COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE KLAMATH HYDROELECTRIC PROJECT
Docket No. P-2082-027

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Proposed Action and Alternatives
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2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the No-action Alternative, the project would continue to operate under the terms and conditions of the existing license and of existing memoranda of understanding or agreement that may be in effect. No new environmental measures would be implemented. We use this alternative to establish baseline conditions for comparison with PacifiCorp's Proposal and other alternatives and to judge the benefits and costs of any measures that might be required under a new license. The effects of the No-action Alternative contribute to the character of existing environmental conditions, and we describe them in our discussion of the affected environment (see section 3.0).

A description follows of the existing project facilities, current operations, and current environmental measures.

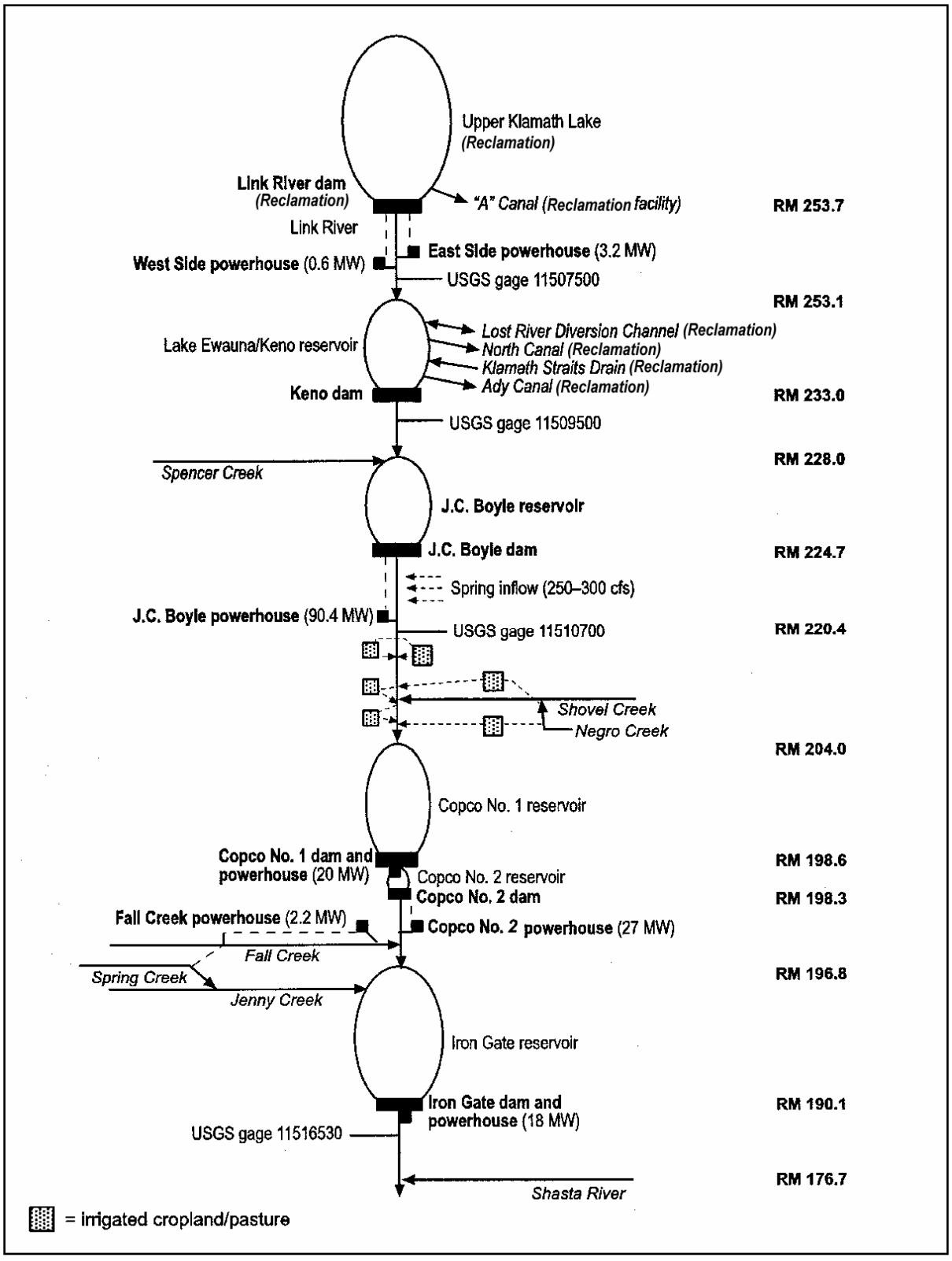
2.1.1 Existing Project Facilities

The Klamath Hydroelectric Project is located on the upper Klamath River in Klamath County (south-central Oregon) and Siskiyou County (north-central California). The existing project consists of eight developments, seven of which are located on the Klamath River between river mile (RM) 190.1 and 254.3. One of the seven developments, Keno, is a dam and associated reservoir with no generation facilities. The eighth development is on Fall Creek, a Klamath River tributary at RM 196.3. The eight developments are East Side, West Side, Keno, J.C. Boyle, Copco No. 1, Copco No. 2, Fall Creek, and Iron Gate (figure 2-1). Table 2-1 shows the relative river miles of key geographical landmarks that are relevant to this relicensing proceeding along the mainstem of the Klamath River. We describe each development in more detail in the following section.

2.1.1.1 East Side and West Side Developments

Link River dam marks the upstream boundary of the current Klamath Hydroelectric Project at RM 254.3, but the dam and its reservoir (Upper Klamath Lake) are not part of the project (figure 2-2). Reclamation owns the dam, and it is located on Reclamation-managed land. Under a contract that expired in April 2006, PacifiCorp operated and maintained the dam at Reclamation's direction. That contract provided PacifiCorp with some operational flexibility with respect to releases for generation from Link River dam, in exchange for operating the dam and providing low-cost power to Reclamation's Klamath Irrigation Project irrigators. In recent years, however, PacifiCorp claims this operational flexibility has not been fully realized, as Reclamation has specified releases from Link River dam in an attempt to comply with Biological Opinions (BiOps) relating to two species of sucker in Upper Klamath Lake and coho salmon in the lower Klamath River, all of which are listed as either endangered or threatened under the Endangered Species Act (ESA).

Link River dam diverts water to East Side and West Side developments, which PacifiCorp owns and operates. The dam formerly had a pool-and-weir type fish ladder. Reclamation replaced this fish ladder with a vertical slot fish ladder that was designed to more effectively enable upstream passage of federally listed suckers (PacifiCorp, 2003). Reclamation's new fish ladder, located between the mechanical spill gates and the headworks of the West Side canal, was completed during the summer of 2005 and, besides suckers, also should enable salmonids to pass from Link River into Upper Klamath Lake. In addition, a gravity bypass from fish screens that were recently constructed at Reclamation's A canal passes midway through the length of Link River dam and exits immediately downstream from the primary headgates. Water for the East Side and West Side powerhouses is diverted to canals and flowlines dedicated to each powerhouse. The existing project boundary includes the intake structures, canals, and powerhouses of both developments, and the East Side development primary transmission line and most of the Link River Trail (the only recreation facility associated with either development).



1 Figure 2-1. Schematic of existing PacifiCorp project facilities. (Source: PacifiCorp, 2004a,
2 modified by staff)

Table 2-1. River reaches, reservoirs, and major tributaries proceeding downstream within the Klamath River Basin. (Source: Modified from PacifiCorp, 2004a, exhibit E; PacifiCorp response to AIR WQ-5)

River Reach (RR), Reservoir (R), or Tributary (T)	Approximate River Mile (RM)	Description or Location
Wood River (T)	RM 282.3	Tributary to Agency Lake
Williamson River (T)	RM 272.3	Tributary to Upper Klamath Lake
Upper Klamath Lake/Agency Lake (R)	RM 254.3 – 282.3	Approximately 28 miles from upper end of Agency Lake to Link River dam on Upper Klamath Lake
Link River (RR)	RM 254.3 – 253.1	1.2 miles long, connecting Upper Klamath Lake to Lake Ewauna on Klamath River
Keno Reservoir (Lake Ewauna) (R)	RM 253.1 – 233.0	20.1 miles long from headwaters of Lake Ewauna to Keno dam
Klamath River – Keno Reach (RR)	RM 233.0 – 228.3	4.7 miles long, between Keno dam and headwaters of J.C. Boyle reservoir
J.C. Boyle Reservoir (R)	RM 228.3 – 224.7	3.6 miles from headwaters to J.C. Boyle dam
Spencer Creek (T)	RM 227.6	Tributary to J.C. Boyle reservoir
Klamath River – J.C. Boyle Bypassed Reach (RR)	RM 224.7 – 220.4	4.3 miles long, between J.C. Boyle dam and J.C. Boyle powerhouse
Klamath River – J.C. Boyle Peaking Reach (RR)	RM 220.4 – 203.1	17.3 miles long, between J.C. Boyle powerhouse and Copco No. 1 reservoir
Oregon/California Border	RM 209.3	State line in J.C. Boyle peaking reach
Shovel Creek (T)	RM 206.5	Tributary to J.C. Boyle peaking reach
Long Prairie Creek (T)	RM 203.3	Tributary to J.C. Boyle peaking reach
Copco Reservoir (R)	RM 203.1 – 198.6	4.5 miles from headwaters to Copco No. 1 dam and powerhouse
Copco No. 2 Reservoir (R)	RM 198.6 – 198.3	0.3 mile from Copco No. 1 dam and powerhouse to Copco No. 2 dam
Klamath River – Copco No. 2 Bypassed Reach (RR)	RM 198.3 – 196.9	1.4 miles long, between Copco No. 2 dam and Copco No. 2 powerhouse
Iron Gate Reservoir (R)	RM 196.9 – 190.1	6.8 miles from headwaters and Copco No. 2 powerhouse to Iron Gate dam
Fall Creek (T)	RM 196.3	Tributary to Iron Gate reservoir
Jenny Creek (T)	RM 194.0	Tributary to Iron Gate reservoir
Klamath River (RR)	RM 190.1 – 0.0	190.1 miles from Iron Gate dam to Klamath River mouth
Bogus Creek (T)	RM 189.6	Tributary to Klamath River
Cottonwood Creek (T)	RM 182.1	Tributary to Klamath River
Shasta River (T)	RM 176.6	Tributary to Klamath River
Scott River (T)	RM 143.0	Tributary to Klamath River
Salmon River (T)	RM 66.0	Tributary to Klamath River
Trinity River (T)	RM 40.0	Tributary to Klamath River

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East Side development facilities are partially located on Reclamation-managed lands. The majority of land within the existing project boundary is owned by PacifiCorp, with smaller portions owned by the city of Klamath Falls and private parties. The facilities consist of (1) 670 feet of mortar and stone canal; (2) an intake structure; (3) 1,729 feet of 12-foot-diameter, wood-stave flowline; (4) 1,362 feet of 12-foot-diameter, steel flowline; (5) a surge tank; and (6) a powerhouse. Maximum diversion capacity for the East Side powerhouse is 1,200 cubic feet per second (cfs).

The East Side powerhouse is a reinforced-concrete structure housing a single vertical Francis turbine with rated discharge of 975 cfs and a rated capacity of 3.188 MW. The generator has a rated capacity of 3.2 MW. The authorized generating capacity for the East Side powerhouse unit is 3.188 MW.[1] There are three single-phase step-up transformers at the powerhouse. From the East Side powerhouse, a 69-kilovolt (kV) primary transmission line, approximately 0.36-mile long (PacifiCorp Line 56-8), crosses over the Klamath River and connects to PacifiCorp's Line 11.

West Side development facilities are partially located on Reclamation-managed land (the remainder are located on PacifiCorp-owned land), and consist of (1) a 5,575-foot-long concrete-lined and unlined canal; (2) a spillway and discharge structure; (3) an intake; (4) 140 feet of 7-foot-diameter steel flowline; and (5) a powerhouse. Maximum diversion capacity of the West Side powerhouse is 250 cfs.

The West Side powerhouse is a reinforced concrete and wood structure housing a single, horizontal, pit-type Francis turbine with a rated capacity of 0.78 MW. The generator has a rated capacity of 0.6 MW. The authorized generating capacity for the West Side powerhouse unit is 0.6 MW.[2] There are three single-phase step-up transformers at the powerhouse. There is no primary transmission line due to a small substation adjacent to the powerhouse that connects to the larger West Side substation.

2.1.1.2 Keno Development

Keno development is a regulating facility owned by PacifiCorp that controls the water level of the Klamath River upstream of Keno dam (figures 2-2 and 2-3). The dam is partially located on Reclamation-managed land at RM 233.0 (the remainder of the dam is on PacifiCorp-owned land, and much of the remaining land within the existing project boundary is privately owned or owned by the state of Oregon). The dam creates Keno reservoir, an impoundment that extends 22.5 miles upstream.[3] The facility does not include power-generating equipment. PacifiCorp currently operates Keno dam under an agreement with Reclamation, the execution of which was required by article 55 of the existing license. Maintenance of a stable water level in Keno reservoir is important because it facilitates consistent water delivery to dependent water users. Gravity flow from Keno reservoir provides water either directly or indirectly to about 41 percent of the lands irrigated by the Klamath Irrigation Project and the Lower Klamath Lake National Wildlife Refuge (figure 2-4). In addition, there are a number of privately owned diversions from Keno reservoir for irrigation of non-federal lands, and important wildlife and recreational resources exist along the shores of Keno reservoir. The existing project boundary includes the dam, reservoir shoreline, and the Keno Recreation Area (the only project-related recreation facility).

[1] 99 FERC ¶62,212 (June 19, 2002).

[2] 99 FERC ¶62,212 (June 19, 2002).

[3] Throughout the remainder of this document, we generally refer to the impounded portion of the Klamath River upstream of Keno dam, including Lake Ewauna (the wider, 2-mile-long upstream-most portion of the impoundment), as Keno reservoir.

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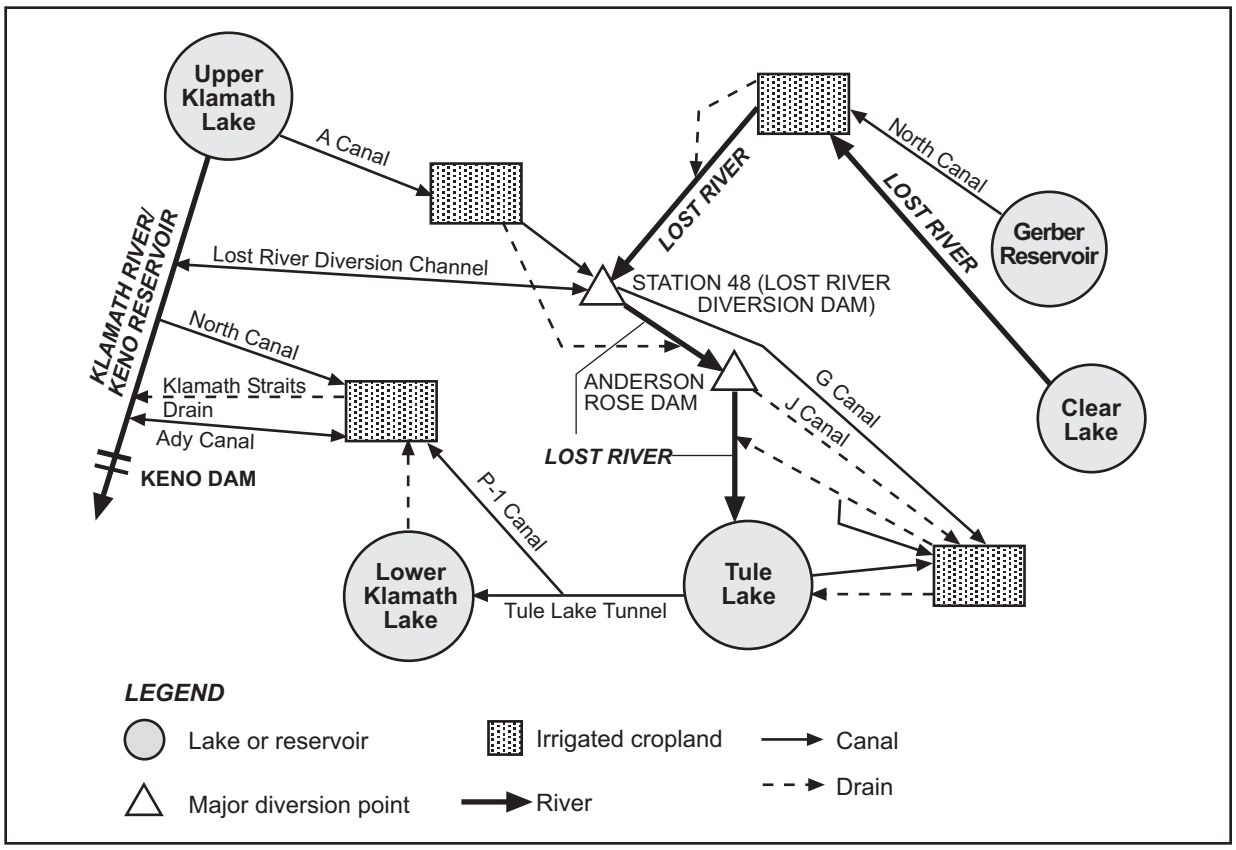

Figure 2-4. Schematic showing movement of water through the Klamath Irrigation Project area. (Source: FWS, 2002a, modified by staff)

Keno dam is a combination of earth embankment and reinforced-concrete, non-overflow, and spillway sections. The dam crest elevation is at elevation 4,070 feet (U.S. Geological Survey [USGS] datum)[4] and approximately 680 feet long and 25 feet high. The ogee-type spillway section has a crest elevation of 4,070 feet, is 265 feet wide, and has six 40-foot-wide spill gates. The normal maximum water surface is at elevation 4,086.5 feet. There is a 24-pool weir and orifice-type fish ladder. This fish ladder gains 19 feet in elevation over a length of 350 feet. Keno reservoir has a surface area of 2,475 acres at elevation 4,085 feet and a total storage capacity of 18,500 acre-feet.

