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2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes each of the alternatives analyzed in detail in this PDEA, and also summarizes the alternatives considered but eliminated from detailed study. The three alternatives analyzed in detail include the No Action Alternative (Alternative A), describing baseline conditions, and two action alternatives (Alternatives B and C) that present new or different protection, mitigation, and enhancement measures to address resource issues identified during project scoping. Alternative B presents the action alternative proposed by PacifiCorp in its applications for the Merwin, Yale, and Swift No. 1 projects, and by Cowlitz PUD in its application for the Swift No. 2 Project.

Protection, mitigation and enhancement measures included in the No Action alternative and the two action alternatives are described below and summarized in tables presented in this chapter. The effects of implementing each of these measures are analyzed in Section 3, cost estimates are presented in Section 4, and an analysis of the consistency of the alternatives with plans and laws is provided in Section 5.

2.1 DESCRIPTION OF GENERAL LOCALE

2.1.1 Lewis River Basin

The Lewis River basin is located on the western slopes of the Cascade Mountain Range. Two volcanic peaks, Mount Adams and the recently active Mount St. Helens, lie on the northern and eastern extremities of the basin. Foothills in the central portion of the watershed are generally steep and forested and extend up to approximately 3,000 feet mean sea level (msl). Downstream of Lake Merwin, the Lewis River enters a terrain of rolling hills that eventually transition to the essentially flat "Woodland Bottoms" near the river's confluence with the Columbia River. Forested areas are dominated by conifer, including Douglas-fir (*Pseudotsuga mensiezii*) and western hemlock (*Tsuga heterophylla*) forest types. Upland deciduous and mixed conifer-deciduous forests also occur in the watershed.

The Lewis River basin has the predominantly temperate marine climate typical of the Pacific Northwest. A narrow range of temperatures, dry summers, and mild but rainy winters are typical. Terrain influences the rainfall and temperature patterns, with lower elevations experiencing warmer temperatures and less rainfall and higher elevations receiving more rain, snow, and cooler temperatures.

Average annual precipitation near the mouth of the watershed is 37 inches, while average annual precipitation on Mount Adams exceeds 140 inches. Snowfall is minimal at lower elevations but greater than 200 inches/yr at elevations over 3,000 feet. In the warmest summer months, afternoon temperatures range from the middle 70s to the lower 80s, with nighttime temperatures in the 50s. Maximum temperatures exceed 90º F on 5 to 15 days each summer. Temperatures in the foothills and higher elevations are slightly lower than those recorded in the valleys.

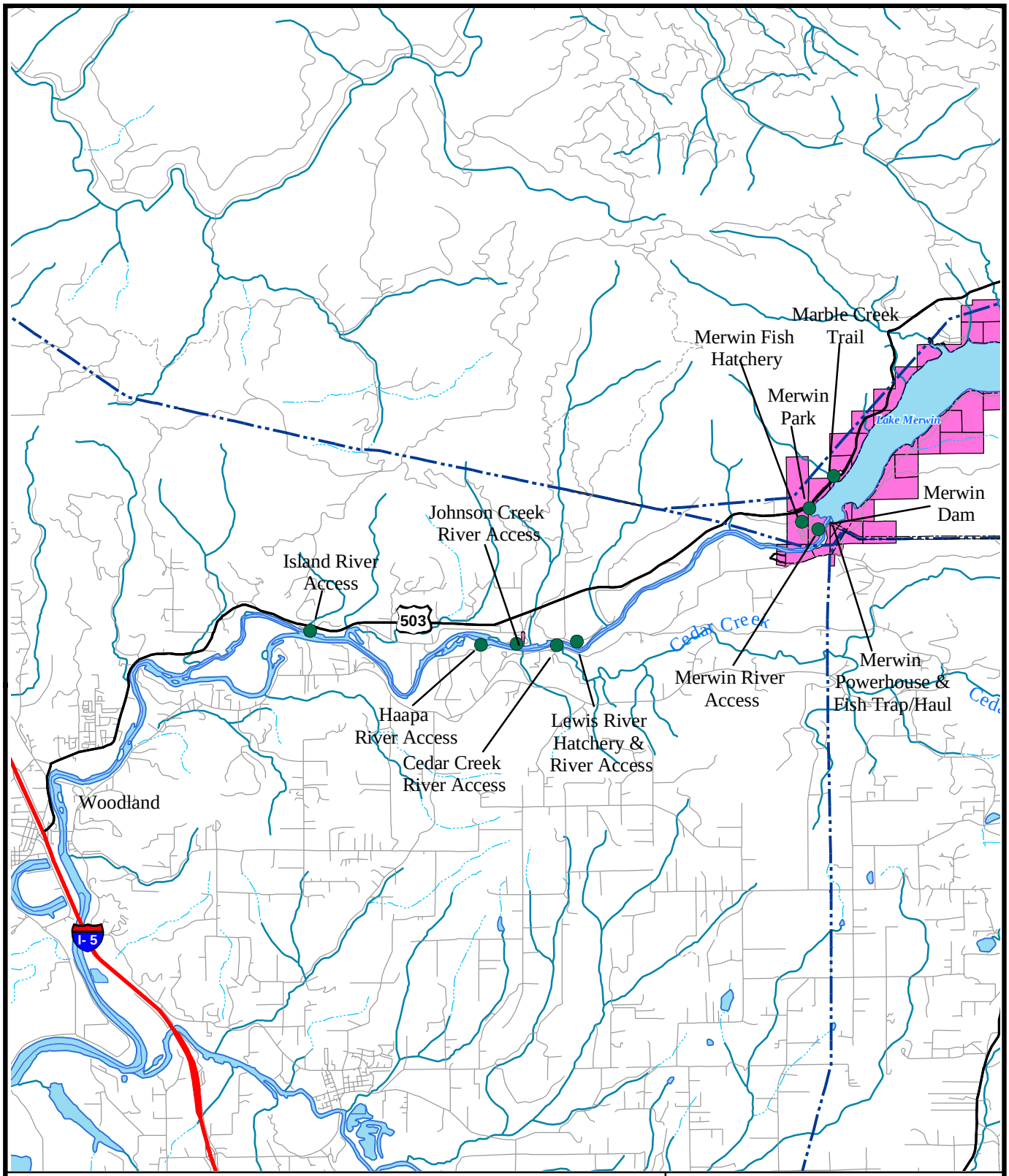
2.1.2 Project Area

The four Lewis River Projects are the dominant feature in the central portion of the Lewis River basin. Large reservoirs are formed by Swift, Yale and Merwin dams. Generally the surrounding area is rural and wooded, with forest lands dominating the landscape around Swift Creek Reservoir, transitioning to more mixed forestry and rural uses in the vicinity of Yale Lake and Lake Merwin. The nearest sizeable community is Woodland, located 10 miles downstream of Merwin Dam along the Interstate 5 corridor. A well-maintained state highway brings many visitors to the project area. State Route (SR) 503, also referred to as the Lewis River Road, parallels Lake Merwin and Yale Lake, then transitions to a Forest Service Road (FR) 90 at the Cowlitz-Skamania county line between Swift No. 1 and Swift No. 2. Visitor destinations include not only the popular project reservoirs, but this is one of the primary routes to the Mount St. Helens Volcanic Monument (Monument), a significant regional recreation destination. Monument lands abut project lands at Yale Lake. The USDA Forest Service (USFS) manages extensive portions of the upper basin, and the Washington Department of Natural Resources (WDNR) manages sizeable holdings in the central basin. PacifiCorp and Cowlitz PUD own and manage lands in the vicinity of the four projects while the lower basin is largely in private ownership. The entire basin is within the jurisdiction of three counties: Cowlitz, Clark and Skamania.

