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## **EXECUTIVE SUMMARY**

### **ES.1 BACKGROUND**

PacifiCorp and Cowlitz PUD have prepared this Preliminary Draft Environmental Analysis (PDEA) to examine their proposed terms and conditions for relicensing four projects on the North Fork Lewis River (Lewis River) near Woodland, Washington. PacifiCorp is seeking new federal licenses for the continued operation of its Merwin (FERC No. 935), Yale (FERC No. 2071), and Swift No. 1 (FERC No. 2111) hydroelectric projects, and Cowlitz PUD is seeking a new federal license for its Swift No. 2 (FERC No. 2213) project.

This PDEA examines the potential impacts of the proposed relicensing terms and conditions for all four projects, evaluates two alternatives for licensing the projects, and identifies a preferred alternative. As required by NEPA, this PDEA also includes analysis of a “No Action” alternative and two alternatives that were considered and rejected as not accomplishing the purpose and need of the proposed action.

The purpose of the proposed action is to allow PacifiCorp and Cowlitz PUD to continue to generate cost-effective electricity from their existing hydroelectric projects on the Lewis River, to meet customer and regional energy needs, and to preserve the operational flexibility of the projects to enhance reliability and safety of the regional power grid, while mitigating the impacts of the projects on the environment and resources of the upper Lewis River. In addition, the projects provide needed flood management and recreational opportunities that help to satisfy the demand for these services. PacifiCorp and Cowlitz PUD have proposed a series of enhancements to mitigate the environmental effects of the projects.

While the environmental analysis evaluates all four Lewis River projects, PacifiCorp and Cowlitz PUD prepared separate financial analyses in Section 4 of the PDEA which reflect each company’s specific financial circumstances. Each applicant has included only its financial information in the PDEA submitted with its application(s).

### **ES.2 DESCRIPTION OF THE PROJECTS**

Swift No. 1 is the largest of the projects, consisting of an embankment dam which forms an 11.5-mile-long reservoir with a 4,600-acre surface area known as Swift Creek Reservoir. A concrete powerhouse with a generating capacity of 240,000 kW (kilowatts) sits just downstream of the dam and transmits to an adjacent substation. All flow from the Swift No. 1 powerhouse is released to the Swift No. 2 canal, which extends approximately three miles before terminating at the Swift No. 2 powerhouse.

Swift No. 2 consists of the canal previously mentioned, a powerhouse, switchyard, and tailrace which releases into Yale Lake. Swift No. 2 operates solely on flows released from the Swift No. 1 powerhouse to the Swift No. 2 canal. The powerhouse is capable of generating 70,000 kW which it transmits to an adjacent substation. The river channel

between Swift No. 1 and the Swift No. 2 tailrace is referred to as the Lewis River bypass reach.

Yale, the middle project in the Lewis River system, includes two embankment dams, a 10.5-mile-long reservoir with a 3,800-acre surface area known as Yale Lake, a powerhouse and an 11.5-mile-long transmission line that connects to the Merwin substation. The Yale Project can generate 134,000 kW. A secondary feature of the Yale Project is the Speelyai Canal which was constructed to carry diverted flows from Speelyai Creek to Yale Lake. Floods in 1996 altered the channel of Speelyai Creek such that all flow from the upper drainage enter the canal and Yale Lake.

The oldest and most downstream project in the basin is Merwin which consists of a concrete dam, 14.5-mile-long reservoir with 4,000-acre surface area known as Lake Merwin, a powerhouse located immediately downstream of the dam with an adjacent substation and two transmission lines. The Merwin powerhouse has a generating capacity of 136,000 kW, which is carried by two transmission lines to the Merwin substation. Merwin is operated to regulate downstream river flows, including a voluntary downramping rate of no more than two inches per hour.

PacifiCorp and Cowlitz PUD provide funding for three hatcheries in the project area, the Lewis River Hatchery, the Speelyai Hatchery and the Merwin Hatchery. These hatcheries produce spring Chinook, coho, and steelhead salmon, kokanee, and rainbow trout.

