



THE STORY OF ENLOE DAM

Okanogan PUD endures the burden of owning a non-operating hydro facility *By Jeri Timm*

Enloe Dam has become a symbol for challenges that have plagued the electric utility industry for decades. Standing at 59 feet tall by 276 feet wide, a run-of-the-river facility, Enloe Dam finished construction in 1922 and is the 19th oldest dam in Washington state. Built on the Similkameen River, just two miles south of the Canadian border, Enloe Dam's history is as impressive as it is intriguing. In 1945, Okanogan PUD condemned the Washington Water Power Service territory in Okanogan County, which included Enloe Dam, to begin providing public power services. Operating until 1958, Enloe Dam has since sat idle. Okanogan PUD has attempted three different efforts to re-energize Enloe Dam and each effort was abandoned due to high costs, environmental and legal challenges, and uncertain power markets.

Re-energizing efforts

The 20-year period after Enloe Dam was de-energized was the only quiet time in the structure's history. In 1978, the U.S. Army Corps of Engineers conducted an inspection pursuant to the National Dam Inspection Act. They recommended

the dam be rehabilitated to allow for a complete safety inspection to occur. Due to the energy crisis of the 1970s, Okanogan PUD attempted to restore power generation at the dam. Proposals to implement the dam safety recommendation were included in Federal Energy Regulatory Commission license applications to restore hydropower generation in 1981 and 1991. However, both applications were unsuccessful, mainly due to the costly impacts of fish passage facilities and the feasibility of restoring power generation.

During the 1990s, after the second abandoned attempt to energize Enloe Dam, Okanogan PUD focused on improving dam safety monitoring and working to identify a way to reduce future maintenance costs. During these years, numerous salmonid species were listed under the Endangered Species Act in the Columbia Basin, including the Upper Columbia Steelhead, which inhabit an area a few hundred feet below Enloe Dam. Neighboring utilities on the Columbia River began to have environmental permits and FERC relicensing efforts challenged. At the same time, multiple attempts

were being made through Congress to support re-energization of existing, non-operating, small hydropower facilities, like Enloe Dam.

The energy crisis developed in the early 2000s, which prompted a third relicensing effort to energize Enloe Dam. A FERC license was issued to build a new 9-MW hydropower plant on the left bank of the river, opposite of the old facility. In 2012, after a decade-long environmental impact analysis, the Department of Ecology issued the 401 Water Quality Permit, which was followed by seven years of continuous litigation with dam removal advocates.

Environmental challenges

Similar to many other hydropower facilities, the history of fish passage issues is a problem that has plagued Enloe Dam for over 50 years. Built just upstream of the approximately 25-foot-tall Similkameen Falls, the record is uncertain if Enloe actually sits on a second set of a falls, or even a run of small falls. A well-established tribal legend exists stating that salmon did not pass the falls. However, a more recent resolution of the Lower Similkameen



Indian Band expresses support for Enloe Dam's removal and restoration of the surrounding area to its natural condition, but objects to artificial fish passage.

Just upstream of Enloe Dam is the historic town of Nighthawk, which was a booming mining town in the late 1800s and early 1900s. However, based upon all known records, there is no documentation of a sustainable salmonid population prior to the construction of Enloe Dam. There are no historical accounts of any salmon passing upstream of the dam at all. Only in the past few years have agency staff stated that Chinook salmon may have ascended the falls. However, the falls have been manipulated by a century of erosion and human-caused rock removals due to three different hydro projects at the site. Determining the natural condition of the falls pre-construction is almost impossible.

Congress, through the Reclamation Authorization Act of 1976, authorized the secretary of the Interior to undertake measures necessary to provide passage, enhancement, and propagation of salmon on the Similkameen River. The following year, an options paper issued

by the Bureau of Reclamation determined that the preferred method for accomplishing the fish enhancement goals would be to remove Enloe Dam. The plan was later revised to specify that the preferred method should actually be fish passage, not removal.

In 1980, Congress enacted the Pacific Northwest Electric Power Planning and Conservation Act, which developed the Columbia River Basin Fish and Wildlife Program. This program proposed that the Bonneville Power Administration provide funds for anadromous fish passage restoration or improvement measures, which included Enloe Dam. BPA funded a study to determine the feasibility of passage at Enloe Dam. The study addressed the introduction of anadromous fish into Canada. If passage were to occur, over 79% of the potential habitat lies in Canada. However, after some deliberation, the British Columbia

Ministry of the Environment expressed a great deal of concern over the potential for the introduction of various fish diseases and was unwilling to accept U.S. fish unless they were guaranteed to be disease free. That assurance could not be met, which made passage at Enloe Dam no longer feasible. The proposal did not proceed.

Public safety concerns

The lack of historical evidence of fish passage above the falls is further complicated by the 2.43 million cubic yards of sediment that has amassed behind Enloe Dam over two miles upstream. There are more than 50 abandoned mines

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throughout the Similkameen Watershed, including an EPA Superfund mine cleanup site just four miles upstream. Furthermore, there is an active, large-scale copper mine in Canada directly on the Similkameen River. Yet, there has not been a comprehensive sediment analysis conducted to determine the chemical makeup. Just this year, a very high-level sediment analysis was conducted by the United States Geologic Service. The initial results of the few samples taken demonstrate very high levels of arsenic, chromium, copper, and nickel. This data only further reinforces the logistical challenges and tremendous cost that would be involved with dam removal. In the end, it could be more cost effective and environmentally sound to leave the sediment in place, especially if the heavy metals are found to be capped.