2.2 ALTERNATIVE A: NO ACTION ALTERNATIVE

Under Alternative A, the four projects would continue to operate as they do under their current licenses. This no action alternative is presented to establish the baseline environmental and economic conditions for comparison with the action alternatives. Baseline environmental conditions are described in Section 3, by resource, in sections titled “Affected Environment.” The existing facilities and their mode of operation are described below and depicted on Figure 2.2-1. No new environmental protection, mitigation, or enhancement measures would be implemented. Yale interim recreation measures and measures implemented under the terms of the existing FERC Licenses and Endangered Species Act (ESA) Biological Opinion and Incidental Take Statement would continue and are listed in Table 2.2-3.

Baseline conditions analyzed in this PDEA are those that have existed since the four Lewis River projects were completed or were last relicensed. In April 2002, a section of the Swift No. 2 canal embankment failed, damaging the powerhouse, switchyard, and tailrace. Because Cowlitz PUD is actively pursuing reconstruction of Swift No. 2 and intends to complete this process prior to the expiration of its existing FERC license in 2006, the alternatives described in Chapter 2 and analyzed in Chapter 3 are based on environmental and operational conditions authorized under the existing licenses. Such conditions are characteristic of those prior to April 2002 and of conditions reasonably expected to exist at the time of relicensing. The measures included in each alternative scenario, therefore, assume that Swift No. 2 will be operating in a manner and configuration similar to that which pre-existed the 2002 incident.



PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative A

FERC No. 935, 2071, 2111, 2213

Sheet 1 of 4

Figure 2.2-1

0 1 2 Miles

0 1 2 Kilometers

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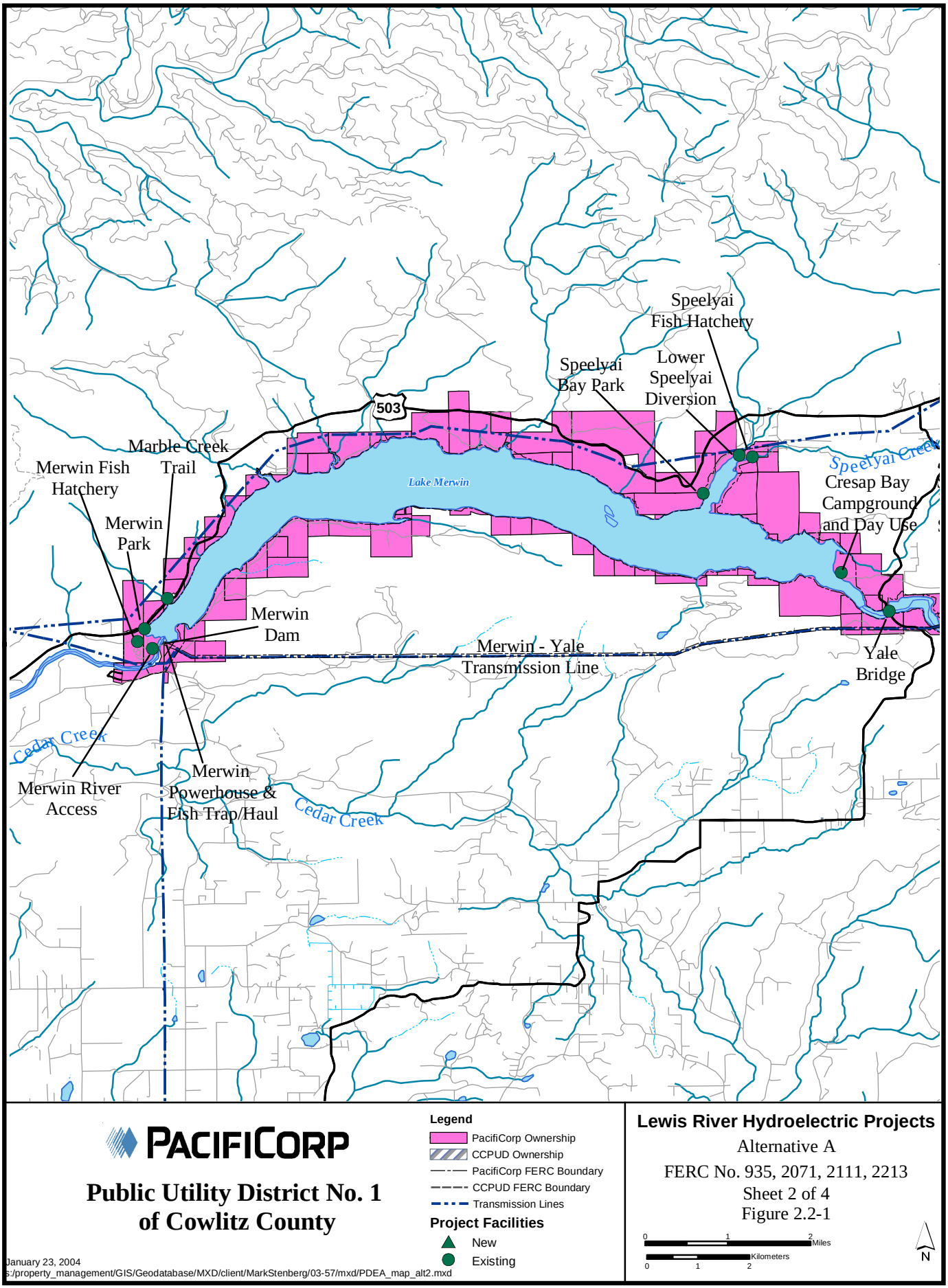