2.1.1.3 J.C. Boyle Development

J.C. Boyle development consists of a reservoir, a combination embankment and concrete dam, a water conveyance system, and a powerhouse on the Klamath River, all between about RMs 228.3 and 220.4 (see figure 2-3). The powerhouse tunnel and much of the intake canal are located on Bureau of Land Management-managed land. PacifiCorp owns most of the remaining land within the existing and proposed project boundary. The existing project boundary includes the dam, most of the reservoir shoreline, the intake canal and tunnel, the powerhouse, the primary transmission line, much of the right bank of the bypassed reach, as well as Pioneer Park (East and West) and Topsy Campground (operated and maintained by the Bureau of Land Management).

J.C. Boyle dam impounds a narrow reservoir of 420 surface acres (J.C. Boyle reservoir). The normal maximum and minimum operating levels are between elevation 3,793.5 and 3,788 feet. The

[4]All subsequent elevations are in USGS vertical datum, unless otherwise indicated.

reservoir contains approximately 3,495 acre-feet of total storage capacity and 1,724 acre-feet of active storage capacity.

The embankment dam is a 68-foot-high earthfill structure with a length of 413.5 feet at elevation 3,800 feet. The concrete portion of the dam is 279 feet long and composed of a spillway section, an intake structure, and a 115-foot-long gravity section that is 23 feet high. The spillway is a concrete gravity ogee overflow section with three 36-foot-wide by 12-foot-high radial gates. The spillway crest is at elevation 3,781.5 feet, and normal pool is 0.5 foot below the top of the gates (at elevation 3,793.5 feet).

A 24-inch-diameter fish screen bypass pipe provides about 20 cfs of flow below the dam. The intake structure is a 40-foot-high reinforced concrete tower. A pool and weir fishway approximately 569 feet long provides upstream fish passage. The water conveyance between the dam and the powerhouse has a total length of 2.56 miles. From the intake structure, the water flows through a 638-foot long, 14-foot-diameter, steel flowline. The flowline is supported on steel frames where it spans the Klamath River and discharges into an open power canal. The canal is a 2-mile-long concrete flume. The power canal is provided with overflow structures at the upstream and downstream ends and terminates in a forebay. Water for power generation passes from the forebay through a 15.5-foot-diameter, concrete-lined, horseshoe-section tunnel, which is 1,660 feet long. The last section of the tunnel before the downstream portal is steel lined with the liner bifurcating into two 10.5-foot-diameter steel penstocks. Descending to the powerhouse, the penstocks reduce in two steps to 9 feet in diameter. Each penstock is 956 feet long.

The conventional outdoor-type reinforced concrete powerhouse is located approximately 4.3 river miles downstream of the dam (defined as the J.C. Boyle bypassed reach). There are two vertical-Francis turbines, each with a rated discharge of 1,425 cfs. The rated capacity of the Unit 1 turbine is 56.775 MW with a generator rating of 50.35 MW (order amending the project license, issued on July 21, 2005). The rated capacity of the Unit 2 turbine is 42 MW. The authorized capacity of the units is 90.350 MW.[5] The Unit 2 generator is rated at 40 MW. Two three-phase transformers step up the generator voltage for transmission interconnection. Flow from the powerhouse passes into the 17.3-mile-long J.C. Boyle peaking reach, before entering Copco reservoir (figure 2-5).

The power from the powerhouse is transmitted 0.24 mile to the J.C. Boyle substation. There is also a second line that pre-dates the substation. The 0.24-mile 69-kV transmission line (PacifiCorp Line 98), which connects the plant to a tap point on PacifiCorp's Line 18, is not currently energized.

2.1.1.4 Copco No. 1 Development

Copco No. 1 development consists of a reservoir, dam, spillway, intake, and outlet works and powerhouse located on the Klamath River between RMs 203.1 and 198.6 near the Oregon-California border (figure 2-6). Nearly all of the land within the existing and proposed project boundary is owned by PacifiCorp. Most of the remaining land is privately owned, and less than 1 acre of land in the proposed project boundary is managed by Reclamation. The existing project boundary includes the dam, powerhouse, reservoir shoreline, all of primary transmission line 26, a portion of primary transmission line 15, and the Copco Cove Recreation Area.

Copco reservoir[6] has a surface area of approximately 1,000 acres and contains approximately 33,724 acre-feet of total storage capacity at elevation 2,607.5 feet and approximately 6,235 acre-feet of active storage capacity. The normal maximum and minimum operating levels are at elevations 2,607.5 and 2,601.0 feet, respectively.

[5]112 FERC ¶62,063 (July 19, 2005).

[6]Copco No. 1 reservoir is also commonly known as Copco reservoir. Subsequent references will be made to Copco reservoir. Copco No. 2 reservoir is referred to by its full name to distinguish it from Copco reservoir.

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Copco No. 1 dam is a concrete gravity arch structure with a 462-foot radius at the crest. The total height of the dam is 126 feet, and the crest length is about 410 feet. The ogee-type spillway on the crest of the dam is divided into 13 bays controlled by 14-foot by 14-foot Taintor gates. The spillway crest is at elevation 2,593.5 feet. The normal operating reservoir water level is at elevation 2,606.0 feet. Two intake structures are located in the dam. The left intake provides water to two 10-foot-diameter (reducing to 8-foot-diameter) steel penstocks that feed Unit No. 1 in the powerhouse. The right intake provides water to a single, 14-foot-diameter (reducing to two 8-foot-diameter) steel penstock that feeds Unit No. 2.

The Copco No. 1 powerhouse is a reinforced-concrete substructure with a concrete and steel superstructure enclosed by metal siding located at the base of Copco No. 1 dam. The two turbines are double-runner, horizontal-Francis units, each with a rated discharge of 1,180 cfs. The Unit 1 turbine has a rated capacity of 16.319 MW, and the Unit 2 turbine has a rated capacity of 13.95 MW. The generators are each rated at 10 MW. The total authorized capacity of the units is 20 MW.[7] There are no turbine bypass valves. Unit 1 has three single-phase step-up transformers. Unit 2 also has three single-phase step-up transformers.

Copco No. 1 plant has two associated 69-kV primary transmission lines. PacifiCorp Line 15 connects the Copco No. 1 switchyard to Copco No. 2, approximately 1.23 miles to the west. PacifiCorp lines 26-1 and 26-2, each approximately 0.07 mile long, connect Copco No. 1 powerhouse to the Copco No. 1 switchyard.

2.1.1.5 Copco No. 2 Development

Copco No. 2 development consists of a small impoundment, a diversion dam, a water conveyance system, and a powerhouse (see figure 2-6). All land associated with this development is owned by PacifiCorp. The existing project boundary includes the dam, reservoir, flowline, powerhouse, and primary transmission line. The reservoir is about 0.25-mile long and has a storage capacity of 73 acre-feet. At the normal water surface elevation of elevation 2,483 feet, there is very minimal active storage, and thus, the reservoir is held at elevation 2,483 feet. As a result, Copco No. 2 generation follows Copco No. 1 generation.

Copco No. 2 dam is a concrete gravity structure with an intake to the flowline on the left abutment and a 145-foot-long spillway section with five Taintor gates. The dam is 33 feet high with an overall crest length of 335 feet. The crest elevation is at elevation 2,493 feet. The dam includes a 132-foot-long earthen embankment. A corrugated metal flume provides about 5 to 10 cfs of instream flow to the 1.5-mile-long bypassed reach. The concrete gravity spillway section crest elevation is 2,473 feet. The flowline to the powerhouse consists of 2,440 feet of concrete-lined tunnel, 1,313 feet of wood-stave pipeline, an additional 1,110 feet of concrete-lined tunnel, a surge tank, and two steel penstocks. The diameter of the tunnel and wood stave pipeline sections is a constant 16 feet. The two penstocks, one 405.5 feet long and one 410.6 feet long, range from 16 feet in diameter at the inlet to 8 feet in diameter at the turbine spiral cases.

The powerhouse is a reinforced concrete structure that houses two vertical-Francis turbines. Each turbine has a rated discharge of 1,338 cfs. The Unit 1 turbine has a rated capacity of 19.714 MW, and the Unit 2 turbine has a rated capacity of 15 MW. The generators are rated at 13.5 MW. The total authorized capacity of the units is 27.0 MW.[8] There are three single-phase, 6,600/72,000-volt transformers connected to three single-phase, 73,800/230,000-volt step-up transformers for interconnection to the transmission system. A 69-kV primary transmission line (PacifiCorp Line 15) connects the Copco No. 2 powerhouse to the Copco No. 1 switchyard, approximately 1.23 miles to the west.

[7] 99 FERC ¶62,212 (June 19, 2002).

[8] 99 FERC ¶62,212 (June 19, 2002).

2.1.1.6 Fall Creek Development

Fall Creek development is located on Fall Creek, a tributary to the Iron Gate reservoir, about 0.4 mile south of the Oregon-California border (figure 2-7). The facilities on Fall Creek consist of a 5-foot-high, concrete and timber flashboard spillway structure; an earth- and rock-filled diversion dam; 4,560 feet of earthen and rock-cut power canal; 2,834 feet of steel penstock; and a powerhouse. These existing facilities are on land owned by PacifiCorp. The existing project boundary includes the Fall Creek diversion dam, intake canal, penstock, powerhouse, tailrace, and primary transmission line. Additional existing diversion facilities located on Spring Creek are not currently part of the licensed project, but PacifiCorp proposes to include the Spring Creek facilities as part of the Fall Creek development. A description of the Spring Creek diversion facilities, located on Bureau of Land Management-managed land, is presented as part of the proposed project in section 2.2.1.5.

The overall dam crest length is 130 feet with a crest elevation at 3,253.4 feet. The concrete spillway section is 32 feet wide. At a normal water surface elevation of 3,251 feet, there is no active storage in the diversion pond. A small hole in one of the spillway stop logs provides 0.5 cfs of instream flow in Fall Creek below the dam. The 4,560-foot-long earth and rock power canal is 9 feet wide. The 42-inch-diameter penstock (reducing to 30-inch-diameter), approximately 2,834 feet long, drops over the hillside to the powerhouse.

Fall Creek powerhouse is a reinforced-concrete substructure with a steel superstructure enclosed by corrugated metal siding. It houses three horizontal shaft Pelton turbines. The Unit No. 1 turbine has a rated discharge capacity of 14 cfs and a rated output of 0.75 MW, and the generator is rated at 0.5 MW. The Unit No. 2 turbine has a rated discharge capacity of 21 cfs and a rated output of 1.125 MW, and the generator is rated at 0.45 MW. Unit No. 3 has a rated discharge capacity of 25 cfs and a rated output of 1.35 MW, and the Unit 3 generator is rated at 1.25 MW. The total authorized capacity of the units is 2.2 MW.[9] The combined rated hydraulic capacity of the three turbines is 60 cfs. There are three single-phase, step-up transformers at the powerhouse. A tailrace channel extends about 500 feet from the powerhouse to Fall Creek.

The Fall Creek powerhouse has two associated 69-kV transmission line segments. Line 3 connects the Fall Creek plant to Copco No. 1 switchyard, about 1.65 miles to the east. There is also a very short segment of Line 3 that connects the plant to a tap point on Line 18.

2.1.1.7 Iron Gate Development

Iron Gate development consists of a reservoir, an earth embankment dam, a non-gated side-channel spillway, intakes for the diversion tunnel and penstock, a steel penstock from the dam to the powerhouse, and the powerhouse. It is located on the Klamath River between RMs 196.9 and 190.1, approximately 20 miles northeast of Yreka, California (see figure 2-6). It is the farthest downstream hydroelectric facility of the Klamath Hydroelectric Project. Most of the land within the existing and proposed project boundary is owned by PacifiCorp, but the Bureau of Land Management is also present at several locations along the reservoir. The existing project boundary includes the dam, powerhouse, reservoir shoreline, and primary transmission line. Also included in the existing project boundary are the Fall Creek, Jenny Creek, Wanaka Springs, and Iron Gate Hatchery recreation areas; portions of the Camp Creek, Juniper Point, and Mirror Cove recreation areas; and the Long Gulch Boat Launch. The Iron Gate Hatchery is also included in the project boundary.

[9] 99 FERC ¶62,212 (June 19, 2002).

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The reservoir formed upstream of Iron Gate dam is about 944 surface acres and contains about 50,941 acre-feet of total storage capacity (at elevation 2,328.0 feet) and 3,790 acre-feet of active storage capacity. The normal maximum and minimum operating levels are between elevation 2,328.0 and 2,324.0 feet, respectively.

Iron Gate dam is a zoned earthfill embankment with a concrete extension wall on the crest. The dam has a height of 194 feet to the top of the wall at elevation 2.348.0 feet and is about 740 feet long. There are fish trapping and holding facilities located at the toe of the dam. High- (elevation 2,310.0 feet) and low- (elevation 2,250 feet) level intakes for the fish facility water are incorporated into the dam. The non-gated chute spillway is excavated in rock at the right dam abutment. The spillway crest, at elevation 2,328.0 feet, is 727 feet long. The diversion tunnel used during construction is limited to emergency use during high flow events. The intake structure for the powerhouse is a 45-foot-high, free-standing, reinforced-concrete tower, located in the reservoir. The intake structure provides flow to a 12-foot-diameter, welded-steel penstock.

The powerhouse is located at the base of the dam. The Iron Gate powerhouse consists of a single vertical Francis turbine. The turbine has a rated discharge capacity of 1,735 cfs, with a rated output of 18.75 MW, and the generator is rated at 18 MW. The total authorized capacity of the unit is 18 MW.[10] In the event of a turbine shutdown, a synchronized Howell-Bunger bypass valve located immediately upstream of the turbine diverts water around the turbine to maintain flows downstream of the dam. There is a single three-phase, step-up transformer at the powerhouse. The Iron Gate powerhouse has one associated 69-kV primary transmission line. Line 62 runs along the north side of Iron Gate reservoir for about 6.55 miles to the Copco No. 2 switchyard.

The Iron Gate fish hatchery is located downstream of Iron Gate dam, adjacent to the Bogus Creek tributary. The hatchery complex includes an office, incubator building, rearing ponds, fish ladder with trap, visitor information center, and employee residences. Up to 50 cfs is diverted from Iron Gate reservoir to supply the 32 raceways and fish ladder. The California Department of Fish and Game (Cal Fish & Game) operates the hatchery, and PacifiCorp provides 80 percent of the annual operating and maintenance costs.

2.1.1.8 Project Safety

Portions of the project have been operating for more than 50 years under the existing license and, during this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, J.C. Boyle, Copco No. 1, and Iron Gate developments have been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report has been submitted for Commission review. East Side, West Side, Keno, Copco No. 2, and Fall Creek developments have been exempted by the Commission from that requirement. As part of the relicensing process, the Commission staff would evaluate the continued adequacy of the proposed project facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to ensure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.2 Existing Project Operations

Link River dam controls Upper Klamath Lake elevations under the direction of Reclamation. Iron Gate minimum flow releases are stipulated by article 52 of PacifiCorp's FERC license. However,

[10] 99 FERC ¶62,212 (June 19, 2002).

PacifiCorp indicates that, since 1997, these releases have increasingly been stipulated by Reclamation, as it attempts to comply with two ESA BiOps related to the operation of its Klamath Irrigation Project. At present, PacifiCorp asserts that it has effectively little or no control over the river's flow regime downstream of Iron Gate dam. Because of limited storage capacity, the project can manage only short-term (hourly, daily) water balancing operations at certain project reservoirs. Water flow through the project is directly related to Reclamation's control of Upper Klamath Lake elevations, downstream releases out of Iron Gate dam, flows into and out of the Reclamation project area, and the relatively small active storage capacities of the project reservoirs. When river flows are less than hydraulic capacity, J.C. Boyle, Copco No. 1, and Copco No. 2 generally operate as peaking generation facilities. Water at Link River dam either flows over the dam or is diverted to East Side or West Side development after which it enters the Link River and flows to Keno reservoir.