The Lewis River Projects are operated to provide flood management in addition to power generation. Under a 1983 contract with FEMA, PacifiCorp provides a minimum of 70,000 acre feet of flood storage between November 1 and April 1 of each year which allows most high-runoff events to be controlled to a release of 60,000 cfs or less.

### **ES.3 PROPOSED ACTION AND ALTERNATIVES**

#### **ES.3.1 No Action Alternative (Alternative A)**

As required by NEPA, this PDEA analyzes the No Action Alternative. Under FERC regulations, this alternative is a continuation of the existing licenses and license conditions which is the environmental baseline against which the other alternatives are compared. No new protection, mitigation or enhancement measures would be implemented but existing measures would continue.

As currently licensed, the Lewis River Projects limit all anadromous fish distribution to the Lewis River and tributaries below Merwin Dam. Stocks of spring Chinook, steelhead, and coho salmon are maintained by hatchery production. A trap at Merwin Dam is used to collect migrating adults which are used as hatchery broodstock. Kokanee and rainbow trout are also produced at hatcheries. Gill nets are used to collect bull trout in the Yale and Swift No. 2 tailraces for transport to Cougar Creek where bull trout spawning occurs. Aquatic habitat in the Lewis River bypass reach is limited due to low

flows, lack of large woody debris, and temperatures higher than those preferred by anadromous fish and bull trout.

PacifiCorp implements the Merwin Wildlife Habitat Management Plan on approximately 5,600 acres of its land around Lake Merwin. The plan focuses on managing key habitats, including forest and old-growth, oak groves, shrublands, meadows and wetlands. In addition, PacifiCorp voluntarily manages most land within the boundary of Swift No. 1 and Yale for the benefit of wildlife, harvesting timber only to improve wildlife habitat. Cowlitz PUD manages 284 acres of land it owns in the Swift Creek Reservoir drainage for natural succession.

PacifiCorp maintains public recreation facilities throughout the project area. In total, PacifiCorp operates four campgrounds and 14 day-use areas. Upgrades to some of these facilities are included in Alternative A as part of ongoing operations and maintenance. PacifiCorp provides funding for marine patrols and land-based law enforcement in the project area. Cowlitz PUD has no developed recreation facilities associated with its Swift No. 2 Project but bank fishing is allowed at Swift Canal and the canal has been used for an annual children's fishing day.

### ES.3.2 Proposed Action (Alternative B)

PacifiCorp and Cowlitz PUD have jointly proposed relicensing measures which are expected to be included as terms and conditions of new project licenses. Measures would be implemented within the first five years of new licenses being accepted and would be maintained throughout the license terms unless otherwise noted. The key measure proposed is a trap and haul program to introduce anadromous fish to the upper Lewis River basin. The proposed fish passage measures include a trap at Merwin Dam from where adult salmonids would be collected and trucked to a release point upstream of Swift Dam. The existing trap would be improved and a new sorting and truck loading facility would be constructed.

A floating surface collector would be installed at Swift Dam to trap juvenile downstream migrants which would be trucked to a release point below Merwin Dam. The juvenile collection system would operate from March 15 through October 15 when out-migrating salmon are present and would be removed during the high flow season of October 16 to March 1. Anadromous fish production at existing hatcheries would be reduced gradually over time as runs become established through the trap-and-haul program and less hatchery support is needed. Hatchery production of resident fish would continue throughout the term of the new licenses.

In addition, 50 cfs would be continuously released from the Swift No. 2 canal to the Lewis River bypass reach to increase habitat. Flood management would be enhanced by implementing new high runoff procedures and improving public notification of forecasted high flow events. Forecasted high-runoff events would trigger pre-releases from the projects at rates of up to 25,000 cfs, and up to 40,000 cfs when exceptionally high flows are predicted, to increase flood storage capacity. In addition, PacifiCorp and Cowlitz PUD would each develop water quality monitoring programs for their projects.

Extensive enhancements to recreational facilities would be provided, including formally including facilities currently operated on a voluntary basis, and improvements, renovations, and expansion of campgrounds and day use areas. Further campground expansion would occur in the future when monitoring demonstrates a sustained need. Day-use areas would be renovated and new facilities such as group picnic shelters and children play areas added in some locations. PacifiCorp also proposes to construct new trails and improve existing trail facilities. PacifiCorp would reduce impacts to sensitive riparian and shoreline areas by eliminating some undesirable dispersed use sites. Habitat connectivity would be improved by replacing culverts that are undersized or damaged. PacifiCorp has agreed to partially fund a new Visitors Information Center in Cougar which would curate and display archaeological artifacts from the project area.