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative A

FERC No. 935, 2071, 2111, 2213

Sheet 2 of 4

Figure 2.2-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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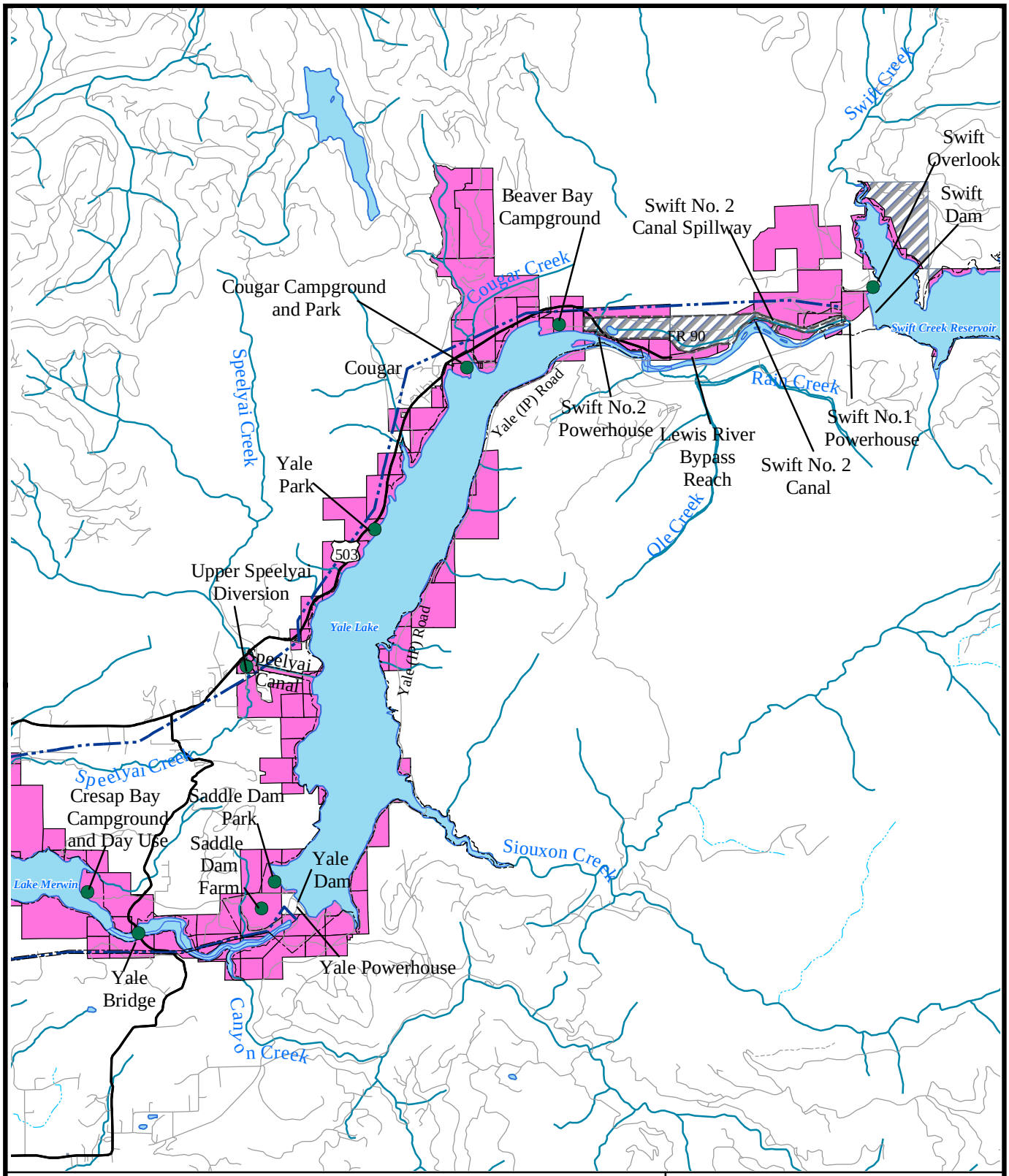

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative A

FERC No. 935, 2071, 2111, 2213

Sheet 3 of 4

Figure 2.2-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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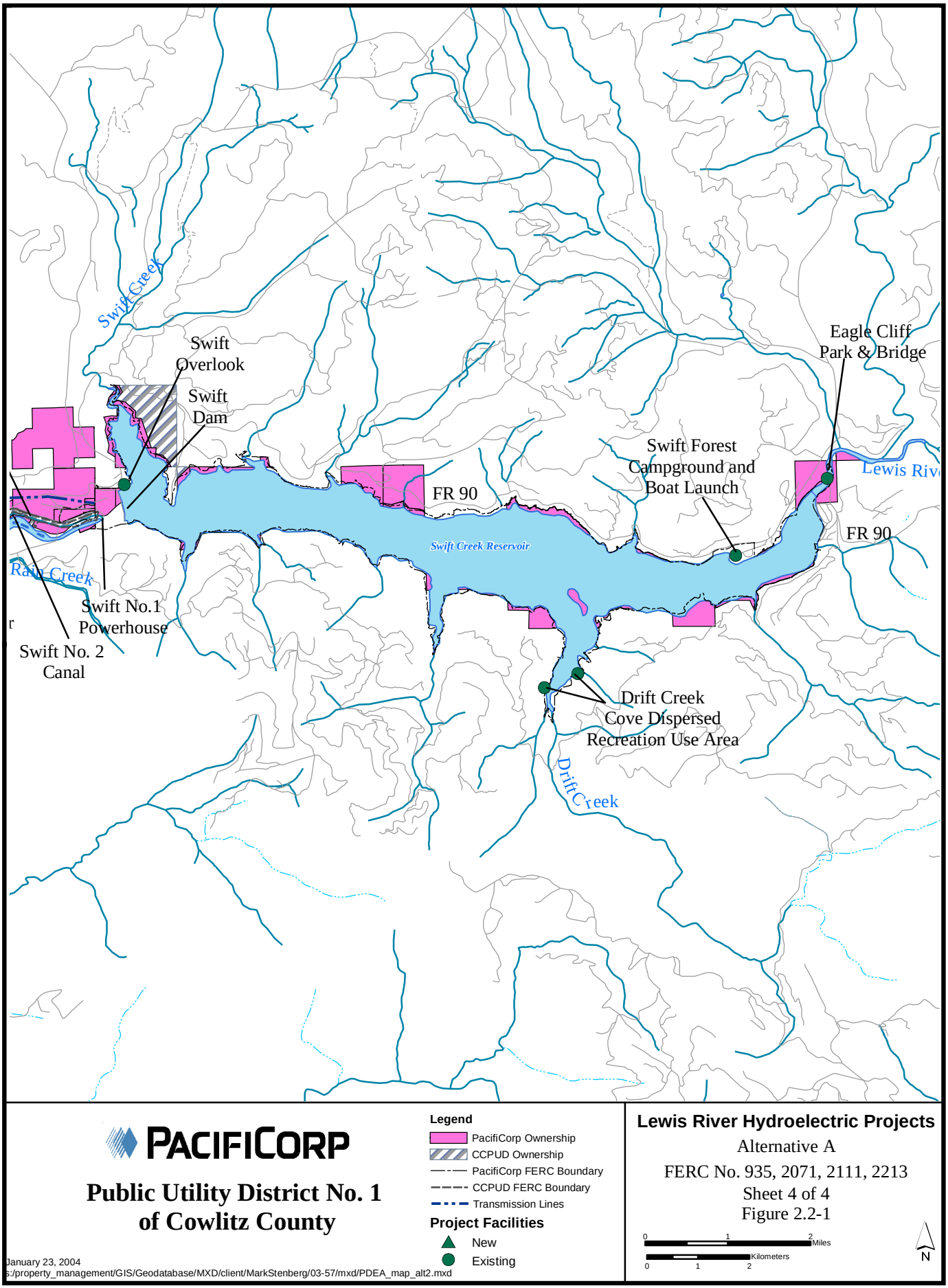

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative A

FERC No. 935, 2071, 2111, 2213

Sheet 4 of 4

Figure 2.2-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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2.2.1 Existing Facilities, Operations and Environmental Measures

2.2.1.1 Swift No. 1

Swift No. 1 is the upper-most and largest project in the Lewis River system. Swift Dam is a 512-foot-high, 2,100-foot-long embankment structure that forms an 11.5-mile-long reservoir. At full pool, Swift Creek Reservoir has a 4,600-acre surface area and an elevation of 1000 feet mean sea level (msl). A deep-water intake directs flow to a surge tank, through three penstocks with a total capacity of 9,120 cubic feet per second (cfs), to turbines within a concrete powerhouse downstream of the dam. The generating capacity is 240,000 kW, which is transmitted to a substation next to the Swift No. 1 powerhouse. All flow from the Swift No. 1 powerhouse enters Swift No. 2 canal, which terminates approximately three miles downstream at the Swift No. 2 powerhouse (Figure 2.2-1).