According to a 1968 contract between PacifiCorp and Reclamation for the operation of Keno reservoir, the reservoir must be maintained between elevations 4,085.0 and 4,086.5 feet. The contract was developed in compliance with article 55 of the current license. However, at the request of irrigators with pumps and gravity-fed diversion weirs located on Keno reservoir, PacifiCorp maintains Keno reservoir at 4,085.4 +/- 0.1 foot from October 1 through May 15 and at 4,085.5 +/-0.1 foot from May 16 through September 30 such that reservoir levels are suited for their irrigation pumps and weirs. There are no terms or conditions in the current license that require PacifiCorp to accommodate the irrigators' requests. Water released from Keno dam enters the Keno reach of the Klamath River before entering J.C. Boyle reservoir.

The normal maximum and minimum elevations of J.C. Boyle reservoir are elevations 3,793.5 and 3,788 feet, a range of 5.5 feet. Under typical peaking operations, the reservoir fluctuates about 3.5 feet, while average daily fluctuations are approximately 1 to 2 feet. Water at J.C. Boyle dam either enters the flow conduit to the powerhouse or the bypassed reach. Flows from the powerhouse and bypassed reach enter the peaking reach of the Klamath River before entering Copco reservoir.

Copco reservoir can fluctuate up to 6.5 feet, from 2,601.0 to 2,607.5 feet, but the average daily fluctuation is about 0.5 foot. Water at Copco No. 1 dam passes directly into Copco No. 2 reservoir, either via the powerhouse or spillage. Because Copco No. 2 reservoir has virtually no active storage, the reservoir rarely fluctuates more than several inches. Water at Copco No. 2 dam either enters the flow conduit to the Copco No. 2 powerhouse or the Copco No. 2 bypassed reach, after which it enters Iron Gate reservoir.

The Spring Creek and Fall Creek diversions that provide flows to Fall Creek powerhouse are operated as run-of-river facilities with no storage. The diversion dams maintain water at elevation 100.2 feet (local datum) and elevation 3,250.5 feet, respectively. Water at Spring Creek diversion dam either spills over the dam or enters the diversion canal, where it eventually enters a tributary to Fall Creek. Once in Fall Creek, water passes about 2 miles downstream to the Fall Creek diversion dam. At Fall Creek diversion dam, water either flows over the dam to the bypassed reach or enters the Fall Creek flow conduit, through the powerhouse and the tailrace channel before re-joining Fall Creek. Fall Creek flows into Iron Gate reservoir.

Iron Gate reservoir is maintained between elevations 2,328 and 2,324 feet, a range of 4 feet. The reservoir is operated on a daily basis over a limited range of about 1.5 feet. Water at Iron Gate dam passes through the powerhouse or over the dam to the Klamath River, and flows unimpeded to the Pacific Ocean, 190 miles downstream.

2.1.3 Existing Environmental Measures

Currently, PacifiCorp provides and supports numerous ongoing project-related environmental resource measures within the Klamath River Basin, as required by its existing license, as amended. These measures are summarized as follows:

- Regulate the water level upstream of Keno dam in accordance with the agreement with Reclamation (article 55, 1965 amended license).
- Operate J.C. Boyle (formerly Big Bend) development such that the rise or fall of the river is increased or decreased gradually at a rate not to exceed 9 inches per hour at a point 0.5 mile below the J.C. Boyle powerhouse, subject to Commission review and adjustment from time to time, after notice and opportunity for hearing (article 36, 1957 amended license).
- Release an instantaneous minimum flow of 0.5 cfs from the Fall Creek diversion dam into Fall Creek and maintain an instantaneous 15 cfs minimum flow, or a quantity equal to the natural flow of the stream, whichever is less (article 69, 1970 amended license).
- Release the following minimum flows downstream of Iron Gate dam: September 1 through April 30, 1,300 cfs; May 1 through May 31, 1,000 cfs; June 1 through July 31, 710 cfs; and August 1 through August 31, 1,000 cfs (article 52, 1961 amended license).
- Restrict changes of release rates to not more than 250 cfs per hour or a 3-inch change in river stage per hour, whichever produces the least change in stage as measured at a gage located not less than 0.5 mile downstream of Iron Gate dam (article 52, 1961 amended license).
- Construct, maintain, and operate permanent wildlife facilities and protective devices including, but not limited to, deer protective fences, and comply with such reasonable modification in project structures and operation in the interest of wildlife as may be prescribed hereafter by the Commission upon the recommendation of Interior and Cal Fish & Game (article 53, 1961 amended license).
- Reimburse Cal Fish & Game for 80 percent of the combined annual cost of operation and maintenance of the Iron Gate Hatchery and of the permanent fish trapping, collecting, holding, and spawn-taking facilities and appurtenances constructed at Iron Gate dam. If the licensee and Cal Fish & Game fail to agree on the amount to be paid by the licensee for this purpose, the Commission reserves the right to determine the amount of such annual payment, after notice and opportunity for hearing (article 50, 1963 amended license).
- Construct, operate, and maintain fishways at the J.C. Boyle (formerly Big Bend) diversion dam, screens at the intake for the J.C. Boyle conduit, and deer escape facilities in and around the open portions of the J.C. Boyle conduit (article 32, 1957 amended license).
- Maintain in the natural channel of the Klamath River immediately below the J.C. Boyle diversion dam a reasonable minimum flow consistent with the primary purpose of the project to be fixed hereafter by the Commission after notice to interested parties and opportunity for rehearing (article 34, 1957 amended license). This minimum flow was later set by the Commission at 100 cfs, released at the dam according to exhibit B of the license application.

2.2 PACIFICORP'S PROPOSAL

2.2.1 Proposed Project Facilities

PacifiCorp proposes to modify the existing project by decommissioning East Side and West Side developments; removing Keno development from the licensed project; and adding or modifying facilities associated with J.C. Boyle, Copco No. 2, Fall Creek, and Iron Gate developments. PacifiCorp also proposes to include the diversion facilities on Spring Creek in the licensed project, as part of Fall Creek development. These changes would require corresponding adjustments to the existing project boundary. Details regarding the facilities that would be removed from or made part of the proposed project are discussed in more detail in the following section.

2.2.1.1 East Side and West Side Developments

All seven gates that supply water to the East Side diversion at Link River dam would be rendered inoperable by removing the individual gate lifting devices. Concrete would be added to the backside of the gates, sealing the intakes. An access ramp would be constructed from the dam site to allow access for filling the existing forebay. The woodstave-portion of the flowline would be dismantled and removed from the site. The steel penstock, surge tank, and support structures would be removed. The powerhouse would have all wooden materials removed. Any components containing chemical or hazardous materials would be removed from the site, including transformers, bushings, tanks, lead bearings, and asbestos based insulating products. All windows and doors would be sealed to prevent public access. The incoming water line and the battery bank would be removed. After removal of the penstock, the penstock outlet would be sealed at the powerhouse assuring that access is prevented. The transmission line (No. 56-8) from the East Side powerhouse to a tap-point on transmission line 11 also would be removed.

Four of the six steel slide gates that control flow at the Link River dam intake at the West Side canal would be made inoperable through removal of the lifting devices. The gates would be secured in place with concrete, with backfill being placed immediately below the dam. The site would be restored and fill areas planted to prevent erosion. The canal leading to the West Side penstock would be filled and regraded to the natural contour. Both the spillway and the intake concrete would be removed. The penstock, including the support structures, also would be removed. The powerhouse would have all wooden materials removed. Any components that contain chemical or hazardous materials would be removed from the site including transformers, bushings, tanks, lead bearings, and asbestos-based insulating products. All windows and doors would be sealed to prevent public access. The incoming water line and the battery bank would be removed. Following the removal of the penstock, the penstock outlet would be sealed at the powerhouse, assuring that access is prevented. The small powerhouse-related substation and transmission lines leading to the larger nearby substation would be removed. The larger West Side substation would remain in place, since it is not associated with the West Side hydroelectric development.

2.2.1.2 Keno Development

In the future, Keno dam would remain in operation to maintain the elevation of Keno reservoir. However, it is not included in the proposed project because the development has no generation facilities, and PacifiCorp states that its operation does not substantially benefit generation at its downstream hydroelectric developments, which would make it, according to PacifiCorp, non-jurisdictional.

2.2.1.3 J.C. Boyle Development

PacifiCorp proposes a surface collection system (gulper) for the J.C. Boyle forebay to exclude fish from the power intake and to facilitate downstream fish passage. The system would include a full-depth guide net barrier extending from the fishway exit to the left bank. A pump system mounted on a floating barge would provide about 200 cfs of attraction flow and surface collection of downstream fish migrants. Collected fish would be conveyed past the dam via a 24-inch bypass pipe with a flow of 20 cfs.

PacifiCorp also proposes modifications for the J.C. Boyle fish ladder. The existing bar spacing on the fishway exit pool trashrack would be increased to facilitate the passage of adult fish. An additional weir also would be added to the fishway entrance pool to decrease the height of the existing step.

PacifiCorp proposes two synchronous bypass valves at the J.C. Boyle powerhouse so that (1) downstream ramping rate requirements would be maintained after a unit trips off-line and (2) the use of the emergency spillway just upstream from the power tunnel and at the end of the power canal would be minimized. The modifications would include two 9.5-foot diameter stainless steel shutoff butterfly valves and two 4-foot diameter stainless steel fixed cone valves. Normally, the butterfly valves would be in the open position, but they would close automatically in the event of an operational failure of the respective

fixed cone valve. A hooded discharge structure and energy dissipation structure also would be included to prevent large amounts of spray that could negatively affect switchyard equipment downstream of the powerhouse. The turbine bypass facility may need to be modified to meet new instream flow requirements downstream of the J.C. Boyle powerhouse. In its license application, PacifiCorp proposes to provide an additional 100 cfs below the powerhouse, but stated that the release would be made (a) at the dam, (b) through a potential small hydro turbine, or (c) through modifications to the proposed turbine bypass facility. PacifiCorp provided the estimated energy loss associated with a release from the dam. Therefore, staff assumes that the release would be made from the dam.

2.2.1.4 Copco No. 2 Development

PacifiCorp proposes to automate the existing instream flow bypass sluiceway on the left side of the spillway to provide a constant release of 10 cfs below Copco No. 2 dam. An automated level sensor and gate operator would be added to control the instream flow releases.

2.2.1.5 Fall Creek Development

PacifiCorp proposes to include the existing diversion facilities on Spring Creek in the licensed project as part of Fall Creek development. The Spring Creek diversion is located on Bureau of Land Management-managed land in the Cascades-Siskiyou National Monument. Spring Creek dam is a small earthen embankment about 7 feet high and 10 feet wide that spans the entire stream width (66 feet). There is a 42-inch diameter vertical pipe that serves as a water level control for the reservoir. The vertical pipe connects to a 42-inch diameter culvert under the road that discharges spill flows to the creek channel downstream. There is a separate gated structure that passes flows of up to 16.5 cfs from the reservoir to the Spring Creek ditch, which, in turn, flows into Fall Creek.

PacifiCorp proposes canal screens and fish ladders for both the Fall Creek and Spring Creek diversions. The canal screens would be diagonal-type screens meeting U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Service Fisheries (NMFS) SW Region criteria for salmonid fry, including a maximum approach velocity of 0.4 foot per second, a sweeping velocity of 2 times the approach velocity, maximum screen openings of 0.07 inch, and a minimum open area of 27 percent. The bypass pipes would be 12 inches in diameter with 2.5 cfs of flow each. The Fall Creek fish ladder would be a pool-and-weir type ladder consisting of six pools. The pools would be constructed from rock and include a 0.5-foot vertical jump for each pool. The existing flashboards would be notched at the exit pool to permit a fishway flow of 2.5 cfs. The Spring Creek fish ladder would be a timber or concrete pool-and-weir type ladder consisting of eight pools. The pools would be 4 feet by 5 feet in plan with 0.5-foot vertical jumps. A fishway control structure consisting of a 24-inch diameter culvert and manually operated slide gate would provide 2.5 cfs of fishway flow. PacifiCorp also proposes a Parshall flume for the Spring Creek canal to permit measurement of diverted flows.

2.2.1.6 Iron Gate Development

Minor modifications proposed for Iron Gate development include the purchase of a mass-marking trailer for use at the hatchery. The mass-marking trailer is a portable building containing automated fish-marking equipment. Modifications to Iron Gate dam may be required to facilitate the release of low-level reservoir water, pending the outcome of ongoing water quality investigations. These modifications may include retrofit of the existing low-level outlet and bulkhead gate. PacifiCorp also proposes to install an oxygenation system at Iron Gate development, which would entail installation of a diffuser on the bottom of Iron Gate reservoir (letter from C. Scott, Licensing Project Manager, PacifiCorp, to the Commission dated October 17, 2005; response to our AIR WQ-1).

2.2.2 Proposed Project Operations

The proposed project would not include East Side and West Side developments, so it is expected that Reclamation would solely and at its own discretion operate Link River dam and would be responsible for releasing water to meet any Link River dam instream flow requirements and also the Klamath River instream flow requirements, which are specified for and measured at Iron Gate dam. The proposed project also would not include Keno development, but Keno dam would continue to be operated as it is currently, only under the jurisdiction of the state of Oregon.

Overall, the amount and timing of water available at J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate developments would be similar to those under existing hydrologic conditions, because PacifiCorp does not propose any new storage facilities above J.C. Boyle, nor are storage facilities being removed. East Side and West Side developments have no storage capacity.

2.2.3 Proposed Environmental Measures

PacifiCorp proposes the following additional protection and enhancement measures:

Water Resources

1P. Implement instream flow and ramping rate measures in project reaches to protect and/or enhance various flow-dependent resources, including water quality.

2P. Implement a low-level release of cooler hypolimnetic water from Iron Gate reservoir during summer to provide some cooling of the Klamath River downstream of the project.[11]

3P. Install a reservoir oxygenation diffuser system at Iron Gate development as needed to prevent adverse downstream effects caused by seasonally low levels of dissolved oxygen in hypolimnetic generation flows.

4P. Implement reservoir management plans for improving water quality in J.C. Boyle, Copco, and Iron Gate reservoirs that include evaluating the effectiveness and feasibility of hypolimnetic oxygenation, epilimnetic or surface aeration or circulation, and copper algaecide treatment, for controlling water quality conditions.[12]

5P. Consult and coordinate with appropriate agencies on the annual scheduled outages for project maintenance events where flows in project reaches are required to be outside the normal operations.

Aquatic Resources

6P. Decommission the East Side and West Side facilities to eliminate entrainment of ESA-listed suckers from Upper Klamath Lake.

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[11]On page E3-207 of its license application, PacifiCorp describes this as a "potential" measure, which would be evaluated in consultation with the Water Board during the CWA Section 401 certification process. PacifiCorp reaffirmed its commitment to continue to explore opportunities for using cool-water storage in Iron Gate reservoir to enhance downstream water temperatures in its May 12, 2006, response to terms and conditions.

[12]Not included in PacifiCorp's license application, but proposed in PacifiCorp's water quality certification application, submitted to the Water Board by letter dated March 29, 2006, and confirmed in PacifiCorp's responses to terms and conditions, filed by letter to the Commission, dated May 12, 2006.

7P. Release a minimum flow of 100 cfs from J.C. Boyle dam at all times to enhance usable fish habitat while maintaining high water quality in the J.C. Boyle bypassed reach, and install a gage to measure the flow.

8P. Release an additional minimum flow of 100 cfs at J.C. Boyle powerhouse or dam.

9P. Limit flow down-ramp rates to 150 cfs per hour in the J.C. Boyle bypassed reach, except for flow conditions beyond PacifiCorp's control.

10P. Limit flow up-ramp rates to 9 inches (in water level) per hour in the J.C. Boyle peaking reach (the reach of the Klamath River from the J.C. Boyle powerhouse to Copco reservoir). Flow down-ramp rates would not exceed 9 inches per hour for flows exceeding 1,000 cfs and would not exceed 4 inches per hour for flows less than 1,000 cfs.

11P. Install a synchronized bypass valve on each of the two J.C. Boyle powerhouse units to ensure ramping rates could be met if a unit trips off-line.

12P. Install a surface collection system (gulper) for the J.C. Boyle reservoir to exclude fish from the power intake and to facilitate downstream fish passage.

13P. Make minor improvements to the J.C. Boyle fish ladder (i.e., increasing the existing bar spacing on the exit pool trashrack and adding an additional weir) to facilitate the passage of adult fish.

14P. Eliminate the gravity-fed water diversions from Shovel Creek and its tributary, Negro Creek (located adjacent to the Klamath River in the California segment of the J.C. Boyle peaking reach), to prevent trout fry from being entrained and lost in the various ditches on PacifiCorp's Copco Ranch (a non-hydro related property).

15P. Place approximately 100 to 200 cubic yards of spawning gravel in the upper end of the J.C. Boyle bypassed reach.

16P. Maintain a minimum flow of 10 cfs in the Copco No. 2 bypassed reach, and make improvements to the gate and flow conduit to the bypassed reach.

17P. Limit flow down-ramp rates to 125 cfs per hour (equivalent to less than 2 inches per hour in most of the expected flow ranges) in the Copco No. 2 bypassed reach, except for flow conditions beyond PacifiCorp's control.

18P. Release a minimum flow of 5 cfs into the Fall Creek bypassed reach, and release a minimum flow of 15 cfs downstream of the bypass confluence.