### ES.3.3 Enhancement and Mitigation Measures (Alternative C)

Alternative C was developed by PacifiCorp and Cowlitz PUD to analyze measures requested by interested parties and stakeholders during the study and consultation process. Flood management, recreation, and cultural resource measures would be the same as Alternative B.

Alternative C introduces anadromous fish to all three reservoirs with trap-and-tram facilities constructed at each dam. Fish entering the traps would be sorted and transported via overhead trams similar to ski-lifts to a release point just upstream of each dam. Juveniles migrating downstream would be captured in floating surface collectors located just upstream of each dam and transported via pipelines to the water body directly below the dam. The floating collector at Swift Dam would operate from March 15 through October 15 and be removed or secured during peak runoff months. The other collectors could operate year round, except during extreme flood events.

Hatchery production of resident fish would cease while production of anadromous fish would increase using space created by eliminating kokanee and rainbow trout production.

A variable flow regime would be provided in the Lewis River bypass reach by installing a valve and pipe system from one of the penstocks serving Swift No. 1 to a release structure at the base of Swift Dam. Flows ranging from 50 to 400 cfs would be released continuously in average water years and from 50 to 200 cfs in low water years. These flows would reduce the power generation at Swift No. 1 and Swift No. 2. Pulsed releases from Merwin Dam of 5,000 cfs would be provided once a week for 12 hours from March 1 to June 30 to assist in juvenile outmigration. Downramping rates below Merwin Dam would remain two inches per hour from February through October and be increased to six inches per hour the remainder of the year.

In addition to the recreation and terrestrial measures proposed under Alternative B, Alternative C would include an Integrated Wildlife Habitat Management Program that would replace the existing Merwin Wildlife Habitat Management Plan and would cover all PacifiCorp lands.

## ES.4 EFFECTS OF ALTERNATIVES

The effects of each alternative on environmental resources are summarized in Table ES.4-1. A narrative summary of the comparative effects for each resource is provided following the table.

### ES.4.1 Geology and Soils

Alternative A would have minor adverse effects on geology and soil resources through the continued slow erosion of reservoir shorelines. Under Alternatives B and C, additional erosion could occur during construction of new facilities, resulting in minor adverse effects. Properly implemented erosion control measures should be effective at minimizing the amount of erosion and soil loss during construction of these new facilities. Additional planned recreation development and management measures could reduce erosion at some developed and undeveloped sites.

### ES.4.2 Water Quantity

There would be relatively minor changes to reservoir levels under each of the proposed alternatives. Alternatives B and C would provide greater flow in the Lewis River bypass reach than under Alternative A, and would beneficially affect water quantity, water quality, aquatic and terrestrial resources, aesthetics, and recreation. The increased flows under Alternative B would result in decreased generation at Swift No. 2. Increased flows under Alternative C would result in decreased generation at Swift No. 1 and Swift No. 2. Generation impacts under Alternative B are greater than Alternative A, but significantly less than under Alternative C.

There would be minimal changes to average daily flow releases in the Lewis River downstream of Merwin Dam under each of the alternatives, with minor differences in ramping rates and slightly different spring operations. Alternative B also establishes a critical flow level of 8,000 cfs to reduce stranding and improve fry emergence. Under Alternative C, pulsed flows to assist outmigrating smolts would provide beneficial effects to fisheries resources and have minor effects on generation.

Flood management effects under Alternative A are expected to be neutral, while effects associated with Alternatives B and C provide more benefits.

### ES.4.3 Water Quality

Alternatives B and C are not expected to result in measurable changes to water quality or water temperature in project reservoirs relative to currently licensed conditions. Introduction of anadromous fish and associated inputs of marine derived nutrients may positively influence the structure of reservoir phytoplankton populations.