Swift No. 1 typically operates as a flexible resource, generating from 6:00 a.m. to 10:00 p.m., and not generating the remainder of the night. Swift Creek Reservoir has a total storage capacity of 755,500 acre-feet and a useable storage capacity of 447,000 acre feet. Useable storage is regulated for power generation, recreation, and flood management. As the uppermost impoundment in the Lewis River basin, Swift Creek Reservoir is affected significantly by natural inflow. Winter and spring elevations reflect this variability, with median levels ranging from about 970 to 991 feet msl. Summer elevations are more constant, with a median monthly level of about 997 feet. Flows released into the Swift No. 2 canal vary from 0 to approximately 9,000 cfs. Average monthly flows in the canal from October through May are close to 4,000 cfs, while average monthly flows in the canal from June through September are under 2,000 cfs. When inflow to the reservoir exceeds the capacity of Swift No. 1, water flows over the Swift Dam spillway directly into the Lewis River bypass reach, an event that occurs for short periods (typically about three days). Spill events occur sporadically, but generally spill of several thousand cfs or more occurs every few years. In addition, on an infrequent basis, outflow from the Swift No. 1 powerhouse exceeds Swift No. 2 capacity and flows over the Swift No. 2 canal spillway and into the Lewis River bypass reach.

2.2.1.2 Swift No. 2

Swift No. 2 is located between Swift No. 1 and Yale Lake. It consists of a canal, powerhouse, substation, and tailrace and operates with flows released from the Swift No. 1 powerhouse into the 3-mile-long Swift No. 2 canal. As reconstructed, the upstream section will be earthen and the downstream section will be concrete. Flows in excess of the canal capacity pass over an ungated spillway, through a spillway channel to the North Fork Lewis River (a reach referred to in this document as the Lewis River bypass reach) upstream of Yale Lake (Figure 2.2-1). Two penstocks deliver water to the metal-sheathed powerhouse containing two turbines that generate 70,000 kW. Cowlitz PUD owns 0.9 miles (between the Skamania-Cowlitz County line and Swift No. 2) of a transmission between Swift No. 1 and Swift No. 2.

Operation of Swift No. 2 is dependant upon water releases from Swift No. 1 to the Swift No. 2 canal; therefore, the two facilities operate in tandem. Canal operating levels range from a maximum of 604 feet mean sea level (msl) to a minimum of 601 feet msl. Releases from the Swift No. 2 powerhouse enter Yale Lake, while flows in excess of the powerhouse capacity are released through an overflow spillway into the Lewis River bypass reach. Between elevation 490 (full pool) and about elevation 478 feet, Yale Lake encroaches on (backs up into) the Swift No. 2 tailrace, creating a very large path for the Swift No. 2 outflow. Below about elevation 478 feet, the tailrace channel is exposed and all flows are carried within the limits of the channel. The Swift No. 2 Project provides peaking capacity and has no flood management capability, function, or responsibility.

2.2.1.3 Yale

Yale, the middle project in the Lewis River system, includes two zoned embankment dams, a 10.5-mile-long reservoir with a surface area of 3,800 acres at full pool, a two-unit powerhouse, and 11.5-mile-long transmission line (Figure 2.2-1). Yale Dam is 323 feet high and 1,500 feet long. It includes five taintor gates that control releases to a chute-type spillway. Located 0.25 miles north of the main dam, Saddle Dam is 40 feet high and 1,600 feet long. Two tunnels/penstocks with a total capacity of 9,640 cfs direct flow to a concrete powerhouse at the base of Yale Dam. It contains two turbine generators with a nameplate capacity of 134,000 kW. Power is transmitted 11.5 miles over a 115 kV line to a substation adjacent to the Merwin Project. A secondary project feature is the Speelyai Canal, a 3,200-foot-long earthen-banked canal that was excavated to direct flow from upper Speelyai Creek into Yale Lake. A diversion structure at RM 4.3 directs all flow into the canal. The diversion has been non-functional since 1996 when floods altered the Speelyai Creek channel. The new channel bypasses the diversion and directs all flow into the canal.

The Yale Project typically operates as a flexible resource, generating from 6:00 a.m. to 10 p.m., and is off-line (not generating) the remainder of the night. Median monthly releases range from a peak of 6,500 cfs in December to low of 1,300 cfs in August, with releases dropping to zero when off-line. Water levels are maintained between 480 and 490 feet msl in summer for recreation uses, averaging 487 feet msl. Winter/spring elevations are relatively stable, with median monthly values averaging 475 feet msl. Primary inflow to the reservoir is from the Swift No. 2 Project, with additional flow contributions from Cougar Creek, Rain and Ole creeks, Siouxon Creek, and Speelyai Canal.

2.2.1.4 Merwin

The oldest and most downstream project in the basin is the Merwin facility. Its 314-foot-high concrete arch dam extends 1,300 feet across the Lewis River. Deepwater inlets lead to three short penstocks with a total capacity of 11,470 cfs, discharging to the powerhouse immediately downstream of the dam. The plant has a nameplate capacity of 136,000 kW, carried by two 115 kV transmission lines to the Merwin substation. Flows in excess of powerhouse capacity are controlled by five taintor gates situated above the 206-foot-long spillway. The project impounds the 14.5-mile-long Lake Merwin, with a

surface area of about 4,000 acres at full pool. Merwin's 263,700 acre-feet of useable storage is managed for the purposes of power generation, flood management, recreation, and downstream fish habitat enhancement.

As the downstream-most facility, Merwin operates as a regulation facility for the other Lewis River Projects, providing minimum instream flows and meeting ramping rates for the lower river. The reservoir is maintained at a fairly constant level throughout the year, fluctuating between elevations 235 feet (normal minimum summer pool) and 239.6 feet (full pool). Due to its large size, Lake Merwin experiences only minimal hourly fluctuations in response to peaking operations at the Yale Project. The pattern of releases from the Merwin Project varies seasonally, with median monthly values ranging from 1,300 cfs in August to 8,000 cfs in December. During periods of high runoff, the Merwin facility spills water in volumes ranging from a few thousand cubic feet per second in moderate high runoff events to as much as 80,000 cfs or more during severe floods. Flood management operations are described in Section 2.2.1.6.

2.2.1.5 Lewis River Hatchery Complex

Three fish hatcheries are associated with the Lewis River Projects. Operational since 1932, the Lewis River Hatchery is the oldest, built in conjunction with the Merwin Project. Its construction and all operation costs are funded by PacifiCorp, although the facility is owned and operated by the Washington Department of Fish and Wildlife (WDFW). The Lewis River Hatchery currently has twelve concrete raceways, three 0.5-acre ponds, and one 0.5-acre juvenile rearing/adult holding pond located off-station (NPPC 1990; WDFW 2000a). There are 410,000 cubic feet of rearing space with a total water flow of approximately 65 cfs. The facility has an eyeing capacity of 13 million eggs and a hatching capacity of 7.7 million fry. Nine pumps deliver water from the Lewis River to supply all the water needs. Currently, the Lewis River Hatchery is used for adult collection, incubation, and rearing of spring Chinook, early coho (Type S), and late coho (Type N) salmon.