19P. Divert no flow from Spring Creek during July and August, and release 1 cfs, or inflow, downstream of the Spring Creek diversion dam for the remainder of the year; install a Parshall flume to measure the minimum flow.

20P. Install canal screens and fish ladders for both the Fall Creek and Spring Creek diversions.

21P. Maintain the instream flow schedule and ramp rates downstream of Iron Gate dam according to Reclamation's Klamath Project Operations Plans consistent with BiOps issued by FWS and NMFS.

22P. Place approximately 1,800 to 3,500 cubic yards of spawning gravel downstream of Iron Gate dam between the dam and the Shasta River confluence.

23P. Maintain current obligation of funding for operation and maintenance of the Iron Gate Hatchery.

24P. Purchase, construct, and operate a mass-marking facility at the Iron Gate Hatchery that provides for marking 25 percent of all Chinook salmon released.

Terrestrial Resources

25P. Implement a vegetation resource management plan to include the following environmental measures: (1) project facility (including road and powerline rights-of-way) vegetation management activities; (2) noxious weed control; (3) restoration of project-disturbed sites; (4) protection of threatened, endangered, and sensitive plant populations; and (5) riparian habitat restoration.

26P. Implement a wildlife resource management plan to include the following environmental measures: (1) installation of wildlife crossing structures on the J.C. Boyle canal; (2) deer winter range management; (3) monitoring powerlines and retrofitting poles to decrease electrocution risk; (4) development of amphibian breeding habitat along Iron Gate reservoir; (5) support of aerial bald eagle surveys and protection of bald eagle and osprey habitat; (6) selective road closures; (7) installation of turtle basking structures; (8) installation of bat roosting structures; (9) surveys for threatened, endangered, and sensitive wildlife species in areas to be affected by new recreation development; and (10) long-term monitoring of environmental measures.

Recreational Resources

27P. Work with the Bureau of Land Management and others to resolve current effects of recreational use on sensitive resources and provide increased resource protection and visitor management controls throughout the proposed project area.

28P. Increase the supply of camping and day-use facilities to help meet current and future demand, principally at Iron Gate reservoir, by adding about 85 new campsites and 30 day-use picnic sites by 2040, or when needed on the basis of monitoring results.

29P. Provide increased management presence at developed and undeveloped recreation sites.

30P. Address Americans with Disabilities Act (ADA) compliance at all existing and new recreational facilities, including providing ADA-accessible fishing access sites.

31P. Provide improved maintenance and repair or replace site-specific facilities at existing developed recreation sites, including boat launches, picnic sites, and campsites.

32P. Finalize a recreational resource management plan including a multi-resource interpretation and education program with new signs, kiosks, brochures, and/or services.

33P. Provide new or enhanced multi-use, non-motorized trail opportunities.

34P. Provide designated wildlife viewing areas, such as watchable wildlife stations.

35P. Maintain current undeveloped open space lands on PacifiCorp-owned property for activities such as wildlife viewing, sightseeing, nature appreciation, photography, and other recreational activities that rely on adequate natural open space.

36P. Work with the Bureau of Land Management and Oregon Parks and Recreation Department to implement portions of the Upper Klamath River Management Plan, when adopted, from Stateline Take-Out on the Klamath River to Fishing Access Site 1 on Copco reservoir.

37P. Provide whitewater boating and fishing opportunities in the upper Klamath River/Hell's Corner reach.

Land Use and Aesthetic Resources

38P. Reduce visibility and contrast of powerhouse facilities through vegetative screening or painting at J.C. Boyle and Iron Gate developments.

39P. Finalize and implement the Study Area Roadway Inventory Analysis and Project Roadway Management Plan.

Cultural Resources

40P. Complete the project's historic properties management plan providing direction and guidelines for the management of historic properties within the new project boundary as proposed by PacifiCorp.

41P. Through the final HPMP, implement measures to protect historic buildings and structures, archaeological sites, and traditional cultural properties.

2.2.4 Proposed Project Boundary

The proposed project boundary includes about 3,737 acres of land, of which 156 acres are lands of the United States administered by the Bureau of Land Management. PacifiCorp's proposed project boundary excludes some lands in the existing project boundary that it no longer considers necessary for project purposes. Lands proposed for exclusion from the project boundary are lands associated with (1) East Side and West Side developments, which are proposed for retirement; (2) Keno development, because the development has no generating facilities and PacifiCorp asserts its operation does not substantially benefit generation at PacifiCorp's downstream hydroelectric facilities and is thus non-jurisdictional; (3) roadways that are not needed for project operations and maintenance; and (4) excess lands surrounding project features that PacifiCorp concludes are unnecessary for project operations and maintenance or are not needed for long-term, project-related environmental protection or enhancement. PacifiCorp's proposed project boundary would eliminate all land managed by Reclamation (about 20 acres) from the project.

PacifiCorp also proposes to include some additional land within the project boundary that it now considers necessary for project operations and maintenance or for long-term environmental protection or enhancement. Lands proposed for inclusion in the project boundary include (1) lands associated with the Spring Creek diversion structures and the canal from the diversion to Fall Creek; (2) lands needed for development, enhancement, or expansion of recreational facilities; (3) project-related transmission line rights-of-way that are not currently within the project boundary; (4) buffer zones along the Klamath River mainstem or tributary streams that are considered to be environmentally sensitive and in need of protection or enhancement; (5) roadways needed for project purposes that are not currently within the project boundary; and (6) other lands deemed necessary for project operations and maintenance or for long-term protection or enhancement.

We summarize PacifiCorp's proposed project boundary modifications for each development in the following sections.

2.2.4.1 East Side and West Side Developments

PacifiCorp proposes to remove all current project lands associated with East Side and West Side developments from the project boundary as part of its proposed retirement of those facilities. This would exclude from the project boundary the gates, canals, forebays, penstocks, and powerhouses of both developments, as well as the Link River from Link River dam to its confluence with Keno reservoir (and about 80 to 500 feet of land from the edge of the river). This also would exclude from the project boundary lands associated with much of the Link River Trail.

2.2.4.2 Keno Development

PacifiCorp proposes to remove all current project lands associated with Keno development from the project boundary because it asserts that Keno dam does not serve project purposes. This would

exclude from the project boundary land that generally corresponds to Keno reservoir high water mark, including that associated with the Miller Island Wildlife Refuge (managed by Oregon Fish & Wildlife), except within about 1 mile of Keno dam, where the project boundary varies from about 50 to more than 1,300 feet from the high water mark of the reservoir and the 0.7-mile-long reach downstream of Keno dam. PacifiCorp's proposed project boundary also would exclude lands associated with the Keno Recreation Area, a campground currently managed by PacifiCorp, and Keno dam itself, including the existing fish ladder.

2.2.4.3 J.C. Boyle Development

PacifiCorp proposes to add a small area at the upstream-most limit of the reservoir to extend the project boundary about 650 feet to the area currently backwatered, including the high water line on both sides of the reservoir. Nearly all of the proposed project boundary along the reservoir, except the 0.7 mile portion immediately upstream of the dam, would remain essentially unchanged, and would provide a buffer zone of from 50 to more than 1,200 feet from the water's edge, with typical buffer zone distances of from 100 to 300 feet. The limit of the buffer zone in this area corresponds to the edge of PacifiCorp-owned property. PacifiCorp also proposes to expand the project boundary to include some land to the east of Topsy Grade Road near a cove adjacent to the Topsy Campground upstream of the dam. Downstream of J.C. Boyle dam, PacifiCorp proposes to include two small semi-circular areas along the access road to the powerhouse near Spring Island in the project boundary.

PacifiCorp also proposes to remove land from the project boundary at several locations. These include (1) a small area along Topsy Grade Road near the Rt. 66 bridge crossing; (2) excess PacifiCorp-owned lands to the north (but retaining at least a 200 foot buffer zone in the proposed project boundary along this portion of the reservoir), west, and south of the dam (but retaining in the project boundary the uppermost 0.6 mile of the bypassed reach that passes through land owned by PacifiCorp); (3) lands associated with the Bureau of Land Management-owned and -managed Topsy Campground that are included in the current project boundary (the proposed project boundary would be essentially at the high water mark of the reservoir); (4) excess lands along the upper access road from the dam to the powerhouse, leaving a 50-foot-wide road right-of-way; (5) lands along the west side, and portions of the bypassed reach extending to the limits, of the 200-foot-wide canal right-of-way (including much of the downslope area from the canal overflow spillway); (6) lands associated with the right-of-way for a retired transmission line near the powerhouse; (7) lands along the Klamath River opposite the powerhouse; and (8) the road and its right-of-way south of the turn-around near the Bureau of Land Management-managed Spring Island Boater Access site (the road from the turnaround to the powerhouse would remain in the proposed project boundary).

The proposed project boundary at J.C. Boyle development would encompass a total of about 718 acres, including the 341-acre reservoir, 82 acres of which are managed by the Bureau of Land Management (most of which are downstream of the dam). The proposed project boundary would include the proposed upper J.C. Boyle reservoir boater access site, but not the access road to that site (which passes through Sportsman's Park, a non-project recreational area). The proposed project boundary would only include a portion of the proposed Boyle Bluff recreation area, but would include all land associated with J.C Boyle dam and powerhouse river access sites, which would provide public access to the bypassed reach.

2.2.4.4 Copco No. 1 Development

PacifiCorp proposes to extend the existing project boundary upstream of the Klamath River from its current limit about 0.3 mile upstream of Fishing Access Site 1 north to the California-Oregon border (a portion of the peaking reach). The land to be included within the project boundary ranges from 50 feet to about 300 feet from the shoreline at various locations along the reach. Also proposed for inclusion in the project boundary would be PacifiCorp-owned land and water within 50 feet of the centerline of Shovel

Creek for a distance of about 2.2 miles upstream of its confluence with the Klamath River and PacifiCorp-owned land and water within 50 feet of the centerline of Negro Creek from its confluence with Shovel Creek to about 0.2 mile upstream.

Most of the project boundary around Copco reservoir would remain essentially unchanged, corresponding to the high water mark, with minor adjustments to reflect more recent surveys and the current reservoir configuration. As such, there would be no buffer zone along most of the reservoir shoreline, which is predominantly privately owned. PacifiCorp proposes to expand the project boundary in the vicinity of Copco reservoir at several locations: (1) land associated with the Mallard Cove Recreation Area, 0.7 acre of which is currently managed by the Bureau of Land Management; (2) a small, PacifiCorp-owned parcel abutting the Copco Cove Recreation Area; (3) roadway rights-of-way leading to Copco Road and the Copco No. 1 water supply, ranging in width from 30 to 50 feet, as well as the area surrounding the water supply and the 25-foot-wide water line right-of-way; (4) the 30-feet-wide road right-of-way leading to the cinder pit, as well as the 900-feet diameter volcanic cinder pit; and (5) some additional lands between the Copco No. 1 powerhouse and Copco No. 2 dam to the west of the current project boundary.

At the Copco No. 1 development, the only lands PacifiCorp proposes to remove from the project boundary are excess PacifiCorp-owned lands along the southern limits of the current project boundary near the dam (but retaining a 200-foot-wide buffer zone along the southern 0.3 mile of the reservoir immediately upstream of Copco No. 1 dam), and some excess lands outside of the 100-foot-wide transmission line right-of-way between the Copco No. 1 substation and the Fall Creek substation. The buffer zone along the 0.5 mile of the northern side of the reservoir immediately upstream of the dam on PacifiCorp-owned land would continue to range from about 150 to 900 feet, as it does with the existing project boundary.

The proposed project boundary would include the portion of the existing Stateline Boating Take-out Recreation Area that is on PacifiCorp property, but not the abutting Bureau of Land Management-managed campground, which includes the access road to the boating take-out site. Fishing Access Sites 1 to 6, which currently provide angler access to the peaking reach, would be included within the proposed project boundary, although at Access Sites 2, 3, 4, and 6, the parking area and associated facilities would be project boundary "islands" separated from the project area adjacent to the river by a public road. Only the shoreline at Fishing Access Site 1, which also serves as a whitewater boating takeout area, is within the existing project boundary. The existing Mallard Cove Recreation Area would be completely within the proposed project boundary, whereas only the high water line at this site is within the existing project boundary. The existing Copco Cove Recreation Area would continue to be within the project boundary.

2.2.4.5 Copco No. 2 Development

The only lands proposed for removal from the project boundary at Copco No. 2 development are PacifiCorp-owned land outside a 200 foot buffer zone along the southern shoreline of the Copco No. 2 reservoir. This proposed adjustment would diminish the width of the existing buffer zone, which now approaches 1,000 feet at some locations.

PacifiCorp proposes to add the following to the project boundary associated with Copco No. 2 development: (1) a 100-foot-wide transmission line right-of-way from near the dam to the Copco No. 2 powerhouse; (2) road rights-of-way, ranging in width from 25 to 30 feet, near from the vicinity of the dam to the vicinity of the powerhouse and from near the dam and powerhouse to Ager-Beswick Road (50-feet wide); (3) some additional lands south of the power canal; (4) lands adjacent to the canal spill channel; (5) lands south and east of the existing project boundary along the Klamath River downstream of the powerhouse (with adjacent lands associated with the Iron Gate development); and (6) an area of land north of the Klamath River downstream of the powerhouse (with adjacent lands associated with Iron Gate development). The only portion of the Copco No. 2 bypassed reach that is included in the existing or

proposed project boundary is associated with the proposed project boundary expansion identified in item (6), which would include only the lower 800 feet of this reach.

As previously mentioned, the proposed project boundary adjustments would decrease the width of the buffer zone along the south side of the Copco No. 2 reservoir. However, the width of the buffer zone to the north of the reservoir, which currently ranges from about 50 to 800 feet, would be increased to between 300 and 1,300 feet, based on adjustments to include portions of project roads associated with Copco No. 1 powerhouse.

The proposed project boundary at the Copco No. 1 and No. 2 developments would encompass a total of about 1,514 acres, including the 1,008-acres associated with both reservoirs. PacifiCorp owns 1,498 acres of the land associated with this total area. Lands of the United States at both developments would include only 0.7 acre that is managed by the Bureau of Land Management at the Mallard Cove Recreation Area.

2.2.4.6 Fall Creek Development

PacifiCorp proposes to expand the project boundary at Fall Creek development to include Spring Creek diversion dam and a 100-foot-wide right-of-way associated with a canal that leads to a tributary of Fall Creek. The diversion dam and canal are not included in the current project boundary. PacifiCorp also proposes to expand the project boundary to include the 30-feet-wide roadway rights-of-way leading from Copco Road to the Fall Creek diversion canal and spillway, and lands from the spillway to its point of discharge to Fall Creek. The 100-feet-wide right-of-way associated with the Fall Creek canal and penstock would continue to be within the project boundary. In addition, PacifiCorp proposes to include additional lands along about 2,000 feet of the bypassed reach of Fall Creek and lands surrounding the existing Fall Creek trail, a proposed loop trail that would extend the existing trail to the north and east of the Fall Creek bypassed reach, and the Cal Fish & Game fish hatchery/holding facility. Finally, PacifiCorp proposes to expand the project boundary to the southeast of the Fall Creek powerhouse to include the access road to the powerhouse and parking area adjacent to Copco Road, and to the northeast of the powerhouse.

The proposed project boundary at Fall Creek development would encompass a total of about 102 acres. PacifiCorp owns 83 acres of the land associated with this total area. Lands of the United States at this development would include about 10 acres managed by the Bureau of Land Management at the Spring Creek diversion dam and canal. PacifiCorp does not propose to include in the project boundary the natural channel of the tributary of Fall Creek into which the Spring Creek diversion canal discharges or most of the natural channel of Fall Creek, other than near the diversion dam, the spill channel, and the lower portion of the bypassed reach where recreational enhancements are proposed.

2.2.4.7 Iron Gate Development

PacifiCorp proposes to expand the area within the project boundary at Iron Gate development at the following locations: (1) a corridor that extends 100 feet from the center line of Jenny Creek for a distance of about 1 mile upstream of Iron Gate reservoir; (2) lands to accommodate the proposed expansion of the existing Camp Creek Recreation Area; (3) lands adjacent to the existing Juniper Point Recreation Area to a distance of 50 feet to the west of the centerline of Copco Road for a distance of about 1,700 feet along the road; (4) lands that include all of the existing Mirror Cove Recreation Area (some of which were not included in the existing project boundary) and abutting land to a distance of 50 feet to the south of the centerline of Copco Road for a distance of about 800 feet along the road; (5) a 20-foot-wide right-of-way associated with the access road to Overlook Point (which was not included in the existing project boundary); (6) a corridor that extends 50 feet from the center line of Long Gulch extending approximately 3,500 feet upstream from the Iron Gate reservoir and approximately 7.5 acres at the upstream end of the reach; (7) lands to the west of Iron Gate Estates Road that would include the

proposed Long Gulch Bluff recreational area (adjacent to the existing Long Gulch boat launch) and the portion of Iron Gate Estates Road, and its associated 60-foot-wide right-of-way, that provides access to these existing and proposed recreational sites; and (8) a corridor that extends 50 feet from the center line of Bogus Creek for a distance of about 1 mile upstream of its confluence with the Klamath River (about half of this reach is within the current project boundary).