**Table ES.4-1. Comparison of Alternatives A, B and C.**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
Geology & Soils	Slow erosion of shorelines resulting in loss of upland habitat and addition of sediment to reservoirs.	Ongoing effects are the same as Alternative A. Construction effects minimized by implementing erosion control plan.	Same as Alternative B.
Water Quantity	Lewis River bypass reach flows dependent on groundwater, tributaries and canal seepage. Spills cause scour in bypass reach.	Increasing flows in Lewis River bypass reach to 50 cfs has beneficial effects on water quantity, water quality, aquatic and terrestrial resources, aesthetics and recreation. Improved high runoff procedures moderately reduce 5- to 50-year flood events. Reduction in generation at Swift No. 1 and Swift No. 2 result from flows in the Lewis River bypass reach.	Variable flows in bypass reach between 100 to 400 cfs incrementally increases wetted area, beneficially affecting water quantity/quality, aquatic and terrestrial resources, aesthetics and recreation. Effects would be reduced in low water years with flows between 50 and 200 cfs. Improved high runoff procedures moderately reduce 5 to 50-year flood events. Pulsed flows below Merwin Dam provide beneficial effects for fisheries. Generation losses at Swift No. 1 and Swift No. 2 are greater than Alternative B.
Water Quality	Project-affected waters satisfy all state water quality standards except Total Dissolved Gas. Monitoring programs would be implemented at all four projects.	Project-affected waters satisfy all state water quality standards (TDG at the Yale tailrace would be addressed through turbine replacement and monitoring.) Reduced fluctuations in water temperature in the bypass reach. Introduction of anadromous adults to upper basin would provide marine-derived nutrients. Monitoring programs would be implemented at all four projects.	Project-affected waters satisfy all state water quality standards. Variable flows result in seasonal range of water temperatures in bypass reach which remain within state standards. Introduction of anadromous adults into the reservoirs would have similar effects as Alternative B. Other water quality effects expected to be negligible. Monitoring programs would be implemented at all four projects.
Aquatic Resources	Anadromous stocks maintained by hatchery production and limited to Lewis River and tributaries below Merwin Dam. Aquatic habitat in bypass reach is poor. No change in aquatic habitat below Merwin Dam. Voluntary two-inch-per-hour ramp rate. Upstream migrants taken to hatcheries or released back to river. Gill nets used to	Upstream migrants collected at Merwin and transported via truck to Swift Creek Reservoir, to access an estimated 117 miles of potential habitat which is 67% of available habitat upstream of Merwin Dam. Hatchery production reduced on a fish-for-fish basis as runs become established. No change in resident fish production. A minimum of 94% of fish collected at Merwin Dam are expected to survive transport to the upper basin. Juvenile survival around all projects is expected to range from 67 to 93%, depending on the efficiency of the surface collector.	Anadromous fish passage at all dams and reservoirs would provide access to 174 miles of potential habitat. However, total anadromous fish production is expected to be lower than Alternative B due to juvenile mortality in each reservoir. Coho presence in Yale Lake could significantly threaten bull trout if they were to spawn in Cougar Creek. Negative interactions with kokanee would also be likely. Variable flows in the Lewis River bypass reach would increase habitat but quality would still be poor. High water temperatures likely would limit production of



