

**FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR HYDROPOWER LICENSE**

Klamath Hydroelectric Project
FERC Project No. 2082-027

Oregon and California

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, N.E.
Washington, DC 20426

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SUMMARY

This final environmental impact statement (EIS) for relicensing the Klamath Hydroelectric Project has been prepared by the staff of the Federal Energy Regulatory Commission (Commission or FERC) to fulfill the requirements of the National Environmental Policy Act (NEPA); the Commission's implementing regulations under Title 18, Code of Federal Regulations (CFR), Part 380; and the Council on Environmental Quality regulations for implementing NEPA (40 CFR Parts 1500-1508). The purpose of this document is to inform the Commission, the public, and the various federal and state agencies, tribes, and non-governmental organizations about the potential adverse and beneficial environmental effects of the proposed project and reasonable alternatives.

The Commission must decide whether to relicense the Klamath Hydroelectric Project and, if so, what conditions to place on any license issued. In deciding whether to authorize the continued operation of the hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (e.g., flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of energy conservation; the protection and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection and enhancement of recreational opportunities; and the preservation of other aspects of environmental quality.

The principal issues that we address in the EIS include the influence of project operations on water quality, including downstream of Iron Gate dam; approaches to facilitate the restoration of native anadromous fish within and upstream of the project; the influence of peaking operations at J.C. Boyle development on downstream biota and whitewater boating opportunities; the effect of project operations on archaeological and historic sites and resources of concern to various tribes; the effects of decommissioning East Side and West Side developments and removing Keno development from the project; and decommissioning other project developments.

PacifiCorp's Proposal

On February 25, 2004, PacifiCorp filed an application with the Commission for a new license for the Klamath Hydroelectric Project, located principally on the Klamath River in Klamath County, Oregon and Siskiyou County, California, between Klamath Falls, Oregon, and Yreka, California. The existing project occupies 219 acres of lands of the United States, which are administered by the U.S. Bureau of Land Management or the U.S. Bureau of Reclamation. The current license expired on March 1, 2006, and the project is operating under an annual license.

The existing Klamath Hydroelectric Project consists of eight developments, seven of which are located on the Klamath River. One of the seven developments, Keno, currently regulates water levels of Keno reservoir to facilitate irrigation withdrawals. It has no generation capabilities and PacifiCorp states that it no longer serves project purposes and should be deleted from the project. PacifiCorp also proposes to decommission East Side and West Side developments because the cost of installing screens that would be protective of federally listed suckers that reside in Upper Klamath Lake would be prohibitive. The remaining project developments on the mainstem of the Klamath River include J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate. The Iron Gate Fish Hatchery produces anadromous fish to compensate for lost spawning and rearing habitat between Iron Gate and Copco No. 2 dams. The eighth project development, Fall Creek, is on a Klamath River tributary that flows into Iron Gate reservoir. The installed capacity of the entire project is 169 megawatts (MW) and, on average, the project annually generates 716,800 megawatt-hours (MWh) of electricity.

PacifiCorp proposes to operate the five remaining developments in a manner similar to past operations with a set of 41 environmental measures (described in detail in section 2.2.3), the purposes of which include the following:

- Enhancement of the quality of project-influenced waters by installing a hypolimnetic oxygenation system at Iron Gate reservoir and evaluating other methods to increase dissolved oxygenation, decrease temperature, and decrease nutrient loading and associated problems.
- Enhancement of aquatic habitat in the J.C. Boyle bypassed and peaking reaches by increasing the minimum flows and controlling ramping rates.
- Elimination of the source of major slope failures downgradient of the J.C. Boyle emergency overflow spillway by installation of bypass valves at the powerhouse.
- Facilitation of fish passage at J.C. Boyle dam by installation of a surface collection system upstream of the dam and making improvements to the existing fish ladder.
- Enhancement of spawning habitat in the J.C. Boyle bypassed reach and downstream of Iron Gate dam by gravel placement.
- Enhancement of aquatic habitat downstream of the Fall Creek diversion by increasing the minimum flow to 5 cubic feet per second (cfs).
- Protection of habitat downstream of the Spring Creek diversion dam by not diverting flow during July and August and releasing a minimum flow of 1 cfs for the remainder of the year.
- Facilitation of fish passage at the Fall and Spring Creek diversion dams by installing fish screens and ladders at both sites.
- Enhancement of Iron Gate Hatchery stock management by purchasing and operating a facility capable of marking 25 percent of all Chinook salmon released.
- Management of vegetation resources by implementation of a vegetation resources management plan.
- Management of wildlife resources by implementation of a wildlife habitat management plan.
- Enhancement of recreational opportunities by improving existing and construction of additional recreation sites and facilities and implementation of a recreation resources management plan.
- Enhancement of the appearance of project facilities by reducing their visibility and contrast through vegetative screening at recreation sites and at J.C. Boyle and Iron Gate developments via implementation of a visual resources management plan.
- Coordination of the management of project roads via implementation of a Project Roadway Management Plan.
- Protection of archaeological and historic resources via implementation of a Historic Properties Management Plan.