PacifiCorp proposes to remove from the project a substantial amount of land from along the periphery of the impoundment that was included in the current project boundary. In many areas, the existing buffer area within the project boundary along the impoundment, which ranges from about 50 feet to about 1,000 feet from the high water line (and typically is about 100 to 200 feet from the shoreline), would be eliminated, setting the high water line as the new project boundary. A 100-foot-wide right-of-way would be retained along the transmission lines.

PacifiCorp proposes to remove some excess lands to the west of Copco Road, across the Klamath River from the fish hatchery, and some excess lands to the east of the access road on the east side of the dam and fish hatchery. Much of the right-of-way for Copco Road from the Fall Creek Recreational Area (at the confluence of Fall Creek with Iron Gate reservoir) to the Iron Gate dam and fish hatchery (which is in the existing project boundary) would be removed from the proposed project boundary, as would excess lands on both sides of the Copco Road right-of-way.

The proposed project boundary at Iron Gate development would encompass a total of about 1,402 acres, including the 935-acre reservoir, 64 acres of which are managed by the Bureau of Land Management (most of which are associated with transmission line rights-of-way). The proposed project boundary would include the existing Fall Creek Recreation Area; the existing Jenny Creek Recreation Area; the existing Wanaka Springs Recreation Area and its proposed expansion; the existing Camp Creek Recreation Area and its proposed expansion; the existing Juniper Point Recreation Area; the existing Mirror Cove Recreation Area; the existing Overlook Point Recreation Area, including its access road; the existing Long Gulch Bluff Recreation Area and its proposed expansion; and the existing Hatchery Day Use Area.

2.3 MODIFICATIONS TO THE PROPOSED ACTION

2.3.1 Mandatory Conditions

2.3.1.1 Water Quality Certification

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. PacifiCorp filed applications for water quality certification with the California State Water Resources Control Board and Oregon Department of Environmental Quality by letters dated March 29, 2006. Both water quality agencies documented receipt of the requests for water quality certification on the same day, March 28, 2006. Decisions by the agencies are pending, with the certifications due by March 28, 2007.

2.3.1.2 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce and Interior may prescribe.

In its March 29, 2006, filing, Interior (for the U.S. Fish and Wildlife Service) provided preliminary fishway prescriptions for anadromous and resident fish passage. On March 29, 2006, NMFS also filed preliminary fishway prescriptions for anadromous fish passage. Interior and NMFS both state that these prescriptions are preliminary and may be amended because the Commission has not issued its draft EIS. They reserve the right to amend these prescriptions based on new information and conclusions arising from the Energy Policy Act of 2005 process (see section 2.3.1.3). Both letters state that the

prescriptions were developed jointly and are consistent with the prescriptions filed by the other agency. Both agencies provide general preliminary prescriptions, followed by specific fishway prescriptions for each project development. The general prescriptions are as follows:

- For each facility, licensee shall develop detailed design, construction, evaluation and monitoring plans for review and approval by FWS and NMFS prior to construction. Facilities shall be constructed according to NMFS guidelines for the design of fish screens, fishways, and other fishway structures. All designs would be reviewed by the fisheries technical subcommittee (that FWS and NMFS would establish), and agency consultation would be required during the conceptual level design. FWS and NMFS would approve conceptual design prior to feasibility and final level design. Licensee would allow at least 90 days for review and approval of comprehensive plans. Plans shall include provisions for stocking critical spare parts and equipment to affect timely repairs of critical system components. Downstream fishways (screens, bypasses, and spillway modifications) would be complete prior to the completion of upstream fishways. After approval by FWS and NMFS, the final designs would be filed with the Commission.
- Licensee shall provide timely site access to agency personnel at all project developments and project records for the purpose of inspecting fishways to determine compliance with this fishway prescription.
- Licensee shall keep all fishways in proper order, clear of trash, sediment, logs, debris, and other material that would hinder passage or create a personnel safety hazard. Licensee shall perform maintenance well in advance of critical migratory periods. If any fishway becomes seriously damaged or inoperable, notify FWS and NMFS within 48 hours and take timely remedial action in a manner satisfactory to FWS and NMFS.
- Licensee shall, in consultation with agencies, develop a fishway operation, inspection, and maintenance plan describing the planned activities and contingencies for each fish passage facility. Plans would be completed and approved prior to completion and operation of fishways.
- Prior to the completion of construction of new fishways, licensee, in consultation with agencies, shall develop post-construction monitoring and evaluation plans to assess the effectiveness of each fishway, spillway, and tailrace barrier. Plans shall include hydraulic, water quality, and biological evaluations using electronic tags or similar technology to detect and record fish passage and assess the performance of the fishway. Licensee shall provide a report on the monitoring and evaluation annually for the term of the license. Plans shall provide for estimating numbers of fish passed by species on a daily basis (including spring and fall-run Chinook, coho, steelhead, Pacific lamprey, Lost River and shortnose suckers, and redband/rainbow trout); sampling fish size and age class on a daily basis; records of daily observations by a qualified fisheries biologist on the physical condition of fish using the fishways; and a continuous record of DO and water temperature at locations in the fishways determined by FWS and NMFS, and in front of and adjacent to the entrances and exits of the fishways. Evaluation plans shall be submitted to FWS and NMFS within 6 months of the date when final designs for fishway construction are approved. As least 60 days shall be given for FWS and NMFS to review evaluation plans. Licensee shall fund plan implementation and any operational or physical changes necessary for effective fish passage.
- Licensee shall, in consultation with the fisheries technical subcommittee, prepare a fishway evaluation and modification plan for each fishway, spillway, and tailrace barrier. An outline for the plan shall be provided to FWS and NMFS no later than 1 year from license issuance. Complete plans shall be submitted to FWS and NMFS no later than 18 months from license issuance. Each plan shall include: (1) a quantified program to meet FWS and NMFS fish

passage goals, objectives, and strategies; (2) FWS's and NMFS's criteria by which to measure progress towards fisheries management goals; (3) procedures for redirecting effort; (4) schedule for implementation of activities; (5) a monitoring plan to evaluate progress towards and achievement of FWS's and NMFS's goals and objectives; and (6) a format for an annual report and work plan. Annual reports detailing work under this plan for the previous year shall be submitted by February 1. By December 1 of each year, licensee shall submit a proposed work plan for the upcoming year.

- Licensee shall design each upstream fish passage facility to pass migrants throughout a designed streamflow range, bracketed by a designated high and low fish passage design flow. The low fish passage design flow shall be the mean daily average stream discharge that is exceeded 95 percent of the time (based on at least 25 years of daily discharge data or an alternative method approved by FWS and NMFS) during periods when migrating fish were historically present at the site. The high fish passage design flow shall be the mean daily average stream discharge that is exceeded 5 percent of the time during periods when migrating fish were historically present at the site. Each facility shall be designed to produce at least 10 percent of the high fish passage design flow. For fishways at streams with annual mean flows greater than 1,000 cfs, licensee shall determine optimum attraction flow in consultation with FWS and NMFS. Licensee shall ensure that any reduction in attraction flow shall not result in reduction in passage efficiency below the standards established by FWS and NMFS during important fish migrations. Licensee shall test fishway performance, report testing results to FWS and NMFS, and implement appropriate modifications to attraction flow, but to no less than 5 percent of high fish passage design flow, if approved by FWS and NMFS.

Table 2-2 shows the specific fishway prescriptions for each development. We discuss these measures further in sections 3.3.3.2.2, *Fish Passage*, and 3.3.3.2.3, *Anadromous Fish Restoration*.

In addition to its fishway prescriptions, FWS also requests that the Commission include as a license condition a reservation of authority to prescribe fishways during the term of a new license. The reservation of authority includes, but is not limited to, authority to prescribe fishways for spring and fall-run Chinook salmon; coho salmon; steelhead; Pacific lamprey; Lost River and shortnose suckers; and any other fish to be managed, protected, or restored to the Klamath River Basin during the term of a new license. Authority is also reserved to prescribe an upstream fishway for sucker criteria at Keno dam, pending evaluation of the need for such a fishway.

NMFS also requests that the Commission include as a license condition a reservation of authority to prescribe fishways during the term of a new license. The reservation of authority includes, but is not limited to, authority to prescribe such additional or modified fishways at those locations and at such times as may subsequently be determined to be necessary to provide for effective upstream and downstream passage of anadromous fish through project developments. Reserved authority includes amendments to its current fishway prescriptions, upon approval by NMFS of such plans, designs, and implementation schedules pertaining to fishway construction, operation, maintenance, and monitoring, as may be submitted by the licensee in accordance with the terms of the license articles containing such fishway prescriptions.

Table 2-2. Summary of preliminary fishway prescriptions and timetable for the Klamath Hydroelectric Project (NMFS and Interior). (Source: Letter from P. Detrich, Field Supervisor, FWS, Yreka, California, to the Commission dated April 29, 2006)

Development	Target Species	Fish Ladder and Passage Impediment Modification (in Chronological Order)	Tailrace Barrier	Screens and Bypass	Spillway Modifica-tions	Interim, Seasonal Trap and Haul
Copco No. 2 Bedrock Sill	Salmonids, lamprey	2 years (Bypass Barrier/Impediment Modification)	Not Applicable (NA)	NA	NA	NA
J.C. Boyle (Bypass)	Salmonids, lamprey	2 years (Bypass Barrier/Impediment Modification	NA	NA	NA	NA
East Side	Salmonids, lamprey, suckers	Reclamation current facility	3 years[a]	3 years[b] (to sucker criteria)	NA	Seasonal downstream trapping and hauling for Chinook salmon
West Side	Salmonids, lamprey, suckers	Reclamation current facility	3 years[a]	3 years[b] (to sucker criteria)	NA	Seasonal downstream trapping and hauling for Chinook salmon
Fall Creek	Resident trout	3 years (0.5 foot/drop and ≤ 10%)	5 years[c]	3 years	NA	NA
Spring Creek	Resident trout	3 years (0.5 foot/drop and ≤ 10%)	NA	3 years	NA	NA
Keno	Salmonids, lamprey	3 years (0.5 foot/drop and ≤ 10%)	NA	NA	3 years	Seasonal upstream trapping and hauling for Chinook salmon
J.C. Boyle (Dam)	Salmonids, lamprey	4 years (0.5 foot/drop and ≤ 10%)	4 years	4 years	4 years	NA
Iron Gate	Salmonids, lamprey	5 years (0.5 foot/drop and ≤ 10%)	NA	5 years	5 years	Modify existing trapping facility
Copco No. 2	Salmonids, lamprey	6 years (0.5 foot/drop and ≤ 10%)	8 years[c]	6 years	6 years	NA
Copco No. 1	Salmonids, lamprey	6 years (0.5 foot/drop and 10%)	8 years[c] (if adults in Copco No.2 reservoir pool)	6 years (bypass below Copco No. 2 dam)	6 years	NA

[a] Study of effects on and the potential design and construction of tailrace barrier is given priority due to the presence of federally listed suckers.

[b] Screen and bypass system given priority due to the presence of federally listed suckers.

[c] Tailrace barrier design and construction deferred for study to determine optimal design.

2.3.1.3 Alternative Section 18 Fishway Prescriptions Pursuant to the Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPAct) provides parties to this licensing proceeding the opportunity to request trial-type hearings regarding issues of material fact that support the prescriptions developed under FPA section 18. EPAct also provides parties the opportunity to propose alternatives to preliminary prescriptions.

PacifiCorp

In an April 28, 2006, filing in accordance with section 241 of EPAct, PacifiCorp requested hearings regarding issues of material fact pertaining to the preliminary fishway prescriptions. The primary issue raised by PacifiCorp is that it is premature to require fishways when it is not yet established that anadromous fish can be restored to identified historic spawning and rearing habitat. An administrative law judge is scheduled to release findings following the hearing at about the same time this draft EIS is due to be issued. PacifiCorp also presented an alternative fishway prescription that takes an adaptive approach to anadromous fish restoration. PacifiCorp would construct a trap and haul facility at Iron Gate dam and hatchery, including a collection, sorting, holding, and loading facility. Some of the existing facilities at the dam and hatchery would be used, with modifications. Anadromous fish collected would be hauled above J.C. Boyle dam or upstream sites, as appropriate, and would form the basis for conducting a series of studies designed to address uncertainties pertaining to anadromous fish restoration. PacifiCorp would conduct the following six related studies.

1. An evaluation of juvenile salmonid survival through lakes and reservoirs; from March through June 15 and September and October.
2. An assessment of survival of juvenile fish collected at collection facilities during the juvenile downstream passage study, as they are transported to holding facilities at Iron Gate Hatchery by truck.
3. An assessment of survival of adult salmonids collected at Iron Gate dam as they are transported to various release sites upstream of J.C. Boyle dam, including the Williamson and Wood rivers, and an assessment of the spawning success of released fish by spawning surveys.
4. An assessment of the smolt to adult survival rate, by using uniquely marked juvenile fish transported and released in the lower Klamath River and upon their return to Iron Gate dam. PacifiCorp would also possibly search spawning areas to retrieve tags.
5. An evaluation of the survival rate of young introduced salmonids, an assessment of whether most of the young salmonids outmigrate as subyearlings or yearlings, and when juvenile outmigration begins and ends. This evaluation would entail monitoring young anadromous salmonid migration behavior in upper Klamath River Basin tributaries (e.g., Wood and Williamson rivers) with screw-traps.
6. An assessment of whether redband trout disease load and severity increases as more anadromous fish are released into the upper Klamath River Basin based on constant monitoring (samples taken during spring, summer, fall, and winter) of juveniles and adults for disease, including redband trout.

Based on the results and analysis of the six studies, fisheries' managers would decide if self-sustaining runs of anadromous fish can be established. If so, PacifiCorp would design permanent juvenile collection facilities at or above J.C. Boyle dam, and modify the adult collection facility at Iron Gate dam, as appropriate, to implement a reintroduction program (using a trap and haul approach). If fisheries' managers determine that reintroduction of anadromous fish is not feasible, PacifiCorp would conduct a

limiting factors analysis to identify obstacles to establishing self-sustaining populations of anadromous fish to historical habitat.

Hoopa Valley Tribe

The Hoopa Valley Tribe also requested a hearing on disputed issues of fact, and filed an alternative fishway prescription by letter dated April 27, 2006. By letter dated July 3, 2006, the Hoopa Valley Tribe withdrew its request for a hearing. Its alternative fishway prescription is as follows: PacifiCorp should provide a minimum flow of 730 cfs to the Copco No. 2 bypassed reach to facilitate safe, timely, and effective upstream and downstream volitional fish passage. If inflow is less than 730 cfs, PacifiCorp should direct all flow to the bypassed reach. If 40 percent inflow to Copco reservoir is greater than 730 cfs, than 40 percent inflow should be released to the bypassed reach. Inflow should be computed as a running average of flows during the prior 3 days at the J.C. Boyle powerhouse gage added to a new gage on Shovel Creek. We discuss PacifiCorp's and the Hoopa Valley Tribe's alternative fishway prescriptions further in sections 3.3.3.2.2, *Fish Passage*; 3.3.3.2.3, *Disease Management*; and 3.3.3.2.5, *Anadromous Fish Restoration*.

2.3.1.4 Section 4(e) Federal Land Management Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The existing Klamath Hydroelectric Project occupies approximately 219 acres of lands that are administered by the Bureau of Land Management or Reclamation, both within the U.S. Department of the Interior (Interior). The proposed project would occupy 156 acres of land administered by the Bureau of Land Management.

In a March 29, 2006, filing with the Commission, Interior, on behalf of the Bureau of Land Management and of Reclamation, submitted preliminary terms and conditions pursuant to section 4(e) of the FPA. Interior states that these conditions are preliminary and may be amended because the Commission has not issued its draft EIS; it reserves the right to amend these conditions based on new information and conclusions arising from the EPAct process. The conditions consist of specific environmental measures, summarized in tables 2-3 and 2-4, as well as administrative conditions that pertain to aspects of PacifiCorp's use of Bureau- or Reclamation-managed reservation lands. Because the administrative conditions are not environmental measures, we do not analyze them in this EIS.