**Table ES.4-1. Comparison of Alternatives A, B and C (cont.).**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
	collect bull trout for transport to Cougar Creek. Periodic spill events in the Lewis River bypass reach dislodge colonizing riparian vegetation.	Increased spawning and rearing habitat for resident fish is provided in the Lewis River bypass reach, although habitat quality remains poor. Temperatures in the bypass reach would limit benefits to bull trout, but the creation of bull trout habitat in the bypass reach could be detrimental to the Yale Lake sub-population. Alternative methods for capturing adult bull trout with less adverse effect would be investigated. Spillway improvements at Yale Dam would benefit resident fish passing downstream. Flows below Merwin and downramping rates would be the same as Alternative A. A critical flow level of 8,000 cfs would be established to minimize fish stranding and enhance fry emergence. Generation losses at Swift No. 1 and Swift No. 2 would increase as a result of higher flows in the bypass reach.	anadromous fish and bull trout in this reach. Increased flows in the bypass reach could delay upstream migration and decrease survival. Flows below Merwin Dam would be the same as Alternative A with pulsed flows to assist juvenile outmigration. Ramping rates would increase to 6 inches per hour from November 1 to February 15. Generation losses at Swift No. 1 and Swift No. 2 would be higher than in Alternative B.
Botanical Resources	Ongoing management and protection would gradually increase old growth and mature conifer forest; maintain mixed-age forests around Lake Merwin; and decrease deciduous vegetation. Increased use of existing recreation facilities would increase disturbance to shoreline vegetation.	Introduction of marine derived nutrients from salmon carcasses above Swift Dam, additional recreation management and restrictions on shoreline dispersed camping would have beneficial effects on botanical resources. Within lands managed under the Merwin Wildlife Habitat Management Plan (MWHMP), riparian, shoreline and wetland habitat would be protected, managed, and enhanced. Periodic spills to the Lewis River bypass reach would scour colonizing riparian vegetation, disrupting the formation of new habitat.	Effects would be similar to Alternative B with additional benefits to vegetation from the development of an integrated wildlife management plan on PacifiCorp lands.
Wildlife Resources	Merwin Wildlife Habitat Management Plan would continue to focus on benefiting elk. An additional 300 acres are protected for conservation. Increased recreation pressures would result in increased disturbance to wildlife.	Introduction of anadromous fish to the upper basin would increase carrying capacity for many wildlife species. Expansion of recreation facilities would reduce wildlife habitat but closure and management of dispersed shoreline use sites would benefit wildlife. The MWHMP would remain in effect on the current land base.	Fish passage facilities would eliminate small areas of habitat. Availability of salmon carcasses would have beneficial effects similar to Alternative B. Integrated Wildlife Management Plan would improve wildlife habitat and variable flows in the bypass reach would widen the wetted channel from which some wildlife species would benefit.

**Table ES.4-1. Comparison of Alternatives A, B and C (cont.).**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
Cultural Resources	No new effects on archaeological sites, historical structures or traditional cultural properties.	Historical Properties Management Plans at Swift No. 1, Yale, and Merwin would reduce impacts on cultural resources. Establishment of native fish runs would help achieve an important tribal goal.	Same as Alternative B.
Recreation	Increased recreation use would result in increased ecological impact. Perceived crowding and displacement of local residents would be exacerbated.	Improvements and expansions to PacifiCorp's recreation facilities would alleviate some pressure and crowding and displacement. Approximately 25 acres would be affected by new facility construction. Trail improvements would be made as would ADA accessibility to developed sites.	Same as Alternative B.
Land Management and Use	No new land use effects.	Measures to enhance fish passage, and recreation would intensify current land uses. Expanded recreation facilities would draw more visitors and fish passage would increase truck hauling traffic.	Similar effect to Alternative B with more extensive construction impacts.
Aesthetic/Visual Resources	No new effects.	Fish collection facilities at Swift Dam would be visible to motorists. Fish passage facilities would be largely out of sight of recreation visitors.	Overhead tram facilities at Swift No. 1 and Swift No. 2 would be highly visible creating an adverse aesthetic effect.
Socioeconomics	No effect on utility rates or employment levels. Negative effects would result from increased recreation demand. Need for public services would increase while tax revenues would decrease due to decreased value of project facilities.	Utility rates would increase due to increased costs from enhancement measures. Some local employment opportunities would result from these measures. Increased recreation would have secondary benefits to the local economy. Need for public services would increase, supported by increased tax revenues from improved project facilities. Improved flood management and notification could reduce economic impact of high runoff on downstream property owners.	Utility rates could increase, reflecting the higher cost of PM&E measures and generation losses. Increased construction would provide short-term employment opportunities with a beneficial effect on the local economy. Improved flood management and notification could reduce economic impact of high runoff on downstream property owners.

#### ES.4.4 Aquatic Resources

Under Alternative A, project operations and fishery management in the Lewis River basin would remain unchanged from existing conditions and there would be no new effects on aquatic resources. The distribution of anadromous fish would be limited to the mainstem Lewis River and tributaries below Merwin Dam. Most upstream migrating anadromous fish would be collected at Merwin Dam and transported to the Lewis River Hatchery Complex or released back into the river for harvest by anglers. Smolts released from the hatcheries would prey on wild fall Chinook juveniles rearing in the lower river. In addition to predation concerns, hatchery fish would compete for food and space with native fish and returning adult hatchery fish may breed with wild fish, possibly reducing their genetic fitness.