An independent feasibility analysis has yet to be conducted to identify the net ecological benefits, if any, that would result from removal of the dam, an accurate cost estimate, or the ability for this project to compete for funding with other habitat projects in the Pacific Northwest. Enloe continues to be compared to other dam removal projects as a simple, smaller, less costly project. However, just downstream of Enloe Dam is the small town of Oroville, Washington, which is protected from the Similkameen River high flows by a U.S. Army Corps of Engineers levy. From Enloe Dam, the Similkameen River flows into the Okanogan River, traveling over a predominantly low-grade, slow-moving system for 80 miles to its confluence with the Columbia River. Removal of Enloe potentially impacts multiple towns, water systems, irrigation diversions, and PUD ratepayers with justifiable concerns about potential water quality issues, making this project vastly different from other dam removal projects.

Okanogan PUD is frequently contacted by interested stakeholders who would like to see Enloe Dam removed; however, Okanogan PUD is not mandated to remove Enloe Dam. Nevertheless, the PUD remains open to reviewing comprehensive proposals from interested stakeholders. Okanogan PUD has outlined criteria for a proposal, which must include components such as an independent feasibility assessment, identification of a partner with the means to fund dam removal, and relief of any future liability. To date, these stakeholders have

presented no credible proposal or identified a capable or willing partner.

Current status

Similar to past attempts, on November 19, 2018, the Okanogan PUD Board of Commissioners unanimously passed a motion to no longer pursue electrification of Enloe Dam. This decision was based on the complexity, controversy, risk, and considerable cost involved in restoring power generation. The estimated cost per megawatt-hour to electrify Enloe Dam was projected to be approximately \$150 per mWh.

Since then, Okanogan PUD staff has been evaluating all options for the future of Enloe Dam, with dam safety requirements being a top priority. In August 2019, FERC terminated the PUD's license for failure to start construction on the project. Due to this termination, a surrender process was not required because no facilities were constructed under that license. Multiple environmental non-governmental organizations (NGOs) sought rehearing of FERC's decision to terminate the license, asking FERC to engage in additional processes before the license officially terminated. FERC denied the NGO's challenge and reaffirmed the license termination.

Okanogan PUD also sought to address its right to maintain the structure in the river, as Enloe Dam was constructed on property owned by the Bureau of Land Management. The PUD obtained clarification from BLM that the right to maintain the dam remains in effect until June 30, 2063. Okanogan PUD only owns the Enloe Dam facility and does not own adjoining or





Okanogan PUD General Manager Steve Taylor at Enloe Dam.



dewatering the face of Enloe Dam and conducting a complete inspection are high priorities. Currently, Okanogan PUD is working closely with Ecology to ensure that this work is completed.

In order to meet this dam safety requirement, the entire Similkameen River

must be diverted around the crest of the dam to dewater the face and allow for a complete visual inspection. With fluctuating river flows of spring freshets averaging more than 20,000 cubic feet per second (CFS), to low fall flows around 300 cfs, there are limited options to achieve this task. Over the last two years, Okanogan PUD has been working with Max J. Kuney Company and Tetra Tech to implement the dewatering construction plan. A comprehensive alternatives analysis was conducted to select the best dewatering alternative. The selected option, though initially more expensive at approximately \$7 million, was the only long-term option that would allow future inspections to be repeated at any time for limited additional cost. This option requires the intake gates

and penstocks to be replaced and maintenance access to be provided to the structure. Project construction began in April and is anticipated to proceed through 2021. During the spring freshet of 2022, the intake gates will be opened during high flows for an initial operation and flush of sediment that is immediately behind the gates. This will allow for a comprehensive dam safety inspection, including a visual inspection of the face, toe, and abutments to occur during low flows in fall of 2022.

While the history of Enloe Dam's struggles is centered on ESA salmonid species, the similarities can be applied to many other generation facilities and electrical infrastructure projects that face environmental challenges while trying to balance costs and keep electrical rates low.

"The long-term future of Enloe Dam remains uncertain," said Steve Taylor, general manager of Okanogan PUD. "However, Okanogan PUD continues to work in the best interest of our ratepayers and follow the least-cost option for the future of Enloe Dam." **NWPPA**

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underlying lands. While the Washington State Department of Natural Resources has asserted state ownership of the beds and shores of the Similkameen River, it has determined that it will not seek authorization for Enloe Dam as it exists today due to uncertainties about navigability of this stretch of river, as well as federal and state legislative history from the early 1900s regarding construction of dams in state-owned rivers.

When the FERC license termination order became effective, dam safety jurisdiction of Enloe Dam reverted to the Washington State Department of Ecology's Dam Safety Division. Okanogan PUD has worked closely with both FERC and Ecology to ensure a smooth transition for oversight of the dam. As identified by both FERC and Ecology,