Table 2-3. Environmental measures specified by the Bureau of Land Management pursuant to section 4(e) of the Federal Power Act and PacifiCorp's and others' corresponding alternative conditions pursuant to the Energy Policy Act of 2005. (Source: Letter from S. Thompson, Manager, California/Nevada Operations Office, Interior, to the Commission filed on March 29, 2006)

Bureau of Land Management Specified 4(e) Conditions	**Alternative Conditions**
Condition 1A: PacifiCorp should consult with the Bureau to identify and resolve potential conflicts with Bureau policy and direction prior to initiating activities on Bureau-administered land when such activities are beyond the scope of any new Commission license or that have not been already approved by the Bureau.	**Alternative Condition 1A**: PacifiCorp restricts consultation to proposed activities on Bureau reservation lands within the project boundary, and deletes the "beyond the scope of the license" phrase.
Condition 1C: PacifiCorp should obtain written approval from the Bureau prior to changing the location of any project feature or facility on Bureau-managed lands and for any actions that are inconsistent with authorizations for use or occupancy of Bureau-managed lands "according the new license". At least 90 days before any such change or departure, PacifiCorp should file a report with the Commission and the Bureau describing the change, the reasons, and documentation of Bureau approval.	**Alternative Condition 1C**: PacifiCorp adds a "reasonable discretion" phrase to its need to obtain written approval from the Bureau prior to changing the location of a project, and restricts the scope to Bureau reservation lands within the project boundary
Condition 1D: PacifiCorp should prepare site-specific plans for Bureau approval for PacifiCorp activities required that could affect Bureau-managed land or resources. Prior to implementing any action not analyzed on a site-specific basis, PacifiCorp would work with the Bureau to evaluate whether the action could affect Bureau-managed land or resources. The analysis should be sufficient to meet NEPA requirements and include the following site specific details: (1) a map showing the location of the proposed activity; (2) the land use allocation and management designation, including standards and guidelines for the area of the proposed activity; (3) alternative locations, designs, mitigations, and implementation and effectiveness monitoring necessary to meet standards and guidelines; and (4) data from surveys, biological evaluations, or consultation required by regulation, including, if appropriate, biological assessments of federally listed species, and assessments of Bureau-designated species of concern.	**Alternative Condition 1D**: PacifiCorp adds a "reasonable discretion" phrase to PacifiCorp's need to obtain written approval from the Bureau prior to changing the location of a project feature, and restricts the scope to Bureau reservation lands within the project boundary

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 1E: PacifiCorp should conduct necessary environmental analysis according to NEPA standards and sufficient for formal consultation for federally administered resources subject to regulation pursuant to the National Historic Preservation Act, Arch. Resources Protection Act, Native American Grave Protection Act, Clean Air Act, Clean Water Act, and ESA. Analysis documentation should be sufficient to comply with Bureau direction in the NEPA Handbook.	**Alternative Condition 1E**: PacifiCorp would eliminate this condition.
Condition 1F: PacifiCorp should develop and file with the Commission 60 days prior to ground disturbing activity on Bureau-managed land (such as construction near roads, trails, recreational area, and facilities) a safety during construction plan that addresses potential hazard areas and measures necessary to protect public safety.	**Alternative Condition 1F**: PacifiCorp eliminates the provision to develop a "safety during construction plan" prior to each ground-disturbing activity, but PacifiCorp commits to abide by Commission regulations that pertain to safe operation of hydro projects and project specific public safety plans. PacifiCorp also commits to notifying the Commission prior to proposed project modifications, and as requested by the Commission, would file design plans and specifications 60 days prior to initiating project modifications on Bureau reservation lands within the project boundary.
Condition 1G: PacifiCorp should perform daily inspections of its construction operations on Bureau-managed land and adjoining fee title property while construction is in progress and provide documentation of inspections to the Bureau. During inspections, PacifiCorp should evaluate fire plan compliance, public safety, and environmental protection, and act immediately to address any necessary corrections.	**Alternative Condition 1G**: PacifiCorp eliminates the provisions for daily construction inspections on adjoining fee title property, and would restrict the scope of this condition to Bureau reservation lands within the project boundary.
Condition 1H: PacifiCorp should prepare a spoils disposal plan in consultation with the Bureau, prior to initiating any ground disturbing activity on Bureau-managed land. The plan should address disposal and storage of waste soil or rock material generated by road maintenance, slope failures, and construction projects and include provisions for: (1) identifying and characterizing the nature of the spoils in accordance with applicable Bureau regulations; (2) identifying sites for disposal and storage of spoils to prevent contamination of water by leachate and surface water runoff; and (3) developing and implementing stabilization, slope reconfiguration, erosion control, reclamation, and rehabilitation measures.	**Alternative Condition 1H**: PacifiCorp restricts the scope of this condition to Bureau reservation lands within the project boundary and adds a “reasonable discretion" phrase to PacifiCorp’s need to obtain the Bureau’s approval of the spoil disposal plan prior to submittal to the Commission.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 1I: PacifiCorp should file a hazardous substances plan for oil and hazardous substance storage, spill prevention, and clean up with the Commission prior to planning, construction or maintenance that may affect Bureau-managed land. At least 90 days prior to filing the plan with the Commission, PacifiCorp would submit the plan to the Bureau for review and approval. The plan should outline procedures for reporting and responding to releases of hazardous substances and make provisions for maintaining emergency response and HAZMAT cleanup equipment sufficient to contain any spill from the project.	**Alternative Condition 1I**: PacifiCorp modifies to say that it would implement and maintain Spill Prevention Countermeasure Control plans at all project facilities in compliance with 40 CFR part 112. Plans would be made available to the Commission and the Bureau on request. Restricts scope of this condition to Bureau reservation lands within the project boundary.
Condition 1J: PacifiCorp should semi-annually provide the Bureau with information on the location of spill cleanup equipment on Bureau-managed land and the location, type, and quantity of oil and hazardous substances stored in the project area. PacifiCorp should inform the Bureau immediately as to the nature, time, date, location, and action taken for any spill affecting Bureau-managed land.	**Alternative Condition 1J**: PacifiCorp modifies by stating that it would maintain spill clean-up equipment on Bureau reservation lands within the project boundary in accordance with the required Spill Prevention Countermeasure Control plans. Submit a copy of its annual emergency and hazardous chemical inventory (Tier II form) to the appropriate state jurisdictional agencies in accordance with federal regulations on an annual basis. PacifiCorp agrees to notify the Bureau of any spills on Bureau reservation lands within the project boundary, pursuant to project-specific Spill Prevention Countermeasure Control plans.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 1M: PacifiCorp should restore Bureau lands to a condition satisfactory to the Bureau prior to any surrender of the project license or abandonment of project facilities. At least 1 year in advance of license surrender, facility abandonment, or "Project boundary change", PacifiCorp should file with the Commission a restoration or maintenance plan approved by the Bureau. The plan should identify any capital improvements that would be removed, restoration measures, maintenance of facilities abandoned but not removed, time frames, and costs. In addition, PacifiCorp should commission an audit to assist the Bureau in determining whether PacifiCorp has the financial ability to fund the decommissioning and restoration work specified in the plan. If the license is transferred, PacifiCorp should guarantee in a manner satisfactory to the Bureau that PacifiCorp or the transferee would provide for the costs of surrender and restoration. "Any license amendment that authorizes use of Bureau-administered lands shall be subject to such conditions the Bureau deems necessary to protect and utilize affected Bureau reservations."	**Alternative Condition 1M**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary and that the restoration of such lands would not be to a level that is greater than surrounding lands. PacifiCorp agrees to provide information to the Bureau that PacifiCorp has the ability to fund restoration work specified in the restoration plan, but not by an audit, if the information provided is sufficient to document PacifiCorp's financial ability to fund decommissioning. After receiving this information, PacifiCorp agrees that the Bureau could request an audit. Deletes the Bureau's provision that if the license is transferred, PacifiCorp should guarantee that the transferee or licensee would provide for the costs of surrender and restoration.
Condition 1O: PacifiCorp should within 1 year of license issuance, develop a standard operating procedures plan, in consultation with the Bureau, for emergencies to address procedures, environmental permits, and subsequent measures for any project-related effects to Bureau lands, including but not limited to, the emergency spillway and canal and slope failures. The plan should include implementation strategies for agency coordination, restoration actions, monitoring and evaluation, and potential mitigation measures.	**Alternative Condition 1O**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary; eliminates the required development of standard operating procedures that would specifically address emergency spillway and canal and slope failures; adds a "reasonable discretion" phrase to PacifiCorp's need to obtain Bureau approval of the plan to address emergencies.
Condition 2A: Licensee should consult with the Bureau between September 1 and November 31[sic] each year and prepare a report on the status implementing conditions of the license that could affect Bureau lands. The report should include monitoring results from the previous year regarding effectiveness of environmental measures, a review of non-routine maintenance, discussion of foreseeable changes in project facilities or operations, discussion of any needed revisions to plans associated with the license, and discussion of elements of current year maintenance plans, such as road maintenance.	**Alternative Condition 2A**: PacifiCorp limits the scope of the annual consultation with the Bureau to Bureau reservation lands within the project boundary.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 2D: Within 60-days of issuance of the report to the Bureau, PacifiCorp should file the record of consultation and any Bureau comments and recommendations with the Commission. The Bureau reserves the right, after notice, comment, and administrative review, to require changes to Project operation through revision of 4(e) conditions.	**Alternative Condition 2D**: PacifiCorp eliminates the Bureau's reservation of rights to change its 4(e) conditions after notice, comment, and administrative review.
Condition 3: Within 6 months of license issuance, PacifiCorp should file a project roads inventory analysis and roads management plan for project-related roads that cross Bureau-managed land. The purpose of the plan would be to facilitate coordination of transportation maintenance and management, continue to provide for public safety, minimize potential damage to big game winter range, manage transportation access consistent with Bureau management objectives, coordinate OHV management, minimize the spread of noxious weeds, restore hydrologic function in areas that have been affected by use of Bureau roads for project purposes, and continue to protect cultural resources. Additional details of the plan contents are also provided.	**Alternative Condition 3**: PacifiCorp modifies the Bureau's condition to conform to the content of its application and its Roadway Inventory and Analysis and Project Roadway Management Plan (2004). Limits the scope of this condition to Bureau reservation lands within the project boundary. PacifiCorp still calls for finalizing the plan in consultation with the Bureau prior to submitting the final plan to the Commission, but deletes provisions for Bureau modification of the plan after it has been filed with the Commission.
Condition 4A1(a)(b): PacifiCorp should discharge from J.C. Boyle dam an instantaneous minimum flow of 470 cfs or 40 percent of the combined inflow from Keno reach (gage #11509500) and Spencer Creek (gage #11510000), whichever is the greater of the two flows. When the proportional flow of 40 percent of inflow is greater than 470 cfs, the required proportional flows are the average of the previous 3 days of the combined daily flow.	**Alternative Condition 4A1(a)(b)-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4A1(a)(b)-2**: PacifiCorp's second alternative is its proposed minimum flow of 100 cfs from J.C. Boyle dam supplemented by an additional 100 cfs from the dam or powerhouse. **Alternative Condition 4A1(a)(b)-3**: Oregon Fish & Wildlife and Cal Fish & Game set the minimum base flow at 640 cfs, rather than 470 cfs.
Condition 4A1(c): At least once a year between February 1 and April 15, PacifiCorp should not divert water to the J.C. Boyle power canal when inflow to J.C. Boyle reservoir (including Spencer Creek) exceeds 3,300 cfs. Flow would be diverted to the J.C. Boyle bypassed reach for at least 7 full days.	**Alternative Condition 4A1(c)**: PacifiCorp's alternative is to eliminate this measure.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 4A2: PacifiCorp should, within 1 year of license issuance, not exceed an up ramp or down ramp rate of 2 inches per hour as measured at a new gage downstream of J.C. Boyle dam at RM 225, when conducting controlled flow events (e.g., scheduled maintenance and changes in minimum flow requirements), except during implementation of the seasonal high flow.	**Alternative Condition 4A2-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4A2-2**: PacifiCorp's second alternative is a down-ramp rate of 150 cfs per hour in the J.C. Boyle bypassed reach, applicable primarily to spills and planned maintenance. To the extent possible, flow changes would occur at night. **Alternative Condition 4A2-3**: Oregon Fish & Wildlife and Cal Fish & Game set a ramping rate of 1 inch per hour and a maximum daily ramping rate of 300 cfs.
Condition 4B1: PacifiCorp should, within 1 year of license issuance, operate J.C Boyle development to provide a streamflow of 1,500 cfs to 3,000 cfs a maximum of once a week, with a priority set for Saturday, Sunday, and then Friday. The minimum flow would be what is released from the bypassed reach, in accordance with 4A1 (item 195).	**Alternative Condition 4B-1**: PacifiCorp's alternative is to eliminate this measure. **Alternative Condition 4B1-2**: Oregon Fish & Wildlife and Cal Fish & Game set a minimum flow of 720 cfs and would eliminate peaking operations for even 1 day per week.
Condition 4B2: PacifiCorp should, within 1 year of license issuance, not exceed an up ramp or down ramp rate of 2 inches per hour as measured at the existing USGS gage downstream of J.C. Boyle powerhouse, when conducting controlled flow events (e.g., scheduled maintenance, power generation, and changes in minimum flow requirements), except during implementation of seasonal high flow.	**Alternative Condition 4B2-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4B2-2**: PacifiCorp's second alternative is to not exceed an up-ramp rate of 9 inches per hour, not exceed a down-ramp rate of 9 inches per hour for flows exceeding 1,000 cfs, and not exceed 4 inches per hour for flows less than 1,000 cfs. Daily peaking operation flow changes would not exceed 1,400 cfs. **Alternative Condition 4B2-3**: Oregon Fish & Wildlife and Cal Fish & Game set a ramping rate of 1 inch per hour and a maximum daily ramping rate of 300 cfs.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 4C1: PacifiCorp should, within 1 year of license issuance, continuously measure the stage of water at a minimum of four gage sites; below Keno dam (existing), Spencer Creek (existing), peaking reach (existing), and a new gage below all outlets from Boyle dam and above the springs at RM 225 at a location approved by the Bureau, using the most current USGS protocols. PacifiCorp should operate and maintain the gages if they are no longer served by the current operators.	**Alternative Condition 4C1-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4C1-2**: PacifiCorp's second alternative is essentially the same as the Bureau's.
Condition 4C2: PacifiCorp should, within 1 year of license issuance: (1) provide instantaneous 30-minute real time streamflow data in cfs via remote access that is readily available and accessible to the public; and (2) design and maintain a database, similar to the most current version of the USGS National Water Information System, for reporting on surface water. The Bureau should review and approve the database. Within 2 years of license issuance, PacifiCorp should begin submitting annual water year reports to the Bureau within 6 months of the end of each water year.	**Alternative Condition 4C2-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4C2-2**: PacifiCorp's second alternative is essentially the same as the Bureau's condition
Condition 4D1(a)(b): PacifiCorp should, within 1 year of license issuance, develop a river gravel management plan in consultation with the Bureau that is designed to increase channel complexity and availability of spawning habitat for resident and anadromous fish. The plan should include the following components: (1) a description of how channel complexity will be provided such that variation in channel depth, velocity, substrate, cover, and temperature at all flows is restored; (2) quantity of gravel to be added, such that the minimum amount to be added is 1,226 tons/year (20 percent of the maximum) and the maximum amount to be added is equal to the estimated average annual deficit of 6,134 tons/year; (3) timing of gravel to be added, based on estimates of ongoing reductions in sediment supply due to J.C. Boyle dam; (4) methods of gravel augmentation, including passive augmentation at a logistically convenient location, allowing high flows to distribute over time, placement of discrete quantities of gravels in locations, usually riffles, where they are expected to be the most benefit, based on hydrologic and biologic considerations, and modeling of reach characteristics to determine gravel augmentation; (5) objectives describing how the plan satisfies Bureau Management Plan direction; and (6) evaluation procedures. The program should be implemented over the term of the license, with implementation during years 1 through 3, monitoring and evaluation during years 1 through 7, and adaptation during years 7 through 9 (which would be used to modify the plan for the next 10 year gravel management cycle).	**Alternative Condition 4D1(a)(b)-1**: PacifiCorp's first alternative is to eliminate this measure. **Alternative Condition 4D1(a)(b)-2**: PacifiCorp's second alternative is to place about 100 to 200 cubic yards of spawnable gravel in the upper end of the J.C. Boyle bypassed reach, monitor the initial placement, and augment as necessary to maintain the effect of the initial placement.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 4D1(c): PacifiCorp should submit to the Bureau and the Commission, within 6 months of the end of each implementation and monitoring year, an annual report on the activities of the gravel management program during the previous year, including the quantities of gravel added, methods used, and monitoring data. PacifiCorp should consult with the Bureau regarding any proposed changes to implementation and monitoring, and implement the changes after Commission approval. PacifiCorp should submit to the Bureau and the Commission in the 7th year, a comprehensive monitoring report of the monitoring data from the previous 6 years and consult with the Bureau regarding any necessary changes to the gravel management plan, and implement any proposed changes after Commission approval.	**Alternative Condition 4D1(c)**: PacifiCorp's alternative is to eliminate this measure.
Condition 4E: PacifiCorp should, within 1 year of license issuance, develop an adaptive management plan in consultation with the Bureau that is designed to monitor how implementation of the "river corridor management condition" [this is the previous 9 measures] is effective in improving fish habitat quantity and quality for resident, migratory, and anadromous fish. Monitoring results and an evaluation of the results, should be reported annually to the Bureau, including PacifiCorp's conclusions on spawning, holding, feeding, juvenile rearing, riparian, and migratory habitat and the adequacy of flows for providing migration, rearing, and spawning habitat for native aquatic species, moving spawning gravel, achieving riparian habitat objectives, supporting power generation, and providing recreational opportunities.	**Alternative Condition 4E**: PacifiCorp's alternative is to eliminate this measure.
Condition 5A: PacifiCorp should, within 1 year of license issuance, complete a cultural resources inventory on 77.2 acres of unsurveyed Bureau-managed land within the APE. The surveys would be conducted using Bureau Class III protocols for cultural resources and in consultation with the Bureau and affected tribes. Newly identified sites would be documented using Bureau and SHPO standards, and assessed for National Register eligibility. Within 60 days of survey completion, PacifiCorp should submit a draft report for Bureau review that follows SHPO report guidelines. The final report should be submitted to the Commission, Bureau, affected tribes, and the SHPO. PacifiCorp should also develop a protocol, in consultation with the Bureau and affected tribes, for conducting cultural resource surveys on Bureau land prior to future project-related activities within the APE and for handling, cataloging, interring, or repatriating cultural resources exposed on Bureau-managed land by unanticipated project-related effects.	**Alternative Condition 5A**: PacifiCorp deletes the Bureau's reference to 77.2 acres of unsurveyed lands within the APE to be surveyed within 1 year of license issuance and replaces it with land within the project boundary, "to the extent such an inventory has not been completed prior to the issuance of the License." PacifiCorp also limits the scope of this condition to Bureau reservation lands within the project boundary. PacifiCorp also specifies that any newly discovered sites shall be incorporated into an amended HPMP, with appropriate protective measures.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 5B: PacifiCorp should amend the HPMP within 18 months of license issuance to include measures to monitor, stabilize, protect, restore, or mitigate for known damage to sites within the APE on Bureau-managed land including 18 specific known sites and any additional sites found during the additional survey work specified in measure 5A. Monitoring of sites should be conducted by a qualified archaeologist, and entail, at a minimum, visiting 20 percent of eligible sites each year, and a determination whether non-eligible sites should be re-evaluated for eligibility. An annual report documenting mitigations, new findings, and monitoring results should be submitted to the Bureau and affected tribes. An implementation should be included in the amended HPMP. Licensee should consult with the Bureau and affected tribes every 5 years to determine if the HPMP needs to be revised based on monitoring and other developments.	**Alternative Condition 5B**: PacifiCorp deletes the Bureau's reference to 18 specific known sites and limits the scope of this condition to Bureau reservation lands within the project boundary.
Condition 6A: PacifiCorp's recreation resource management plan should include: (1) descriptions of existing and potential recreational sites and trails on Bureau-managed lands affected by the project including Topsy Campground, Spring Island Boater Access, Klamath River Campground, dispersed day-use sites, and Stateline takeout; (2) a schedule for implementation, maintenance, capital improvements, and monitoring of Bureau recreational sites affected by the project; (3) identification of the entity responsible for costs of operating, maintaining, and monitoring the sites identified in (1), including J.C. Boyle bypassed reach boating and fishing access sites and associated access trails and scouting trails at major rapids, the estimated costs, and identification of the appropriate instrument for shared administration of these sites; (4) provisions for working with the Bureau to define standards for facility operation and maintenance, replacement, modification, or upgrade, and monitoring; (5) provisions to bring facilities up to Bureau standards for handicap accessibility, public health and cleanliness, safety, and security; (6) provisions for monitoring visitor use of Bureau-managed lands affected by the project at an interval no greater than 5 years, and trigger points for adaptive management; (7) provisions for developing a visitor-use report to the Bureau and the Commission; (8) provisions for annual review and modification of the plan; and (9) a visual resources management plan (see item 208).	**Alternative Condition 6A**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary and deletes any reference to describing and providing for O&M and additional development at Topsy Campground, Spring Island Boater access, the Stateline Takeout, the Klamath River Campground, dispersed day use sites, J.C. Boyle bypassed reach boating and fishing and access sites and associated access trails, and scouting trails at major Boyle peaking reach rapids.
Condition 6B, C: PacifiCorp should, within 1 year of license issuance, develop a recreation resources management plan in consultation with the Bureau. The Bureau reserves the right to require changes to the RRMP by filing modifications to the RRMP within 30 days of service. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Bureau.	**Alternative Condition 6B, C**: PacifiCorp eliminates condition 6C, which reserves the Bureau's right to require changes to the RRMP.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 6A: PacifiCorp should include in its recreation resource management plan a visual resource management plan that includes provisions and guidelines for managing visual resources on Bureau-managed lands from the headwaters of J.C. Boyle reservoir to Iron Gate reservoir. The plan should describe how design, maintenance, and construction of project facilities (i.e., bypass canal and other concrete structures, switch yards, powerhouses, buildings, penstocks, metal structures associated with powerlines, and project recreational facilities) would maintain or preserve visual resource values. Examples of types of enhancement are given.	**Alternative Condition 6A**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary, rather than lands from the headwaters of Boyle reservoir to Iron Gate reservoir, and restricts PacifiCorp's responsibilities for managing visual resources associated with roads to only those roads for which the licensee is solely or jointly responsible, as determined by the Commission.
Condition 7A, B, C, D, E: PacifiCorp should, within 1 year of license issuance, develop a vegetation resources management plan that includes provisions for managing noxious weeds, invasive plants, and threatened, endangered, and sensitive plants on Bureau-managed lands affected by the project. The plan should include provisions for surveying, documenting, and protecting threatened, endangered, and sensitive plants, and should specifically address maintenance of J.C. Boyle powerhouse, maintenance of transmission-line and road rights-of-way, and use of project roads. The noxious and invasive plant section of the plan should include: (1) protocols for conducting weed surveys; (2) timelines for a systematic survey of Bureau lands affected by the project; (3) protocols for producing GIS mapping (or equivalent) and digital database to store information on species occurrence, distribution, status, and timing of last survey, and share with the Bureau; and (4) proposed treatments, mitigations, and best management practices for managing weeds on Bureau-managed lands affected by the project. The threatened, endangered, and sensitive section of the plan should include: (1) protocols for surveying Bureau-managed lands affected by the project to determine or verify the distribution of threatened, endangered, and sensitive species; (2) protocols for documenting, protecting, and mitigating for effects on threatened, endangered, and sensitive species; and (3) protocols for surveying adjacent to project roads which cross seasonally wet meadows for occurrence of threatened, endangered, and sensitive species. The Bureau reserves the right to make changes to the vegetation management plan within 30 days of submittal of the plan to the Commission.	**Alternative Condition 7A, B, C, D, E**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary and along roads for which PacifiCorp has sole or joint responsibility (as determined by the Commission), deletes references to “invasive plants”, and modifies the plan content to include provisions for periodic follow-up noxious weed surveys, rather than the Bureau’s specified "timeline for systematic survey of land affected b the project." PacifiCorp also deletes the Bureau’s condition 7C, which reserves the Bureau's right to require changes to the vegetation management plan.