The reasonably expected impacts to aquatic resources under Alternative B are significantly beneficial as compared with Alternative A and moderately better than Alternative C. Under Alternative B, upstream migrating anadromous fish arriving at Merwin Dam would be collected and transported to Swift Creek Reservoir, allowing access to an estimated 117 miles of potential habitat which represents about 67 percent of the available habitat upstream of Merwin Dam.

Hatchery production of anadromous species would be reduced on a fish-for-fish exchange (1:1 basis) as natural runs become established above Swift Dam. The existing Swift Creek Reservoir rainbow trout program and Lake Merwin kokanee program would continue at the same levels as in Alternative A, but likely would not significantly impact the introduced anadromous fish because the predominant rainbow trout strain (Goldendale Stock) is a fall spawner and will not interact with returning steelhead. Additionally, rainbow trout likely would remain in Swift Creek Reservoir and therefore not compete with rearing steelhead in the tributaries. Kokanee plants into Lake Merwin will not affect anadromous introduction into the Swift Creek Reservoir and above.

Although Alternative B only allows anadromous fish access to stream habitat above Swift Dam, it still produces (on average) as many or more fish than Alternative C; an alternative that allows fish access to all stream habitat within the Project area. This is because juvenile fish produced in Yale or Merwin would be subject to additional mortality as a result of passage through two additional hydro projects before leaving the Lewis River Project area.

Alternative B includes a continuous release of 50 cfs into the Lewis River bypass reach which would increase the amount of available spawning and rearing habitat for resident fish species (cutthroat trout, rainbow trout and mountain whitefish). This represents an improvement in habitat availability over existing conditions; however, overall aquatic habitat quality would continue to be poor in the reach. It is likely that benefits to bull trout would be minimal, as predicted fall water temperatures in the bypass reach (in excess of 9°C) may delay or abort bull trout spawning in the reach. Pratt (2003, published as AQU 20 in PacifiCorp and Cowlitz PUD 2004) determined that recovery of bull trout in Yale Lake was not dependant on the bypass reach and believed that any attempts to provide habitat there would result in a detriment to the small, critical

population residing in Yale Lake. Under Alternative B, flows below Merwin Dam would be similar to those in Alternative A; however, flood management operations would incorporate high flow pre-releases from Merwin, which might introduce minor differences in gravel transport below the dam. A downramping rate of 2 inches/hour and an 8,000 cfs critical flow level for streamflow below Merwin minimizes the potential for stranding and enhances fry emergence, thereby enhancing survival potential of resident and anadromous fish below the projects. The increased flows in the Lewis River bypass reach would have an effect on generation, thus reducing potential revenues available for enhancements.

PacifiCorp and Cowlitz PUD would continue to investigate alternative methods for capturing adult bull trout in an effort to minimize handling and transport effects. An improved spillway at Yale would provide greater protection for any resident fish that attempt to migrate downstream during the spill season.

Alternative C would also have some beneficial effects on aquatic resources in the Lewis River basin over Alternative A but with significantly greater cost to the Applicants. Anadromous fish would have access to Swift, Yale and Merwin reservoirs via a trap-and-tram passage system, representing 174 miles of potential habitat. Hatchery production would be increased 15 percent to support harvest and anadromous fish introduction; however, practices would be made consistent with ESA species management.

A 94 percent survival rate has been assumed for each adult trap-and-tram facility (totaling an 83 percent survival rate past all three dams). Juvenile survival would be 73 percent at Swift, 74 percent at Yale, and 78 percent at Merwin (assuming no delayed mortality from transport). The majority of adult production (75 percent) would result from tributaries located upstream from Swift Dam, 7 percent would result from tributaries to Lake Merwin, and 18 percent would result from tributaries to Yale Lake. Coho presence in Yale Lake represents a significant threat to bull trout if they were to spawn in Cougar Creek. According to EDT modeling, total spring Chinook, coho and steelhead production is expected to be lower under Alternative C in comparison to Alternative B. This primarily results from the location of stream habitat in the basin (76 percent is above Swift), and less fish survival through Project reservoirs and dams. There would likely be some negative interaction between kokanee and coho in Lake Merwin and Yale Lake because the two species would occupy similar feeding spaces in the reservoirs.