Staff Alternative

After evaluating PacifiCorp’s proposal, along with the terms and conditions, prescriptions, and recommendations from resource agencies, tribes, and other interested parties, we compiled a set of environmental measures to address the resource issues raised in the proceeding. We call this the “Staff Alternative” (described in detail in section 2.3.2). The Staff Alternative incorporates most of PacifiCorp’s proposed environmental measures, but in some instances, with modifications. Key modifications include:

- Implementation of turbine venting as an initial dissolved oxygen enhancement measure, rather than hypolimnetic oxygenation, and further evaluation of other measures to enhance

water quality with identification of time frames during which specific actions identified during the evaluation would be implemented.

- Implementation of an integrated fish passage and disease management program, including the installation of a downstream passage and fish collection facility at J.C. Boyle dam, modifying adult collection facilities at Iron Gate dam to facilitate trapping and hauling of adult anadromous fish, evaluation of survival of outmigrating wild smolts at project reservoirs, spillways, and powerhouses, an experimental drawdown of Copco and Iron Gate reservoirs to assess effects on smolt outmigration and water quality, water quality monitoring in project reservoirs and to the mouth of the Klamath River, including major tributaries, to assess project contributions to factors that may cause fish diseases in the lower river, and evaluation of the most feasible and effective means to pass fish to and from project waters and minimize the risks associated with fish diseases that are project related.
- Implementation of an adaptive sediment augmentation program in the J.C. Boyle bypassed reach and downstream of Iron Gate dam based on habitat mapping.
- Implementation of a maximum downramping rate of 2 inches per hour during the first peaking cycle after extended periods of run-of-river operation, which would gradually be increased during each subsequent day until PacifiCorp's proposed ramping rates are achieved.
- Increasing the minimum flow in the Copco No. 2 bypassed reach to 70 cfs.
- Increased funding responsibilities for Iron Gate Hatchery operation and maintenance, tagging operations, and full funding of Fall Creek rearing facility operations.
- Implementation of a hatchery and genetics management plan.
- Addition of operation and maintenance responsibilities for Topsy Campground and Day Use area at J.C. Boyle development.
- Inclusion of Fall Creek and Copco No. 2 powerhouses and Copco No. 2 substation in the visual resources management plan.
- Expansion of the geographic scope of PacifiCorp's proposed area of potential effects pertaining to the protection of cultural resources.

The Staff Alternative includes 25 environmental measures in addition to those proposed by PacifiCorp.

Staff Alternative with Mandatory Conditions

Section 18 of the Federal Power Act, 16 U.S.C §811, states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of the U.S. Department of Commerce (Commerce) and U.S. Department of Interior (Interior) may prescribe. In March 29, 2006, filings with the Commission, Commerce and Interior submitted joint preliminary fishway prescriptions for anadromous and resident fish consisting of 7 general prescriptions and 31 development-specific prescriptions, summarized in section 2.3.1.2. PacifiCorp filed alternative fishway prescriptions by letter dated April 28, 2006, in accordance with section 241 of the Energy Policy Act of 2005, that take an adaptive approach for restoring anadromous fish to historically accessible habitat. On January 29, 2007, Commerce and Interior submitted joint modified fishway prescriptions that take into consideration the results of the Energy Policy Act of 2005 proceeding.

Section 4(e) of the Federal Power Act gives the Secretary of Interior authority to impose conditions on a license issued by the Commission for hydropower projects located on "reservations"

under the Secretary's supervision (16 U.S.C §§796[2], 797[e]). In a March 29, 2006, filing with the Commission, Interior submitted nine preliminary section 4(e) conditions (seven with multiple components) on behalf of the Bureau of Land Management and 7 preliminary section 4(e) conditions (one with multiple components) on behalf of Reclamation (see section 2.3.13). PacifiCorp filed alternative section 4(e) conditions to most of the measures specified by Interior by letter dated April 28, 2006, in accordance with section 241 of the Energy Policy Act of 2005. The alternative conditions, in general, either eliminated the 4(e) condition or reduced the scope of the measure described in the 4(e) condition. On January 29, 2007, Interior, on behalf of the Bureau of Land Management submitted revised section 4(e) conditions that take into consideration the results of the Energy Policy Act of 2005 proceeding.