Bureau of Land Management Specified 4(e) Conditions	Alternative Conditions
Condition 8A, B, C, D: PacifiCorp should, within 2 years of license issuance, prepare a wildlife habitat management plan for Bureau-managed lands affected by project operation and maintenance, in consultation with the Bureau. The plan should include provisions for: (1) wildlife crossings and escape ramps for the J.C. Boyle canal and effectiveness monitoring; (2) western pond turtle habitat and effectiveness monitoring; and (3) threatened, endangered, sensitive, and special status species survey and monitoring, including survey protocols for long-term survey and monitoring of threatened, endangered, sensitive, and special status species and their habitat on Bureau lands within the project to assess effects and develop measures that address those effects, including identification of restoration, protection, and enhancement measures, and seasonal restrictions for active nest sites on Bureau lands for bald eagles, golden eagles, ospreys, peregrine falcons, and other raptors affected by project operations. The Bureau reserves the right to make changes to the wildlife habitat management plan within 30 days of submittal of the plan to the Commission.	**Alternative Condition 8A, B, C, D**: PacifiCorp limits the scope of this condition to Bureau reservation lands within the project boundary, and changes monitoring of wildlife crossings and escape ramps for the Boyle canal from "effectiveness" to "use" and adds the word "existing" to the escape ramp monitoring. Similarly, PacifiCorp modifies the western pond turtle effectiveness monitoring to "use monitoring." PacifiCorp also deletes the Bureau's condition 8C, which reserves the Bureau's right to require changes to the wildlife habitat management plan.

Table 2-4. Environmental measures specified by Reclamation pursuant to section 4(e) of the Federal Power Act and PacifiCorp's and others' corresponding alternative conditions, pursuant to the Energy Policy Act of 2005. (Source: Letter from S. Thompson, Manager, California/Nevada Operations Office, Interior, to the Commission filed on March 29, 2006)

U.S. Bureau of Reclamation Specified Conditions	Alternative Conditions
Condition 1A: PacifiCorp should continue to operate and maintain Link River dam in a manner consistent with the Klamath Reclamation Project Annual Project Operations Plans.	**Alternative Condition 1A**: PacifiCorp's alternative is to eliminate this condition.
Condition 1C: PacifiCorp should, at its own expense, maintain the approach channel to the A canal of the Klamath Reclamation Project to the satisfaction of Reclamation so far as may be necessary to carry a flow of not less than 1,200 cfs into the canal with the water of Upper Klamath Lake at elevation 4,137 feet (USBR vertical datum)	**Alternative Condition 1C**: PacifiCorp's alternative is to eliminate this condition.
Condition 1E: Nothing in the contract that Reclamation would develop with PacifiCorp, should curtail or be construed as curtailing the rights of the U.S. to Klamath water or to the lands along or under the margin of Upper Klamath Lake. No Klamath water should be used by PacifiCorp when it may be needed or required by the U.S. or any irrigation or drainage district, person, or	**Alternative Condition 1E**: PacifiCorp's alternative is to eliminate this condition.

U.S. Bureau of Reclamation Specified Conditions	Alternative Conditions
association obtaining water from the U.S. for use for domestic, municipal, and irrigation purposes on project land.	
Condition 1F: PacifiCorp should operate Keno dam so that the upstream water level would not be below the minimum normal objective of elevation 4,085.0 feet (USBR datum), at or near the location of the present Highway 66 bridge at Keno.	**Alternative Condition 1F**: PacifiCorp's alternative is to eliminate this condition.
Condition 1G: PacifiCorp should operate Keno dam to accommodate the discharge of 3,000 cfs from Lost River diversion channel and 600 cfs from Klamath Straits drain.	**Alternative Condition 1G**: PacifiCorp's alternative is to eliminate this condition.
Condition 2: PacifiCorp should, in consultation with Reclamation, develop operating criteria that provide for coordination of Link River and Iron Gate dam (or the most downstream dam of the project) operations to allow Reclamation to meet its responsibilities.	**Alternative Condition 2**: PacifiCorp's alternative is to eliminate this condition.
Condition 3: PacifiCorp should, in consultation with Reclamation, develop operating criteria that provide for coordination of Keno and Iron Gate dam (or the most downstream dam of the project) operations to allow Reclamation to meet its responsibilities.	**Alternative Condition 3**: PacifiCorp's alternative is to eliminate this condition.
Condition 4: PacifiCorp should provide Reclamation with area capacity curves for all project facilities and real time access to reservoir elevations and releases for project facilities.	**Alternative Condition 4**: PacifiCorp's alternative is to eliminate this condition.

Conditions that we consider administrative or legal in nature filed by the Bureau of Land Management include the following: 1B, obtain appropriate authorizations for use or access to Bureau-administered land; 1K, avoid disturbance of survey monuments, private property corners, and Bureau boundary markers and replace any that are disturbed; 1L, maintain project facilities to acceptable standards; 1N, indemnification of the U.S. for judgments against the U.S. arising from project operations; 1P, use of due diligence to protect land and property of the U.S.; 2B, provision of relevant documents prior to the annual meeting with the Bureau of Land Management; 2C, submit project safety and non-compliance reports to the Bureau of Land Management concurrent with submittal to the Commission; and 9, reservation of authority for the Commission to implement such conditions for protection and use of Bureau of Land Management reservations as may be provided by the Secretary of Interior.

Conditions that we consider administrative or legal in nature filed by Reclamation include the following: 1, requirement to enter into a new or amended contract with Reclamation for operation and maintenance of Link River and Keno dams; 1B, provide electric power for pumping Klamath River water for use on Klamath Irrigation Project land and for drainage of Klamath Irrigation Project land at rates no higher than the cost of service from the Klamath Hydroelectric Project; 1D, assume all liability for damages resulting from PacifiCorp operation of Link River dam; 5, prohibition of any operations or modifications to the project that could affect the Klamath Irrigation Project; 6, no claims against the U.S. arising from the effect of any changes in releases from Upper Klamath Lake or Keno Reservoir related to Klamath Irrigation Project operations or use of water from Upper Klamath, Lower Klamath, or Tule Lake National Wildlife refuges; and 7, reservation of authority for the Commission to implement such conditions for protection and use of Reclamation reservations as may be provided by the Secretary of Interior.

Alternative Section 4(e) Conditions from Others

Oregon Fish & Wildlife and Cal Fish & Game also filed alternative 4(e) conditions pursuant to the EPAct pertaining to flows in the J.C. Boyle bypassed and peaking reaches by letters dated April 26, 2006. Tables 2-3 and 2-4 show the alternative 4(e) conditions of PacifiCorp and the agencies. In addition, by letter dated April 27, 2006, Pacific Coast Federation of Fishermen's Associations and Institute for Fisheries Resources requested a trial-type hearing regarding issues of material fact pertaining to Reclamation's preliminary 4(e) conditions.

2.3.2 Staff Alternative

After evaluating PacifiCorp's Proposal and recommendations from resource agencies, tribes, and other interested parties, we compiled a set of environmental measures that we consider appropriate for addressing the resource issues raised in this proceeding, calling this the Staff Alternative. The Staff Alternative includes some measures included in PacifiCorp's Proposal as well as some of the section 18 and alternative section 18 fishway prescriptions, section 4(e) and alternative section 4(e) conditions, section 10(j) recommendations, section 10(a) recommendations, and measures developed by the staff. We note that the Staff Alternative does not include East Side and West Side developments or Keno dam.

The Staff Alternative incorporates PacifiCorp's proposed environmental measures (see section 2.2.3), modified as follows:

Water Resources

- #2P--modified to include development of a temperature management plan that would include: (1) a feasibility study to assess modifications of existing structures at Iron Gate dam to enable release of the maximum volume of cool, hypolimnetic water during

emergency circumstances; (2) an assessment of methods to increase the dissolved oxygen of waters that may be released on an emergency basis; and (3) development of protocols that would be implemented to trigger the release of hypolimnetic water by using existing, unmodified structures at Iron Gate development or, if determined to be feasible, modified structures, when conditions for downstream salmonid survival approach critical levels.

- #3P--modified to delay implementation of reservoir oxygen diffuser until potential adverse effects are evaluated as part of #4P, but implement turbine venting at Iron Gate development, as described in Mobley (2005), and monitor and evaluate the response of the downstream dissolved oxygen regime.

- #4P--modified to include development of a single, comprehensive water quality management plan for all project-affected waters, rather than three separate reservoir management plans, and expanded to include: (1) consideration of spillage of warm water at Iron Gate dam during late spring; (2) consideration of spillage at Copco No. 1, Copco No. 2, and Iron Gate dams during the summer to enhance dissolved oxygen released at Iron Gate development; (3) consideration of turbine venting at Copco No. 1 and No.2 powerhouses to increase dissolved oxygen in the epilimnion of Iron Gate reservoir and, potentially, downstream of Iron Gate development; (4) specification of water quality monitoring that would be used to evaluate the effectiveness of any implemented water quality management measures; (5) specification of long-term water quality monitoring programs (e.g., temperature and dissolved oxygen) that would enable adaptive management decisions to occur; and (6) provisions for periodically updating the water quality management plan.

Aquatic Resources

- #6P--modified to include consultation with NMFS, Interior, and Reclamation during development of the decommissioning plan to ensure that PacifiCorp's actions to safely secure the developments and restore the landscape in proximity to both developments would not forestall the future installation of a smolt collection facility at this site.

- #8P--modified to specify that the extra 100 cfs, or 200 cfs in total, would be released from J.C. Boyle dam.

- #12P--replaced by staff measures #10S and #11S.

- #15P--replaced by staff measure #1S.

- #16P--replaced by staff measure #7S.

- #19P--modified so that the period during which no flow would be diverted from Spring Creek would extend from June 1 to September 15.

- #20P--not included; need for upstream and downstream resident fish passage at Spring and Fall creek diversion dams is not established.

- #22P--replaced by staff measure #1S.

- #23P--modified to increase the level of Iron Gate Hatchery funding from 80 to 100 percent.

- #24P--modified to provide for marking 100 percent of Chinook and coho salmon released from Iron Gate Hatchery.

Terrestrial Resources

- #25P--expanded the vegetation management plan to include consultation with affected tribes regarding opportunities for re-establishment of plants of tribal significance in project-affected areas, and include in the upland vegetation management program measures to reduce fire fuels, such as controlled fires, to reduce the risk of wildfires and enhance wildlife habitat.
- #26P--modified to address deer winter range management in the vegetation management plan, rather than the wildlife resource management plan, because it would entail primarily vegetation management measures.