The variable flow regime in the 3.3-mile-long Lewis River bypass reach would provide more resident and anadromous rearing habitat than Alternative A. However, spawning and rearing habitat quality would remain poor, limited by a lack of gravel and large wood. Spring and fall water temperatures in the bypass reach would also be higher than those preferred by bull trout, spawning steelhead and coho, and would also approach the upper end of the preferred range for Chinook. As a result, it is likely that high water temperatures would limit the production of anadromous species and bull trout in this reach. Increased flows in the bypass would also have the potential to attract migrating anadromous fish that are bound for higher quality habitat located above Swift Dam. Such a delay in migration could decrease the survival of these upstream migrants.

Flows and their effects on the mainstem Lewis River below Merwin Dam would be the same as under the current FERC license; however, pulsed flow releases from Merwin included in Alternative C may both stimulate and increase juvenile migration rates in the lower river. PacifiCorp would implement a two-inch per hour down-ramping rate below Merwin Dam from February 16 through October 31, and a six-inch per hour rate from November 1 through February 15, providing less stranding protection than Alternatives A or B. Effects would be greatest on those juvenile salmonids over-wintering in the lower river (i.e., wild spring Chinook, coho, steelhead, and cutthroat trout). The increased flows in the Lewis River bypass reach, pulse flows, and ramping rates would have an effect on generation.

Overall, the measures under Alternative B provide more beneficial effects to aquatic resources than Alternatives A and C, and at significantly less cost to generation and reliability benefits than Alternative C.

#### ES.4.5 Botanical Resources

Both Alternatives B and C would benefit botanical resources more than Alternative A. Continued growth of unmanaged recreation, which would occur under Alternative A, represents a moderate threat to botanical resources by introducing more human disturbance in areas that are susceptible to erosion and invasion by noxious weeds. Alternative B has minor beneficial effects on botanical resources over baseline conditions, primarily through the introduction of anadromous fish above Swift Dam, additional management of recreation, and restrictions on dispersed shoreline camping. Alternative C has moderately beneficial effects on vegetation compared to baseline through (1) introduction of anadromous fish to all three project reservoirs, (2) implementation of the Integrated Wildlife Habitat Management Plan (IWHMP); (3) additional management of recreation; and (4) restrictions on shoreline dispersed camping.

#### ES.4.6 Wildlife Resources

Both Alternatives B and C would benefit wildlife resources more than Alternative A. Continued growth of unmanaged recreation, which would occur under Alternative A, represents a moderate threat to wildlife by reducing habitat structure, increasing disturbance, and creating more areas susceptible to habitat degradation from erosion and invasion by noxious weeds. Alternative B has minor beneficial effects on wildlife over baseline conditions primarily through the reintroduction of anadromous fish above Swift Dam, additional management of recreation, and restrictions on dispersed shoreline camping. The Merwin Wildlife Habitat Management Plan remains in effect on designated lands within the Merwin and Yale project areas. Alternative C has moderate to significant beneficial effects on wildlife compared to baseline through (1) introduction of anadromous fish to all three project reservoirs; (2) implementation of the IWHMP on PacifiCorp lands; (3) additional management of recreation; and (4) restrictions on dispersed shoreline camping.

#### ES.4.7 Cultural Resources

Alternatives B and C would enhance the production of native fish runs, a goal important to tribal stakeholders. National Register eligible historic districts would be least affected by Alternatives B and C, because PacifiCorp's Historic Properties Management Plan (HPMP) developed under these alternatives would provide greater protection to facilities than the existing conditions. Alternatives B and C would specifically include archaeological site protection in PacifiCorp's HPMP. Alternatives B and C also include partial funding for the construction of a curation and interpretation center for artifacts found in the project area, a facility designed specifically for this purpose. Both Alternatives B and C represent moderate beneficial improvements over Alternative A.

