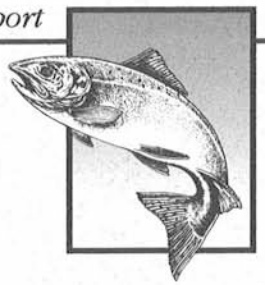
# *IV. Alternatives*

*Glines Canyon project with power house in right foreground and dam in left background, October 19, 1926. (Northwestern Power & Light Company photo)*



# *IV. Alternatives for Restoration*

FERC extensively evaluated the alternatives of removal or retention of both dams, the removal of Elwha Dam, and the removal of Glines Canyon Dam in the context of balancing fish and wildlife protection with hydropower production. In contrast, P.L. 102-495 prescribes the standard of full ecosystem and native anadromous fisheries restoration. Consequently, the following two sections (IV and V) provide excerpts from FERC (1993) but include modifications consistent with the standard of full restoration.

## A. Removal of Both Dams

This alternative would meet the standard of full ecosystem and native anadromous fisheries restoration. It involves decommissioning the Elwha and Glines Canyon projects, removing most if not all of the existing auxiliary structures, returning the river to a free-flowing condition, and implementing habitat (Section VI.H) and fish restoration (Section VI.F) plans. The electrical energy presently produced by the Projects and consumed by the Daishowa America Mill would be discontinued and replaced by power provided by the Bonneville Power Administration through Port Angeles City Light. An evaluation of the impacts on regional power as a result of this alternative can be found in Section VI.M. A description of potential dam removal techniques can be found in Section VI.C.

## B. Removal of Glines Canyon Dam

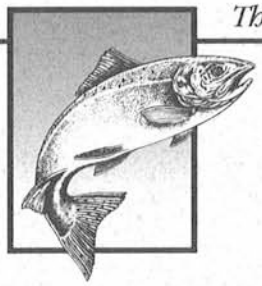
This alternative would not meet the standard of full ecosystem and native anadromous fisheries restoration. It involves the incorporation of upstream and downstream fish passage measures at the Elwha Project and the removal of the Glines Canyon Project. The fish passage measures for the Elwha Project would be those described in Section IV.D. Glines Canyon Project removal would be accomplished in a manner described in Section VI.C.

## C. Removal of Elwha Dam

This alternative would not meet the standard of full ecosystem and native anadromous fisheries restoration. It involves the incorporation of upstream and downstream fish passage measures at the Glines Canyon Project and the removal of the Elwha Project. The fish passage measures for the Glines Canyon Project would be those described in Section IV.D. Elwha Project removal would be accomplished in a manner described in Section VI.C.

## D. Retention of Both Dams

This alternative would not meet the standard of full ecosystem and native anadromous fisheries restoration. It involves the retention of both the Elwha and Glines Canyon projects with the addition of fish passage facilities and operational changes to restore



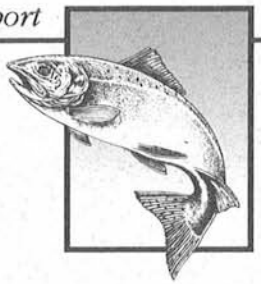
anadromous fish runs in the middle and upper reaches of the Elwha River to the extent practicable. Project automation improvements and measures related to terrestrial, recreational, and cultural resources would also be accomplished.

To pass naturally migrating adult anadromous fish upstream of Elwha Dam, the following facilities would be necessary: (1) an inclined bar rack at the powerhouse tailrace exit portals to prevent fish attraction and entry into the draft tubes where the fish could be delayed or injured; (2) a ladder entrance, barrier weir at the base of the right bank spillway, and fishway; (3) a fish ladder on the south shore of the existing right bank spillway; and (4) holding and sorting pools for sorting and counting migrating fish.

For passing outmigrating anadromous juveniles downstream, all water used for power production would be screened to divert fish and all other water would be passed through spillways modified for fish protection. The fish screen system would include (1) four Eicher screens installed in the 9-foot-diameter project penstocks, (2) a bypass pipe and vertical traveling screen facility, (3) an open channel flume, and (4) a concrete pool-and-weir structure to convey fish to the powerhouse tailrace. However, because the Department of the Interior, National Marine Fisheries Service, and Washington Departments of Fisheries and Wildlife consider the Eicher screen technology to be experimental at this time, a contingency plan involving conventional forebay screens would also have to be developed to address the possibility of unacceptable Eicher screen performance.

For protecting outmigrating juveniles that pass over the spillway, gate bays Nos. 2 and 3 of the Elwha Dam left bank spillway would be modified to include (1) an ogee transition section in gate bay No. 2, (2) concrete-lined chutes and training walls the full length of the spillway chute below bays No. 2 and No. 3, (3) reconstruction of the spillway gate bottom seals to minimize turbulence, and (4) installation of an additional spillway gate hoist to facilitate spillway operation. To ensure stable control of the reservoir water level, prevent flow over the top of the spillway gates, and to control ramping rates, the spillway gate operation for bays No. 2 and No. 3 would be automated.