Recreational Resources

- #28P--modified the schedule for construction of a potable water supply and restroom facilities at the proposed J.C. Boyle Bluffs campground and day-use area to correspond with the initial construction phase at this site (rather than 20 years after license issuance).
- #29P--modified to exclude provisions for funding law enforcement agencies to patrol the project area as a condition of a new license.
- #31P--modified to address facility replacement, as needed, in the final Recreation Resources Management Plan.
- #32P--expanded the flow-related information available to the public on PacifiCorp's website and addressed in the Whitewater Boating and River-based Fishing Program component of PacifiCorp's Recreation Resources Management Plan to include real-time flow information at all telemetry-gaged project-reaches.
- #33P--modified to ensure acquisition of appropriate easements for the final alignment of the proposed J.C. Boyle loop trail that avoids environmentally sensitive areas and includes the final alignment in the project boundary. Exclude the proposed trail from the J.C. Boyle powerhouse to the Spring Island boater access site because it would not serve project purposes.
- #36P--expanded the proposed project boundary at the State-line Takeout Area to include the access road from Ager-Beswick Road to the existing site on PacifiCorp land.

Land Use and Aesthetic Resources

- #38P--included vegetative screening or repainting measures for the Fall Creek and Copco No. 2 powerhouses and the Copco No. 2 substation in the visual resources management plan component of the final Recreation Resources Management Plan.

Cultural Resources

- #40P--modified to specify revision and finalization of the project's HPMP for management of historic properties within the geographic area of historic property management for the project as determined by Commission staff and reflected in a new license.

The Staff Alternative also includes the following additional measures:

Geology and Soils

1S. Develop and implement a sediment and gravel resource management plan that includes mapping and evaluating gravel distribution in project reaches and the Klamath River from Iron Gate dam to the confluence of the Shasta River, determining specific amounts and locations for gravel augmentation based on the mapping; monitoring gravel and spawning use after placement; and supplementing gravel placement based on monitoring results.

2S. Develop and implement a plan to restore slope failures and the affected channel, including the slope below the emergency spillway and removal of sidecast material, along the J.C. Boyle bypassed reach. Retain the right bank slope that is within the existing project boundary in the project boundary of a new license to ensure Commission oversight of restoration and protection measures and to ensure continued stability of the intake canal and project access road.

3S. Develop protocols for contacting agencies that would be followed in the event of a water conveyance system failure. In addition, promptly notify resource agencies in the event of all unanticipated or emergency project-related situations that may result in harm to fish or wildlife to obtain guidance on appropriate remedial measures that should be implemented. Develop thresholds of harm that would trigger such notification, in consultation with the resource agencies, and provide the thresholds to the Commission as well as reports following each event that triggers agency notification, indicating the nature of the event, the actions taken in response to the event, and any follow-up monitoring to ensure that the response is effective.

4S. If a proposed project-related activity entails ground-disturbing activities, develop a site-specific erosion and sedimentation control plan to address erosion and dust control and measures that would be taken to restore such areas following the activity. If the activity would generate spoils, include measures to (1) characterize the spoils; (2) identify where the spoil would be disposed in an environmentally responsible manner; and (3) restore, stabilize, and monitor the spoil disposal site following its use. As appropriate, include this plan in the broader plan for the activity (e.g., the final plan for development of a specific recreational site, or in annual road maintenance plans developed pursuant to a road management plan).

Water Quantity and Quality

5S. Develop and implement a project operations management plan that includes provisions for installing gages to appropriately monitor the flow regime specified in a new license, coordinating operation of the Klamath Hydroelectric Project with the Klamath Irrigation Project, reporting project-related flows to appropriate entities, minimizing water level fluctuations at Iron Gate reservoir from March through July to protect breeding wildlife, and periodically updating the plan.

6S. Develop and implement a monitoring plan for *Microcystis aeruginosa* and its toxin in project reservoirs and immediately downstream of Iron Gate dam.

Aquatic Resources

7S. Release 70 cfs or inflow, whichever is less, to the Copco No. 2 bypassed reach.

8S. Initiate an assessment of restoration potential to project reaches using radio telemetry to determine the movements and spawning location of adult fall Chinook salmon released upstream of Iron Gate, Copco No. 1, and J.C. Boyle dams. Release and monitor 50 radio-tagged fish upstream of each dam in 3 consecutive years.

9S. Evaluate juvenile fall Chinook production in spawning and rearing areas used by fall Chinook (as determined by the radio telemetry studies) using screw traps located at the lower end of each reach or near the mouths of tributaries.

10S. Evaluate potential fish passage options at each reach where study results indicate that anadromous fish restoration may be feasible, and select the most promising and cost-effective reach for initial anadromous fish restoration efforts.

11S. Develop and implement an anadromous fish restoration plan for the selected reach, to include the design of any necessary fish passage facilities, habitat enhancement measures such as spawning gravel augmentation, and any operational changes that are needed to support restoration.

12S. Develop a fish passage resource management plan in consultation with resource agencies that includes designs for any fishways included in a new license, provisions for developing fishway operation and maintenance plans, provisions for evaluating and monitoring fish passage at the fishways, and provisions for modifying the fishways in response to evaluation and monitoring.

13S. Allow state and federal resource agency personnel access to project developments to inspect fishways and records to monitor compliance with license conditions.

14S. Develop and implement a decommissioning plan for East Side and West Side developments, that includes addressing public safety at the sites following decommissioning.

15S. Rehabilitate the Fall Creek rearing ponds, and fund 100 percent of the operation and maintenance costs to facilitate a shift to production of yearling fall Chinook salmon.

16S. Sponsor a fishery technical advisory committee that would provide input to guide project-related fish passage, hatchery, and anadromous fish restoration activities.

17S. Develop and implement a cooperative fish disease risk monitoring and management plan to control disease risk in the Klamath River, including measures to reduce infection rates between Iron Gate dam and the Shasta River.

18S. Develop and implement an aquatic resources monitoring and management plan that includes provisions for recommending project operations and facility modifications in response to monitoring results.

Terrestrial and Threatened and Endangered Resources

19S. Within 2 years of license issuance develop a bald eagle management plan for the project in consultation with FWS, the Bureau of Land Management, Cal Fish & Game, and Oregon Fish & Wildlife that includes provisions for (1) conducting annual aerial bald eagle surveys to document new nests and productivity of territories, (2) monitoring and protecting bald eagle nest sites, roost sites, and regular foraging areas from human disturbance within the project boundary, including seasonal restrictions for active nest sites, and (3) evaluating changes in prey base relationships. The bald eagle management plan should be prepared in

coordination with the wildlife habitat management plan, which includes provisions for monitoring transmission lines and retrofitting poles on lines where birds have died to improve avian protection.

Recreational Resources

20S. Coordinate with Oregon Department of Transportation regarding retaining the existing day-use area at Pioneer Park East (adjacent to the Highway 66 bridge across J.C. Boyle reservoir), and, if feasible, address this recreation site in the final Recreation Resources Management Plan.

21S. Acquire necessary easements to include the access road to the upper J.C. Boyle reservoir boating access site in the project boundary.

22S. Retain Topsy Campground in the project boundary, develop a potable water system for this facility, address this facility in the Operations and Maintenance Program of PacifiCorp's Recreation Resources Management Plan, and develop a Memorandum of Agreement with the Bureau of Land Management that defines PacifiCorp's and the Bureau's responsibilities at this site.

23S. Develop an off-highway vehicle management plan as a component of the final Recreation Resources Management.

24S. Conduct a feasibility study for enhancing communications between the J.C. Boyle powerhouse and the Stateline Take-out and, if feasible, develop a plan and cooperative agreement with appropriate entities to implement reasonable measures that may be identified in the feasibility study.

Land Use and Aesthetic Resources

25S. Consult with the Bureau of Land Management, Oregon Fish & Wildlife, and Cal Fish & Game in the finalization of the Recreation Resources Management Plan and Road Management Plan, as appropriate.

26S. Include the portion of Topsy Grade from Highway 66 to the intersection of the road that provides access to J.C. Boyle dam (designated 300000116 on PacifiCorp's road inventory map) in the project boundary because this road provides, or would provide, access for the public and PacifiCorp staff to Topsy Campground, the proposed Boyle Bluffs Campground and day-use area, proposed recreational areas along the J.C. Boyle bypassed reach, and all J.C. Boyle development features.

Cultural Resources

27S. Consult with state and federal law enforcement agencies and appropriate federal land management agencies in addition to the local law enforcement agencies, Oregon SHPO, California SHPO, and tribes specified in the revised Historic Properties Management Plan (HPMP) in the finalization of the plan and subsequent plan updates.

28S. Conduct archaeological identification surveys in Bureau of Land Management units L through P on the J.C. Boyle peaking reach within the limits of project capacity, and in Units B, D, F, and G on the inside of the J.C. Boyle bypassed reach at Big Bend consistent with the area of potential effects for the project as ultimately licensed, and treat any sites determined eligible or potentially eligible for the National Register in accordance with the provisions of the HPMP.

29S. Include the Oregon State Commission on Indian Services in notifications of discoveries of human remains in Oregon.

30S. Develop a plan for providing tribes with access to areas within the project boundary where plants of traditional cultural importance occur, and permit use of such plants for traditional practices.

31S. In the event that the Commission determines that Keno development is non-jurisdictional, consult with the Oregon SHPO, resource and land management agencies, and tribes regarding treatment of historic properties within the APE that we have established.

2.3.3 Staff Alternative with Mandatory Conditions

NMFS and Interior have made preliminary fishway prescriptions for the project (described in section 2.3.1.2, *Section 18 Fishway Prescriptions*) which, when finalized, the Commission may need to include in a new license for this project. Similarly, the Bureau of Land Management and Reclamation have specified preliminary 4(e) conditions (described in section 2.3.1.3, *Section 4(e) Federal Land Management Conditions*) which, when finalized, also 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 those developments in this alternative. PacifiCorp's proposed measures that we either accepted or modified for inclusion in the Staff Alternative that would be adjusted by mandatory conditions would include the following (see section 2.2.3 for the numerical designation and description of PacifiCorp's measures that would be adjusted):

- Measures 7P and 8P would be replaced by the Bureau of Land Management's condition 4A1(a)(b), which pertains to the minimum flow in the J.C. Boyle bypassed reach.
- Measure 9P would be replaced by the Bureau of Land Management's condition 4A2, which pertains to ramping rates in the J.C. Boyle bypassed reach.
- Measure 10P would be replaced by the Bureau of Land Management's condition 4B2, which pertains to ramping rates in the J.C. Boyle peaking reach. In addition, J.C. Boyle powerhouse would only be able to operate in a peaking mode 1 day per week.
- Measures 12P and 13P would be replaced by NMFS and Interior's fishway prescription for J.C. Boyle development.
- Measure 15P would be replaced by the Bureau of Land Management's conditions 4D1(a)(b)(c) and 4E, which pertain to gravel management in an adaptive manner.
- Measure 20P would remain as a license condition (we concluded the cost of upstream and downstream fish passage at Spring and Fall creeks was not worth the benefit), consistent with NMFS and Interior's fishway prescription for Fall Creek development.

Additional measures identified by staff based on our analysis that would be replaced by mandatory conditions include the following (see section 2.3.2 for the numerical designation and description of staff's additional measures):

- Measures 8S through 11S would be replaced by NMFS and Interior's fishway prescriptions.
- The portion of measure 1S that pertains to gravel augmentation in the J.C. Boyle bypassed reach would be replaced by the Bureau of Land Management's conditions 4D1(a)(b)(c) and 4E, which pertain to gravel management in an adaptive manner. The portion of measure 1 that pertains to gravel augmentation downstream of Iron Gate dam would remain.

2.3.4 Retirement of Copco No. 1 and Iron Gate Developments

We have identified for analysis a dam removal and development retirement alternative, consisting of the removal of Copco No. 1 and Iron Gate dams from the project. This alternative would 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. We also note that this alternative does not include East Side, West Side, and Keno developments. PacifiCorp's proposed measures that we either accepted or modified for inclusion in the Staff Alternative that would be adjusted under this two dam removal scenario would include the following (see section 2.2.3 for the numerical designation and description of PacifiCorp's measures that would be adjusted):

- Measure 2P would be eliminated.
- Measure 3P would be eliminated.
- Measure 4P would be modified to reflect primarily a water quality monitoring plan that would serve as a basis to verify the environmental response to the altered conditions and serve as a basis for potential remedial actions.
- Measure 10P would be modified to include a provision for year-round project down-ramping of 2 inches per hour as measured at the USGS gage downstream of the Iron Gate dam, with a maximum daily limit of 12 inches during the Chinook salmon spawning and incubation period.
- Measure 15P would be replaced with aspects of 1S that pertain to gravel augmentation at the J.C. Boyle bypassed reach.
- Measure 21P would be modified to provide for flows released from Copco No. 2 development that are consistent with Reclamation's Klamath Operations Plans and the BiOps issued by FWS and NMFS for the Klamath Irrigation Project.
- Measure 22P would be eliminated.
- Measure 23P would be eliminated.
- Measure 24P would be eliminated.
- Measure 26P would be modified to eliminate proposed wildlife enhancement measures at Copco reservoir.
- Measure 28P would be modified to eliminate proposed recreational facility enhancements at Copco and Iron Gate developments.
- Measure 31P would be modified to eliminate proposed improved maintenance provisions at recreational facilities at Copco and Iron Gate developments.

- Measure 32P would be modified to eliminate aspects of the interpretation and education program that pertain to Copco and Iron Gate developments.
- Measure 38P would be modified to eliminate aspects of proposed vegetative screening or painting at Iron Gate development.
- Measure 41P would be modified to replace proposed measures to protect historic buildings and structures, archaeological sites, and traditional cultural properties associated with Copco and Iron Gate developments, with measures that would be established during consultation with California SHPO and tribes in a decommissioning plan for both developments.

Additional measures identified by staff based on our analysis that would be replaced or modified under the two dam removal scenario would include the following (see section 2.3.2 for the numerical designation and description of staff's additional measures):

- Measure 1S would be modified to include only aspects of gravel augmentation that pertain to the J.C. Boyle bypassed reach.
- Measure 6S would be eliminated.
- Measures 8S through 11S would be replaced with NMFS and Interior's prescription for a fish ladder, intake screening with a fish bypass system, and spillway modifications at Copco No. 2 dam and the natural bedrock sill removal at the Copco No. 2 bypassed reach.
- Measure 15S would be eliminated.
- Measure 16S would be modified to have the fishery technical advisory committee address the disposition of the Iron Gate Hatchery once it is removed from the project.
- Measure 17S would be eliminated.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.4.1 Federal Government Takeover

We do not consider federal takeover to be a reasonable alternative. Federal takeover of the Klamath Hydroelectric Project would require Congressional approval. Although that fact alone would not preclude further consideration of this alternative, there currently is no evidence showing that a federal takeover should be recommended to Congress. No federal agency has suggested that federal takeover would be appropriate, and no federal agency has expressed an interest in operating the Klamath Hydroelectric Project.

2.4.2 Nonpower License

A nonpower license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. At this time, no government agency has suggested a willingness or ability to take over the project. No party has sought a nonpower license, and, at this time, we have no basis for concluding that the Klamath Hydroelectric Project should no longer be used to produce power. Thus, we do not consider a nonpower license a reasonable alternative.

2.4.3 Decommissioning of Project with Dams Remaining in Place

In its May 12, 2006, reply comments to agency preliminary terms and conditions, PacifiCorp stated that, in its view, the nature and extent of the Departments' preliminary conditions warrant an examination in the EIS of the alternative of project decommissioning without dam removal. PacifiCorp expressed concern that there is the potential that the costs associated with all the final terms, conditions, and prescriptions for the license may put in serious question its ability to accept a new license.

Decommissioning of the project would result in the loss of an annual average of 716,820 gigawatt-hours of energy, which would need to be replaced by an alternate source. Some or all of the various disabled project works could remain in place for historic or other purposes, but this would require the Commission to identify one or more government agencies with authority to assume regulatory control and supervision of the remaining facilities. No such agency has stepped forward. In addition, PacifiCorp would no longer require the project lands for project purposes, thus ownership of the lands could change. Depending on the subsequent landowner, public access to some parts of the project area and recreational opportunities may be eliminated. In addition, leaving the dams in place would not address the environmental issues that result from their presence, including their adverse effects on water quality and anadromous fish passage. We discuss these and other effects in detail in section 3, *Environmental Consequences*. For all these reasons, we do not consider this a reasonable alternative in this relicensing proceeding.

2.4.4 Retirement of Additional Developments

Numerous entities have recommended that we consider the removal of some or all of the mainstem dams, and various permutations of multiple dam removals. As stated in section 2.3., we have identified the removal of Copco No. 1 and Iron Gate dams as an alternative for further analysis in this document; based on our analysis of the benefits and costs. We considered the benefits and costs associated with the removal of additional developments, but were not able to identify other reasonable dam removal alternatives for analysis in this document. However, we discuss the effects of other dam removal scenarios in sections 3.3.1.2.6, *Development Decommissioning and Dam Removal*; 3.3.2.2.2, under *Dam Removal to Enhance Water* Quality; and 3.3.3.2.4, *Dam Removal or Decommissioning;* and we discuss the costs associated with removal of the project dams in section 4.4, *Conceptual Costs of Project Dam Removal*.