The Speelyai Hatchery began operation in 1954 near the confluence of Speelyai Creek and Lake Merwin. PacifiCorp owns the property upon which the hatchery was constructed; Cowlitz PUD and PacifiCorp jointly funded its construction and jointly own the facility; and PacifiCorp has fully funded subsequent capital improvements. Hatchery operations are a joint responsibility, with Cowlitz PUD providing approximately 20 percent of the annual funding and PacifiCorp providing 80 percent. WDFW operates the facility to produce spring Chinook and coho salmon and kokanee. Today, the primary rearing structures at Speelyai Hatchery include a hatchery building that houses vertical incubators and deep troughs for bulk eyeing. The eyeing capacity is 6 million eggs. Outside rearing space consists of raceways and two 0.25-acre rearing ponds. Approximately 20.5 cfs can be delivered to the hatchery system by gravity flow from Speelyai Creek. The Speelyai Hatchery water diversion, located at the mouth of Speelyai Creek, is a total barrier to upstream fish migration from Lake Merwin. Currently, Speelyai Hatchery is used for adult holding, spawning, incubation, and rearing of spring Chinook, coho, and kokanee (TetraTech/KCM, Inc. 2002).

Operational since 1993, the Merwin Trout and Steelhead Hatchery, owned by PacifiCorp just downstream of Merwin Dam, is operated by WDFW. Operations are fully funded by PacifiCorp for the production of rainbow trout, steelhead, and cutthroat trout. The facility includes four adult holding ponds, 10 concrete fingerling raceways, six intermediate raceways, four rearing ponds, and incubation facilities. Approximate rearing space is 216,470 cubic feet. Water is supplied to the hatchery from Lake Merwin using an 11 cfs pump station on the face of the dam. Two intakes are used at depths of 15 and 110 feet (Montgomery Watson 1997). Ozone water sterilization is used to meet fish health needs. In addition to treating incoming water, all water exiting the adult holding ponds and incubation building is disinfected prior to discharge into the pollution abatement ponds. The original goal of the Merwin Trout Hatchery program was to provide winter and summer steelhead, sea-run cutthroat trout, and rainbow trout for harvest by sport anglers (Montgomery Watson 1997). Because of a low return to the creel in 1997 and 1998, as well as concerns over potential interactions (predation and competition) with wild cutthroat and fall Chinook salmon, the sea-run cutthroat trout program at the Merwin Trout Hatchery was discontinued in 1999 (Hillson and Tipping 2000). The hatchery is used for adult collection, incubation, and rearing of winter steelhead and summer steelhead.

The overall goal of PacifiCorp's anadromous fish program at the Lewis River Hatchery Complex is to produce 3,125,000 smolts to target pre-harvest returns of 12,800 adult spring Chinook, 71,000 adult coho, 1,250 adult winter steelhead, and 8,000 adult summer steelhead.

2.2.1.6 Flood Management Operations

The three-reservoir, four project system is currently operated to optimize power production. Merwin, Yale, and Swift No. 1 are also operated to meet FERC and Federal Emergency Management Agency (FEMA) requirements for flood management and FERC minimum instream flows downstream of Merwin Dam. In addition, PacifiCorp voluntarily maintains reservoir water levels during the recreation season.

Prior to a major flood in 1962, the projects provided incidental flood management (secondary to power generation operations), but significant damage downstream prompted revisions to the operating procedures. Currently, flood management operations are carried out in accordance with procedures formalized under a 1983 contract between PacifiCorp and FEMA, the terms of which are conditions of the existing Merwin, Yale and Swift No. 1 FERC licenses. Under Article 43 of the Merwin license, flood control storage is increased from zero on September 20 to a minimum of 70,000 acre-feet by November 1 of each year allocated among all three reservoirs. This minimum level must be maintained from November 1 through April 1. The reservoirs are then gradually refilled to their normal full pool levels by April 30 for the start of the recreation season. These procedures, documented in PacifiCorp's Standard Operating Procedure (1994), are referred to as the "High Runoff Procedures." Available flood management storage, described in terms of "hole," is the feet of depth between the current reservoir level and normal maximum full pool elevations of 1,000 feet msl at Swift, 490 feet msl at Yale, and 239.6 feet msl at Merwin. Total project hole is the sum of the flood storage space in

Swift, Yale, and Merwin reservoirs. The surface areas at full pool of Swift, Yale, and Merwin are 4,600 acres, 3,800 acres, and 4,000 acres, respectively. Thus one foot of hole represents on average about 4,000 acre-feet of storage. As a point of reference, under normal operating conditions during the flood management season, the total project hole is usually substantially higher than the required minimum of 17 feet, and can be in excess of 50 to 60 feet, depending on snowpack and climatological conditions.

Under the existing High Runoff Procedures, releases from Merwin Dam are made during a flood as a function of the magnitude of the estimated natural inflow and the amount of flood control storage remaining at any particular point in time. Project releases are increased in a stepped fashion as available flood storage space is filled during high runoff, as is shown in Table 2.2-1. For example, during high runoff, the total release from Merwin Dam would be held at 40,000 cfs, as high inflows cause the available flood storage to drop from 70,000 to 60,000 acre feet. Once the available flood storage is reduced to 60,000 acre feet, the release from Merwin would be increased to 50,000 cfs, and held at that level until the available flood storage drops to 50,000 acre feet, and so forth.

Table 2.2-1. Existing flood management storage and release for the three-reservoir system.

Available Flood Storage (acre-feet)	Project Hole (feet)	Release from Merwin (cfs)
100,000	24	
		Increase to 40,000 at 17 ft of hole
70,000	17	
		40,000
60,000	14.5	
		50,000
50,000	12	
		60,000
24,000	6	
		75,000
20,000	5	
		85,000
4,000	1	
		90,000
-14,000	-3.5	
	Less than –3.5	Greater than 90,000 and natural inflow

Note: Negative values indicate surcharge storage (i.e. storage above maximum normal full pool elevations).

After the runoff peak has passed, a similar set of requirements applies to operations on the receding or falling limb of the runoff hydrograph, with the intent of restoring the mandatory minimum flood control storage as rapidly as is reasonable in anticipation of the occurrence of another high runoff event.

The 70,000 acre-feet of mandated flood management storage requires a total cumulative reservoir drawdown of about 17 feet (17 feet of hole). Distribution of the required storage space between the three reservoirs varies somewhat from year to year. Generally speaking, Lake Merwin is drawn down for flood management purposes from 1 to 5 feet below normal full pool, Yale from 5 to 10 feet, and Swift from 5 to 10 feet. Actual reservoir drawdown during the flood management season is usually significantly greater than the required minimum as a result of normal operations for power generation or to capture runoff from snowpack.

Coordinated flood management operation of the Lewis River Projects significantly reduces the magnitude and frequency of floods below Merwin Dam, with most being controlled to a release of 60,000 cfs or less. Significant flood damages start to occur in the Lewis River valley when releases are greater than this.

During flood events, considerable coordination takes place among PacifiCorp, the National Weather Service, Clark and Cowlitz county emergency services, the City of Woodland, and, in very severe events, the U.S. Army Corps of Engineers. The National Weather Service and the relevant county and local government agencies are responsible for issuing notifications and flood warnings to the public. Warnings are broadcast over radio and television. If the situation warrants, the county emergency services and local government agencies may initiate evacuations.