When finalized, the fishway prescriptions and 4(e) conditions may need to be included in a new license for this project. Incorporation of these mandatory conditions into a new license would cause us to modify or eliminate some of the environmental measures that we include in the Staff Alternative. Because the Staff Alternative does not include East Side, West Side, and Keno developments, we do not include any mandatory conditions associated with these developments in this alternative. Key differences in this alternative compared to the Staff Alternative include the following:

- The minimum flow in the J.C. Boyle bypassed reach would be increased from 200 to 470 cfs or more.
- The ramping rates in the J.C. Boyle peaking reach would be considerably more restrictive.
- J.C. Boyle powerhouse would only be able to operate in a peaking mode once per week.
- The integrated fish passage and disease management program would be replaced by the installation of fishways at each development.
- PacifiCorp would be responsible for operating, maintaining, and monitoring the Spring Island Boaters access, Klamath River Campground, scouting trails at major rapids along the J.C. Boyle peaking reach, and dispersed day-use sites on Bureau of Land Management administered lands.

Retirement of Copco No. 1 and Iron Gate Developments

We have identified for analysis two dam removal and development retirement alternatives, one consists of the removal of Copco No. 1 and Iron Gate developments from the project. This alternative is intended to address water quality issues that originate in the reservoirs associated with both developments, facilitate restoration of anadromous fish to habitat upstream of Iron Gate dam, and retain a substantial portion of the generation capability of the project. In this alternative, we modify or eliminate some of the environmental measures that we include in the Staff Alternative. Key differences in this alternative compared to the Staff Alternative include the following:

- Potential corrective actions to enhance water quality would no longer be necessary, and the water quality management plan would be replaced with a water quality monitoring plan.
- J.C. Boyle and Copco No. 2 developments would operate in a run-of-river mode.
- Sediment augmentation downstream of Iron Gate dam would be eliminated.
- The integrated fish passage and disease management program would be replaced by the installation of upstream and downstream fishways at Copco No. 2 dam, and the spillway of Copco No. 2 dam would be modified to protect downstream migrating smolts.
- Anadromous fish collected at the existing fish ladders at Iron Gate Hatchery and the base of Iron Gate dam not needed for hatchery brood stock would be transported by truck to the upper end of Copco reservoir during the first year from license issuance to establish naturally

reproducing populations prior to the elimination of salmonid stock from Iron Gate Hatchery. When Copco No. 1 dam is removed and upstream and downstream fishways are constructed at Copco No. 2 dam, all fish collected in excess of brood stock would be transported by truck to Iron Gate reservoir until the beginning of deconstruction of Iron Gate dam, which would occur about 5 years from license issuance.

- Funding obligations for Iron Gate Hatchery would increase to provide 100 percent of the cost of operating the hatchery until Iron Gate dam is removed, after which the disposition of the hatchery would be determined. The Fall Creek rearing facility would not be funded.
- Operation and maintenance requirements for existing recreational facilities at Copco No. 1 and Iron Gate developments would be eliminated, as would proposed new facilities at both developments.
- A new day use area would be constructed near Copco No. 2 dam that would also serve as a whitewater boater take-out point for boaters putting in downstream of J.C. Boyle dam. PacifiCorp would no longer be responsible for maintaining Fishing Access sites 1-6 and the State Line Take-out facility.
- Proposed visual enhancements at Iron Gate development would be eliminated.
- Consultation with the California Historic Preservation Officer regarding measures to protect or mitigate for historic properties associated with both developments would be necessary.

