and use the names of my informants.

RESULTS

There are four primary impacts the Cougar Dam has on McKenzie Watershed. (1) The Cougar Dam is a complete fish passage barrier to smolts traveling downstream and to over 20 miles of upstream habitat (Hansen et al. 2017). Fish such as spring Chinook and bull trout have to be manually trapped and hauled upstream above the dam. The dam greatly impacts spawning and rearing habitat for native fish. (2) Water released from the bottom of the reservoir is too cold for salmon (Risley et al. 2010). (3) The reservoir stores a large amount of sediment which retains contaminants such as DDT, a pesticide sprayed on timber until 1972 when it was banned. Due to runoff, DDT made its way into the river system (Anderson 2007). When the reservoir was drained for construction of the temperature control tower, large amounts of sediment were released. A McKenzie River Guide explained, "all the silt had been there since 1964...The silt had settled to the bottom of the reservoir, but it had DDT in it. It killed the caddisflies and mayflies." The decline in native fly populations hurt the native fish who feed on these aquatic macroinvertebrates.

(4) The reservoir also disrupts nutrient flows as well as debris flows of gravel and wood, which provide habitat for salmon spawning and rearing (Risley et al. 2010). Jennifer Weber noted how the reduction in floods has caused "a dramatic amount of simplification. You're losing a significant amount of side channel habitat, areas that provide refuge for fish during high water flows, also spawning and rearing habitat for native fish. Historically, there was this vast wide valley bottom that includes really complex side channel habitat and marsh wetland habitats. Habitats like that now are very rare." Without these habitats, species like cottonwood, alder, western pond turtle, red-legged frog, and many native fish are being impacted (Risley 2010). Without appropriate habitat for spawning and rearing, native fish populations will continue to decline.

Literature Cited

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CONCLUSION

EWEB and USACE have renovated infrastructure to provide better fish passage, and organizations like the McKenzie Watershed Council are restoring spawning habitat below the dams, such as at the South Fork confluence area. Providing habitat to threatened species is an urgent priority of the watershed. By putting more resources into habitat restoration and fish passage, we can more ethically balance the human benefits of the dams with the health of the watershed.

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