2.2.2 Summary of Ongoing Environmental Measures

Under Alternative A, the Applicants would continue to support the numerous ongoing environmental resource measures and programs within the Lewis River basin. These measures are identified in this section, listed in Table 2.2-2, and described in greater detail in Section 3.2.2.1.

Table 2.2-2. Continuing measures under Alternative A.

Resource Area	Resource Component	Continuing Measure	S1[1]	S2[1]	Y[1]	M[1]
Water Quality/Quantity	Water Quality	Periodically monitor TDG in project tailraces.	X		X	
	Water Quantity	Downramping rates at Merwin of 2 inches/hour.				X
		Maintain minimum flow releases below Merwin in accordance with Article 49.				X
Flood Management		Flood management storage of 70,000 acre-feet.	X		X	X
		Maintain the current high runoff procedure from Nov. 1 to April 1.	X		X	X
Aquatics	Upstream Fish Passage	Net bull trout in Yale tailrace and transport to Cougar Creek.			X	
		Net bull trout from Swift No. 2 tailrace and haul to a location defined by USFWS.	X	X		

Table 2.2-2. Continuing measures under Alternative A (cont.).

Resource Area	Resource Component	Continuing Measure	S1[1]	S2[1]	Y[1]	M[1]
		Follow NMFS and USFWS facility and handling guidelines for anadromous fish and bull trout.	X	X	X	X
	Hatcheries: Anadromous Fish	Operate upstream collection trap at Merwin Dam.				X
		Fund three hatcheries.	X		X	X
		Partially fund operation of Speelyai Hatchery.		X		
		Maintain current smolt production levels (3,125,000) to achieve a goal of 92,000 ocean recruits.	X		X	X
	Hatcheries: Resident Fish	Maintain current production levels for kokanee and rainbow trout.	X		X	X
	Fish Monitoring	Support WDFW annual evaluation of fall Chinook in lower Lewis River.				X
		PacifiCorp evaluates bull trout and kokanee populations annually.	X		X	X
Terrestrial	Habitat Management	Continue implementation of Merwin Wildlife Habitat Management Plan in the Merwin Wildlife Habitat Management Area.				X
		Buffer sensitive habitat from ground-disturbing activities (timber harvest, construction, etc.).	X		X	X
		PacifiCorp manages its designated conservation lands on Cougar Creek for the protection of bull trout.			X	
		Maintain road closures through sensitive habitat areas by installing and maintaining gates and identify additional areas for access control on PacifiCorp lands.	X		X	X
		Cowlitz PUD manages its lands on Devil's Backbone to allow natural succession.		X		
	Timber Management	Manage PacifiCorp lands outside the MWHMA to benefit wildlife habitat.	X		X	X
		Continue to manage project roads to maintain existing aquatic connectivity and control runoff and erosion.	X	X	X	X
	Monitoring	Conduct annual raptor nest surveys on PacifiCorp lands.	X		X	X
Recreation	Visitor Management	Allow recreational access to project lands except where conditions are unsafe.	X	X	X	X

Table 2.2-2. Continuing measures under Alternative A (cont.).

Resource Area	Resource Component	Continuing Measure	S1[1]	S2[1]	Y[1]	M[1]
		PacifiCorp continues to operate its voluntarily constructed recreation and river access sites.	X		X	X
	Campgrounds	Re-gravel group campsites and roads at Beaver Bay Campground and Cougar Park (Yale interim measure[2])			X	
	Day Use Facilities	Install playground equipment and repair tables at Beaver Bay Campground (Yale interim measure).			X	
		Improve the boat launches at Speelyai Bay Park, Yale Park, and Beaver Bay Campground (Yale interim measure).			X	X
	Trails	Provide trails and an interpretive sign at the Beaver Bay wetland (Yale interim measure).			X	
	Access	Upgrade ADA-accessible facilities when developed recreation sites are improved	X		X	X
Cultural	Resource Management	Protect integrity of properties listed in the National Register of Historic Places (NRHP).	X		X	X
		Preserve tribal access for traditional uses.	X	X	X	X
		Conduct archaeological surveys of areas proposed for soil disturbance that have not been previously surveyed or disturbed.	X	X	X	X
Socioeconomics		Fund law enforcement (marine and land-based) at existing levels.	X		X	X

[1] S1 = Swift No. 1; S2 = Swift No. 2; Y = Yale; M = Merwin

[2] Yale Interim Measures are recreation measures PacifiCorp has agreed to implement prior to issuance of a new license for the Yale Project.

2.2.2.1 Water Quantity

Minimum releases from Merwin Dam for the protection of downstream fisheries are stipulated in Article 49 of the existing Merwin license order and range from 1,000 to 5,400 cfs (Table 3.4-4). Down-ramping rates for these releases would continue to be maintained at 2 inches per hour, except under high flow conditions. Flows from upper Speelyai Creek would continue to be routed into Yale Lake for the protection of the Speelyai Hatchery water supply in lower Speelyai Creek and to enhance power generation.

2.2.2.2 Water Quality

Total dissolved gases (TDG) are monitored in the Yale and Swift tailraces. Additionally, as stipulated by Article 19 of the Merwin license, measures would continue to be taken by PacifiCorp to prevent erosion, sedimentation and other water quality degradation from operation and maintenance of the Merwin Project. Even though this is only explicitly required at Merwin, Cowlitz PUD and PacifiCorp routinely provide erosion control for ground disturbing projects that they undertake.

2.2.2.3 Aquatics

PacifiCorp operates a net-and-haul program for bull trout at the Yale tailrace. PacifiCorp and Cowlitz PUD operate a bull trout net-and-haul program at the Swift No. 2 tailrace. PacifiCorp reduces flow releases below Merwin Dam in support of fall Chinook salmon monitoring efforts as requested by WDFW and approved by NOAA Fisheries and the US Fish and Wildlife Service (USFWS). Hatchery production levels stipulated in Articles 50 and 51 of the Merwin license and in the Merwin Hatchery Agreement between PacifiCorp and WDFW would be sustained. Funding for the Lewis River, Merwin, and Speelyai hatcheries would continue to be provided as required by PacifiCorp. Cowlitz PUD would continue to provide partial funding for operation of the Speelyai Hatchery as required in the Swift No. 2 License and in existing agreements with PacifiCorp and WDFW.

2.2.2.4 Terrestrial Resources

PacifiCorp implements the Merwin Wildlife Habitat Management Plan (MWHMP), as stipulated in Article 40 of the Merwin license order. This plan, developed in cooperation with WDFW, mitigates the effects of habitat loss from the original construction and operation of the Merwin Project. The plan includes a variety of measures and practices to enhance wildlife habitat on approximately 5,600 acres of PacifiCorp lands known as the Merwin Wildlife Habitat Management Area (MWHMA). Management focuses on key habitats, including forest and old-growth habitat, oak groves, shrublands, farmland, orchard areas, meadows, transmission rights-of-way (ROW) and wetlands.

In addition, PacifiCorp voluntarily manages most land within the boundary of Swift No. 1 and Yale for the benefit of wildlife. Timber harvest activities on these lands are focused on improving wildlife habitat and are governed by the Washington Department of Natural Resources (WDNR) forest practice rules. These rules describe the minimum acceptable level of resource protection, guide how silviculture treatments are applied to the landscape, and provide recommendations for maintaining aquatic connectivity and controlling erosion along forest roads. Annual raptor surveys are conducted in conjunction with the WDFW.