To pass migrating anadromous fish upstream at Glines Canyon Dam, a trap-and-haul operation would be necessary to convey adult fish past the 190-feet vertical lift of the dam. The collection and sorting facility would be located near the Glines Canyon powerhouse, and fish would be trucked to the existing boat ramp on Lake Mills for release. The trap-and-haul facilities would include (1) a velocity barrier and electric weir structure to prevent fish from moving up the river past the powerhouse and to direct fish to the fishway entrance, (2) a tailrace bar rack downstream of the powerhouse to prevent fish from entering the draft tubes where they could be delayed or injured, (3) a fishway entrance structure, (4) a fish ladder along the face of the powerhouse, (5) holding, sorting, and transport pools, (6) a hoist system for loading adult fish onto a transport truck, (7) 3,000 feet of roadway stabilization and resurfacing, and (8) boat launch site improvements for the transport vehicle. To improve control of the reservoir water level, prevent spills over the top of the spillway

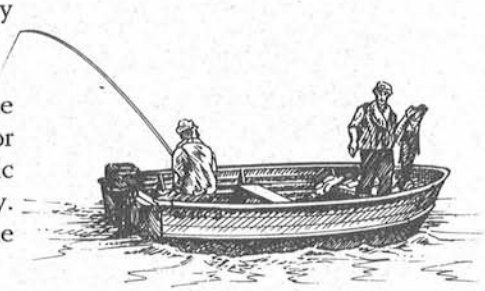


gates and the fixed spillway section, and to control ramping rates, operation of the turbine and generators and one spillway gate would be automated.

For downstream passage of outmigrating anadromous juveniles, 450 cfs would have to be released continuously over the Glines Canyon Dam spillway during the outmigration period, until such time as agency approved passage tests have identified a lesser flow that would provide adequate passage. A screen facility would have to be constructed and operated to protect the juvenile anadromous fish (primarily chinook salmon) that exit Lake Mills via the turbine intake. This facility would include either an Eicher screen in the penstock and a fish bypass system or construction of a new power intake with forebay screening and a fish bypass system. To minimize the potential for adverse impacts to reservoir fisheries, wildlife, and recreation as well as outmigrating anadromous juveniles, the Glines Canyon Project would be operated in a run-of-the-river mode.

FERC estimated the capital costs (in 1990 dollars) of the fish passage measures, as proposed by James River and modified by FERC staff, to be $10,297,000 for Elwha Dam and $3,359,000 for Glines Canyon Dam (total of $13,656,000). If the Eicher screen and bypass system proved unacceptable at Elwha Dam, a conventional screen facility would cost an additional $9,333,000. The measures proposed by James River and FERC do not include fish screens at Glines Canyon Dam, which would vary from about $4 million for an Eicher screen to $10,861,000 for a new intake and screen system. They also do not include the cost for the placement and maintenance of spawning gravel and large organic debris.

In addition to fish measures, 898 acres of James River property outside of Olympic National Park, including Elwha Project lands, property adjacent to Lake Aldwell, and the McDonald gauge tract, would be retained and enhanced for wildlife benefits. Management activities would include (1) gating access roads, (2) creating snags, (3) thinning, (4) creating and enhancing wetlands, (5) recontouring shorelines, (6) fencing to prevent disturbance, and (7) protecting the area from encroaching development. Shoreline areas would be enhanced by thinning the dense overstory and allowing hydrophytic shrubs and trees to regenerate.



Attempts to restore the ecosystem and anadromous fisheries of the river would come under intense public scrutiny. Consequently, it would be important to fully monitor and document the success of the restoration effort. Monitoring programs and specific studies (e.g., elk radio-tagging, fish passage and production) would be necessary. Modifications to the restoration program would depend on the results of the monitoring.

Developed recreational opportunities would be augmented by the installation of the following: (1) three remote boat-in campsites on the east side of Lake Aldwell; (2) a project overlook with parking, sanitary facilities and interpretive signs; (3) a trail to the pool below Elwha Dam for recreationists; and (4) additional interpretive signs.

Fish restoration would be consistent with that discussed in Section VI.F. However,

because of the difficulties associated with the retention of both dams (see Section V.D), some of the stocks could not be restored and others are expected to require continual supplementation for the life of the Projects. Therefore, the costs of fish restoration under the dam retention alternative would likely greatly exceed the FERC estimated cost of $3,754,000 which only assumed fish plants for a 10 year period.

*Fishing the Elwha in the 1920s. (Asahel Curtis photo, Washington State Historical Society)*