Retirement of J.C. Boyle, Copco No. 1, Copco No. 2 and Iron Gate Developments

The second dam removal and development retirement alternative would entail removal of the four lowermost project dams on the mainstem of the Klamath River. The Fall Creek development, with an authorized capacity of 2.2 MW, would be the only remaining project development in a new license for this project, assuming East Side, West Side, and Keno developments are removed from the project, as PacifiCorp proposes. As with the previously discussed two dam removal alternative, this alternative is intended to address water quality issues that originate in the reservoirs associated with Iron Gate and Copco No. 1 developments, and facilitate restoration of anadromous fish to habitat upstream of Iron Gate dam. In this alternative, we modify or eliminate most of the environmental measures that we include in the Staff Alternative. Key differences in this alternative compared to the two dam removal alternative include the following:

- All sediment augmentation would be eliminated.
- Upstream and downstream fishways would not be constructed at Copco No. 2 dam, but anadromous fish would still be trapped at Iron Gate dam and trucked to the upper portion of Copco reservoir until Copco No. 1 and Copco No. 2 dams are removed. Anadromous fish then would be placed in Iron Gate reservoir until the beginning of Iron Gate dam deconstruction, about 5 years following license issuance.
- Operation and maintenance requirements for existing recreational facilities at J.C. Boyle development would no longer be implemented, as would proposed new facilities at this development. The only recreational facility remaining in the project would be the proposed Fall Creek trail, and the recreation resources management plan would be modified to only account for construction, operation, and maintenance of this trail.
- Our recommended visual enhancements at Copco No. 2 development would be eliminated.
- Consultation with the Oregon and California Historic Preservation Officers regarding measures to protect or mitigate for project-related historic structures associated with all four developments would be necessary.

Other Alternatives Considered

Under the No-action Alternative, the project would continue to operate under the terms and conditions of the existing license and existing agreements. No new environmental measures would be implemented. We use this alternative to establish baseline conditions for comparison with PacifiCorp's Proposal, the Staff Alternative, the Staff Alternative with Mandatory Conditions, the Retirement of Copco No. 1 and Iron Gate Developments, and the Retirement of J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate Developments, and to judge the benefits and costs of any measures that might be required under a new license. We also considered federal takeover, issuance of a nonpower license, project decommissioning with dams in place, and decommissioning Fall Creek development, but concluded that none of these alternatives are reasonable in the context of this proceeding.

Project Effects

We summarize the more substantial differences between PacifiCorp's Proposal, the Staff Alternative, the Staff Alternative with Mandatory Conditions, Retirement of Copco No. 1 and Iron Gate Developments, and Retirement of J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate Developments in table ES-1. Based on our detailed analysis of the environmental benefits and costs associated with the four alternatives considered in detail in this EIS, we conclude that the best alternative for the Klamath Hydroelectric Project would be to issue a new license consistent with the environmental measures specified in the Staff Alternative.

Table ES-1. Summary of effects of PacifiCorp’s Proposal, the Staff Alternative, the Staff Alternative with Mandatory Conditions, Retirement of Copco No. 1 and Iron Gate Developments, and Retirement of J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate developments. (Source: Staff)

Resource	PacifiCorp’s Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions	Retirement of Copco No. 1 and Iron Gate Developments	Retirement of J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate Developments
Power Benefits					
Annual generation (MWh)	675,738	663,381	533,879	443,694	12,817
Net annual power benefits	\$17,031,370	\$2,076,740	-\$20,244,360	-\$6,571,040	-\$13,186,870
Geology and Soils					
Sediment Supply and Transport	Relatively minor enhancement of spawning gravel supply from recurring placement in J.C. Boyle bypassed reach and downstream of Iron Gate dam.	Deposition of sediment downstream of J.C. Boyle dam would provide a moderate enhancement of spawning gravel supply and could increase channel complexity and enhance riparian habitat in the bypassed reach. Diverting all flow to the J.C. Boyle bypassed reach for 7 days during the spring, when inflows to the reservoir exceed 3,300 cfs could serve to transport deposited, and naturally occurring sediment from the bypassed reach into the peaking reach, where it could also enhance habitat. Amount and frequency of sediment	Same as Staff Alternative	Similar to Staff Alternative for J.C. Boyle bypassed reach. During and immediately after removal of Copco No. 1 and Iron Gate dams, about 84 percent of the eroded sediment would remain in suspension until it reached the ocean (GEC, 2006). If Copco No. 1 dam is removed before Iron Gate dam, about 40 percent of the resuspended sediment would pass through Iron Gate reservoir, and remain in suspension in the lower Klamath River. Copco No. 2 dam may trap some sediments released from Copco reservoir, but would	Similar to Retirement of Copco No. 1 and Iron Gate dam alternative. Most sediment released from J.C. Boyle is expected to be sand, which would settle out relatively quickly. Sediments would no longer be prevented from moving downstream by project dams, which would enable more natural fluvial geomorphic processes to occur, thus enhancing

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