Cowlitz PUD manages 284 acres on Devil's Backbone in a manner that allows natural succession to occur. Forest stands on these lands would not be harvested, nor would they be actively managed for wildlife. Roads would be managed to maintain existing aquatic connectivity and control erosion.

2.2.2.5 Cultural Resources

Under Alternative A, the Applicants would comply with Section 106 of the National Historic Preservation Act (NHPA) prior to conducting any ground disturbing activities or making changes that could adversely affect buildings and structures that are eligible for listing in the National Register of Historical Places.

2.2.2.6 Recreation

PacifiCorp provides public recreation opportunities by operating and maintaining 4 campgrounds and 14 day use areas throughout the project area (Table 2.2-3). Most facilities were developed and are operated by PacifiCorp. Two of the five river access sites downstream of Merwin Dam are owned by the Washington Department of Fish and Wildlife (WDFW) and are managed and maintained by PacifiCorp. In addition, the Vancouver-Clark Parks and Recreation Department (VCPRD) developed and operates the Haapa River access site on land donated by PacifiCorp. Upgrades to the PacifiCorp facilities are included in Alternative A as part of ongoing operations and maintenance activities. There are no developed recreation facilities associated with Cowlitz PUD's Swift No. 2 Project, but bank fishing at the canal is allowed and the canal has been used for an annual children's fishing day.

2.2.2.7 Socioeconomics

Under Alternative A, PacifiCorp would continue to own and operate the Merwin, Yale, and Swift No. 1 projects and to fund existing measures such as hatcheries and recreation facilities. Employment at the hatcheries would remain stable, providing 20 to 25 jobs. PacifiCorp pays property and utility taxes to the state, a portion of which is returned to the three counties and their service providers. In addition to these ongoing contributions, PacifiCorp pays the Cowlitz County and Clark County sheriff's offices to augment publicly funded land- and marine-based patrols during the peak recreation season. It also hires private security personnel to supplement the publicly funded efforts.

Under Alternative A, Cowlitz PUD would continue to own Swift No. 2 and intends to continue to contract with PacifiCorp to perform designated operations and maintenance functions. Cowlitz PUD pays generation privilege tax to the state, a portion of which is returned to Cowlitz, Clark and Skamania counties. The PUD also pays a portion of the costs of operating Speelyai Hatchery.

Table 2.2-3. Summary of PacifiCorp's Swift No. 1, Yale and Merwin developed recreation facilities.

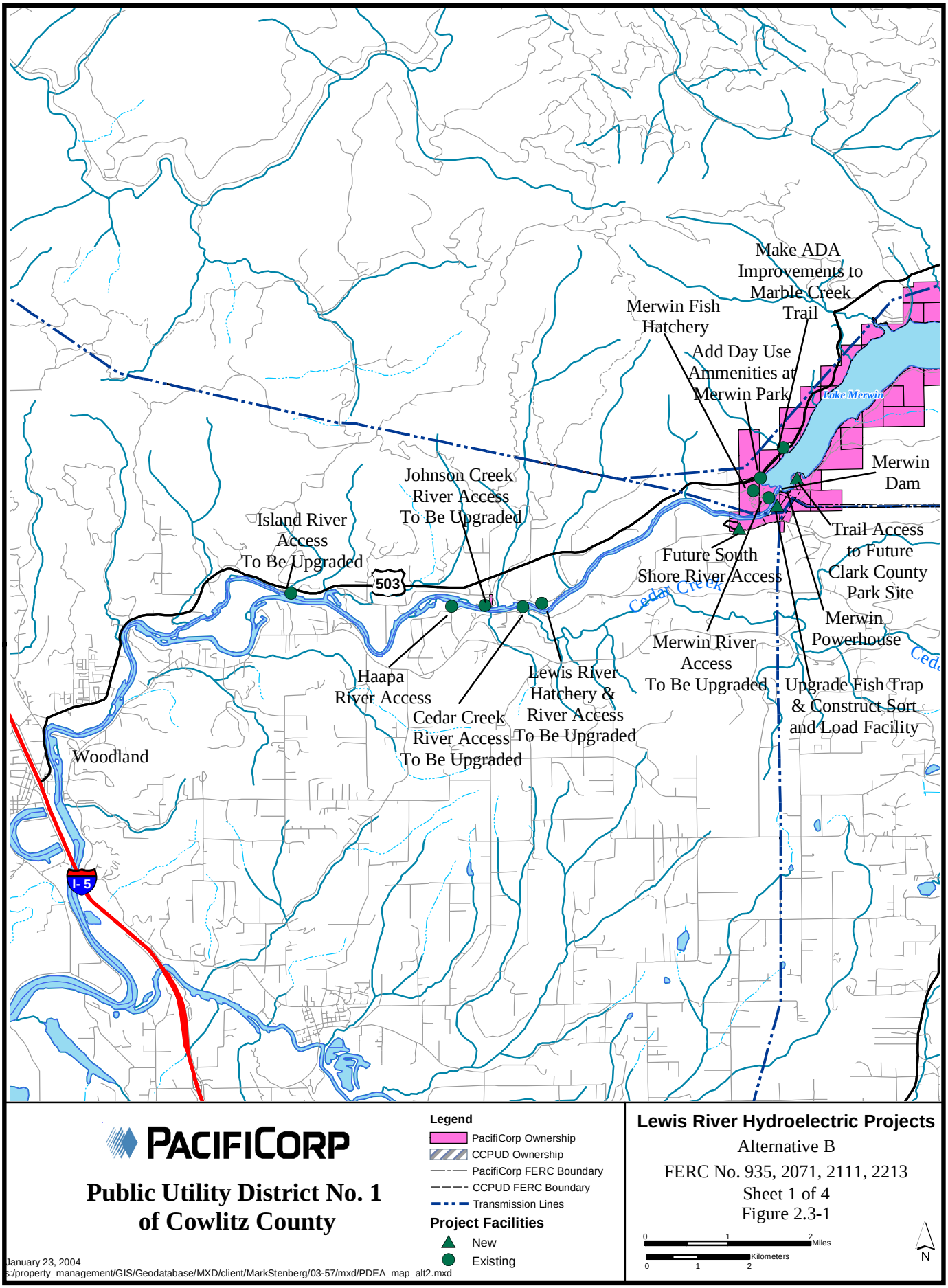
Facility / Location	Individual Camp Units	Group Camp Sites	Restrooms / Showers	Day Use Area	Marine Facilities
Swift Camp/Day Use Area – Swift Creek Reservoir	93	None	Restrooms / showers	Parking for undetermined number of vehicles	1-lane boat ramp, beach swim area
Eagle Cliff Park – Swift Creek Reservoir	None	None	Vault toilet	9 picnic sites; parking for undetermined number of vehicles	None
Cougar Camp / Park – Yale Lake	45	1	Restrooms / showers	Parking for 180 vehicles; 15 picnic tables	1-lane boat ramp
Yale Park – Yale Lake	None	None	Restrooms	44 picnic sites; parking for 280 vehicles	4-lane boat ramp, swim area
Beaver Bay Campground/Day Use Area – Yale Lake	63	1	Restrooms / showers	Parking for 40 vehicles; 6 picnic tables	1-lane boat ramp
Saddle Dam Park – Yale Lake	None	None	Restrooms / showers	Parking for 200 vehicles; 10 picnic tables	1-lane boat ramp (new)
Cresap Bay Campground/Day Use Area – Lake Merwin	58	1	Restrooms / showers	20 picnic tables	2-lane boat ramp, beach swim area
Speelyai Bay Park – Lake Merwin	None	None	Restrooms	25 picnic tables; parking for 250 vehicles	2-lane boat ramp, beach swim area
Merwin Park – Lake Merwin	None	None	Restrooms	135 picnic tables; parking for 500 vehicles	Beach swim area
Merwin Trout Hatchery River Access – below Merwin Dam	None	None	None	Parking for 25 vehicles	1-lane boat ramp
Lewis River Hatchery River Access – below Merwin Dam	None	None	None	Parking for 15 vehicles	River access; hand launch
Island River Access – below Merwin Dam	None	None	None	Parking for 25 vehicles with trailers	2-lane boat ramp
Cedar Creek River Access – below Merwin Dam	None	None	Vault toilets	Parking for 25 vehicles	2-lane boat ramp
Johnson Creek River Access – below Merwin Dam	None	None	None	Parking for 10 vehicles, trail to river	River access; fishing