#### ES.4.8 Recreation

The reasonably expected impacts to recreational resources associated with ongoing actions under Alternative A are likely to be moderately adverse, while the impacts associated with Alternatives B and C are likely to be moderately beneficial. In the short term, the actions under Alternative A would likely have no immediate impact on recreation resources; however, in the long term, potential crowding, capacity, displacement, and terrestrial impacts would worsen.

Alternatives B and C would generally improve and enhance recreation opportunities in the project area through the term of the new licenses. Both alternatives would help reduce existing and future capacity and displacement concerns, although with slight impacts to terrestrial resources due to the increased area of disturbance. As a result of improved recreation facilities, these alternatives likely would require some expanded law enforcement and other emergency services, along with more operations and maintenance staff during the peak summer season. Swift Creek Reservoir recreational facilities would be retained in a less developed condition than the other reservoirs but some recreation facilities would be provided to partially meet anticipated needs during the license term. The proposed recreation measures under Alternatives B and C would have no impact on generation capacity of the projects. Overall, compared to the baseline (Alternative A), the improvements and enhancements under both Alternatives B and C would result in moderately beneficial impacts on recreation in the project area.

#### ES.4.9 Land Management and Use

Land uses would not be altered by the continuing measures under Alternative A nor would significant alterations occur under Alternatives B or C. Under Alternative A, development and visitor pressure are expected to have a moderate adverse impact on project lands over the terms of the new licenses because demand for the recreation facilities would exceed capacity and no new management controls would be implemented.

Expansion of PacifiCorp's recreation facilities under Alternatives B and C would reduce encroachment on adjacent federal, state, and private lands by meeting a portion of the expected demand for water-based recreation. This represents a moderate land

management improvement over existing conditions. Construction-related traffic temporarily would occur under Alternatives B and C.

#### ES.4.10 Aesthetic/Visual Resources

There are no specific aesthetic-related actions proposed under any of the alternatives. Fish passage facilities under Alternatives B and C would have an effect on the aesthetic/visual quality of the project area. The actions proposed under Alternative A would have no new aesthetic/visual impacts. New fish passage facilities proposed under Alternative B would have moderate impacts on aesthetic quality. Under Alternative C, the new fish trap-and-tram facilities would have a moderately high impact on the aesthetic/visual quality of the area, especially on the aesthetic/visual experience of motorists and bikers traveling along FR 90.

#### ES.4.11 Socioeconomics

Alternative A would not have the beneficial effects of new employment and added recreation visitors as shown in Alternatives B and C. Alternative A would adversely affect local service providers over the length of the licenses as gradually increasing needs for fire and emergency services for recreation visitors are not covered by the gradually decreasing revenues distributed by the state, due to the declining valuation of the projects.

Neither Alternatives B nor C have significant adverse effects on local social and economic conditions. Alternatives B and C both include measures to enhance the local economy by expanding recreation opportunities that would attract visitors and by constructing fish passage and recreation facilities that would provide additional construction and operations employment to the area. Local fire and emergency services would be supported through increased tax revenues related to project improvements. Alternative C would provide the most long-term employment of operations personnel at the three fish passage facilities.

### **ES.5 DEVELOPMENTAL ANALYSIS**

The developmental analysis in Section 4 provides the estimated cost of the environmental measures of the four Lewis River Projects and the net power benefits of PacifiCorp's three projects. As indicated previously, each company has presented its own net benefit analysis.

The total estimated capital costs of protection, mitigation and enhancement measures are \$2,352,500 under Alternative A, \$84,062,500 under Alternative B, and \$149,247,500 for Alternative C. Ongoing annual maintenance and operations costs for each alternative are \$2,830,000 for Alternative A, \$3,309,000 for Alternative B, and \$5,184,400 for Alternative C.

## **ES.6 COMPREHENSIVE DEVELOPMENT ANALYSIS**

Consistency with comprehensive plans is evaluated in the Comprehensive Development Analysis (Section 5). Of the 73 comprehensive plans on file with FERC for the state of Washington, ten were found to be relevant to the Lewis River Projects. The comprehensive development analysis concludes that both action alternatives are consistent with each of these applicable plans.