Source: EDAW 2000

2.3 ALTERNATIVE B: APPLICANTS' PREFERRED ALTERNATIVE

Alternative B is the action proposed by PacifiCorp in its applications for new licenses for the Merwin, Yale, and Swift No. 1 projects and by Cowlitz PUD in its application for a new license for Swift No. 2. The Applicants propose additional protections, mitigation and enhancements from the existing baseline conditions (identified as Alternative A) to address resource issues raised during the scoping and consultation processes and to mitigate the Project's impacts. This section identifies the facility and operational changes proposed under Alternative B and the associated environmental enhancement measures. Facilities proposed to be modified or constructed are identified on Figure 2.3-1 and all proposed enhancement measures are listed by resource category in Table 2.3-1. This table includes measures that are part of Alternative A, plus additional measures specific to Alternative B. Unless otherwise specified, it is generally assumed that the Applicants would implement these measures within the first five years after the new licenses become final.

In summary terms, Alternative B provides additional enhancement measures that principally address anadromous fish production, aquatic and terrestrial habitat, flood control and recreation. Alternative B introduces anadromous fish to the watershed above Swift Dam where over 80 percent of the available habitat exists. Trapping fish at Merwin Dam and trucking them to Swift Creek Reservoir would accomplish this. A floating surface collector at Swift Dam would trap downstream migrants and from there, they would be trucked to a release point below Merwin Dam. Anadromous production at the existing hatcheries gradually would be reduced from 1,829,882 smolts as natural runs of anadromous fish are established. Resident fish production would be unchanged. Operational changes would include continuously releasing 50 cfs to the Lewis River bypass reach. Flood management would be enhanced by implementing new high runoff procedures and providing financial support to authorities responsible for public notification. Terrestrial measures would reduce visitor impacts in riparian and shoreline habitats through dispersed campsite closure, monitoring, and public education. Improvements to existing recreation facilities would be extensive, with emphasis placed on improving or expanding day use sites, campgrounds, fishing and boating access sites, as well as partially funding a new visitor information center in Cougar. If constructed, this center also would curate and display archaeological artifacts from the project area.



PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative B

FERC No. 935, 2071, 2111, 2213

Sheet 1 of 4

Figure 2.3-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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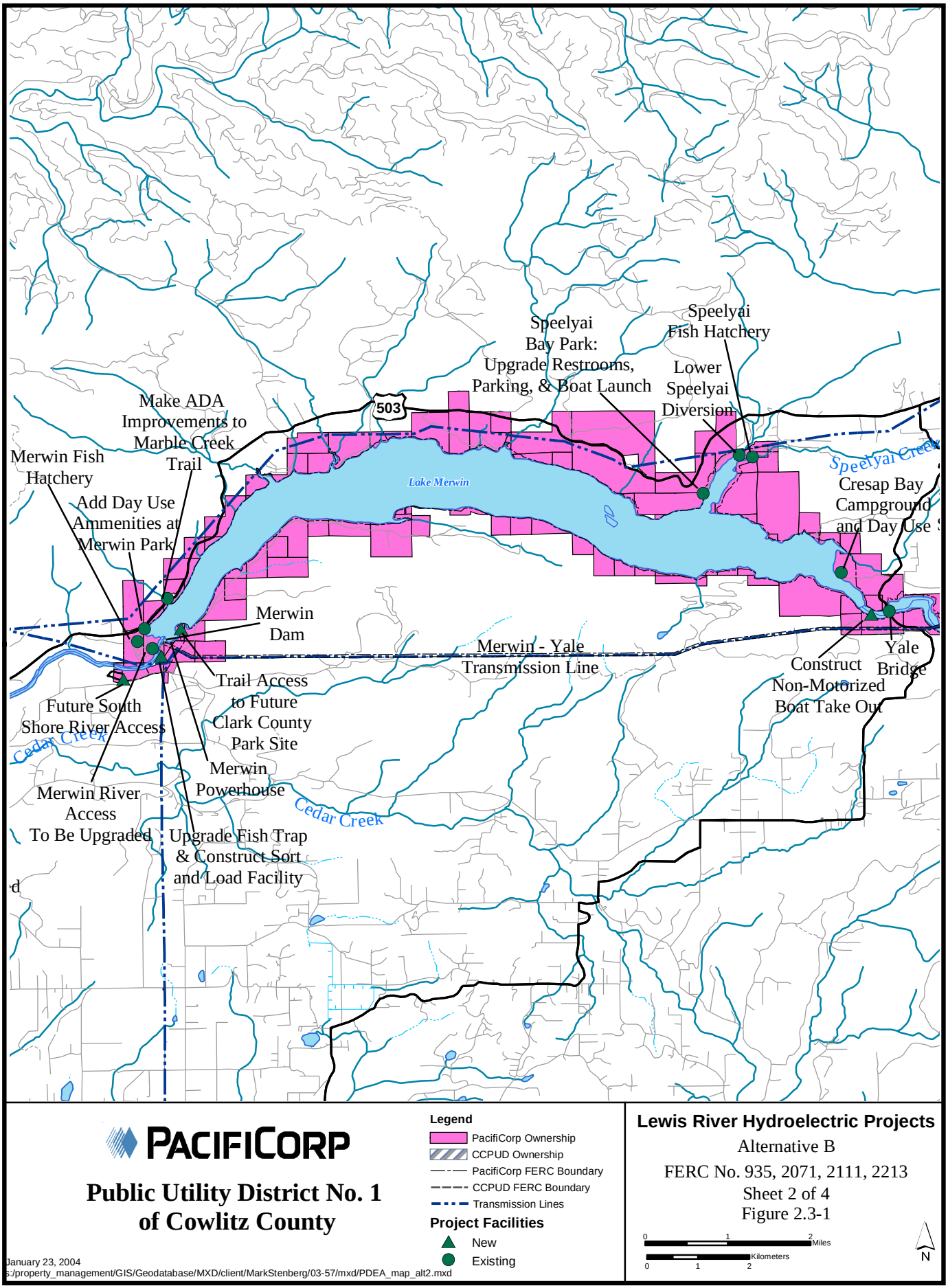

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative B

FERC No. 935, 2071, 2111, 2213

Sheet 2 of 4

Figure 2.3-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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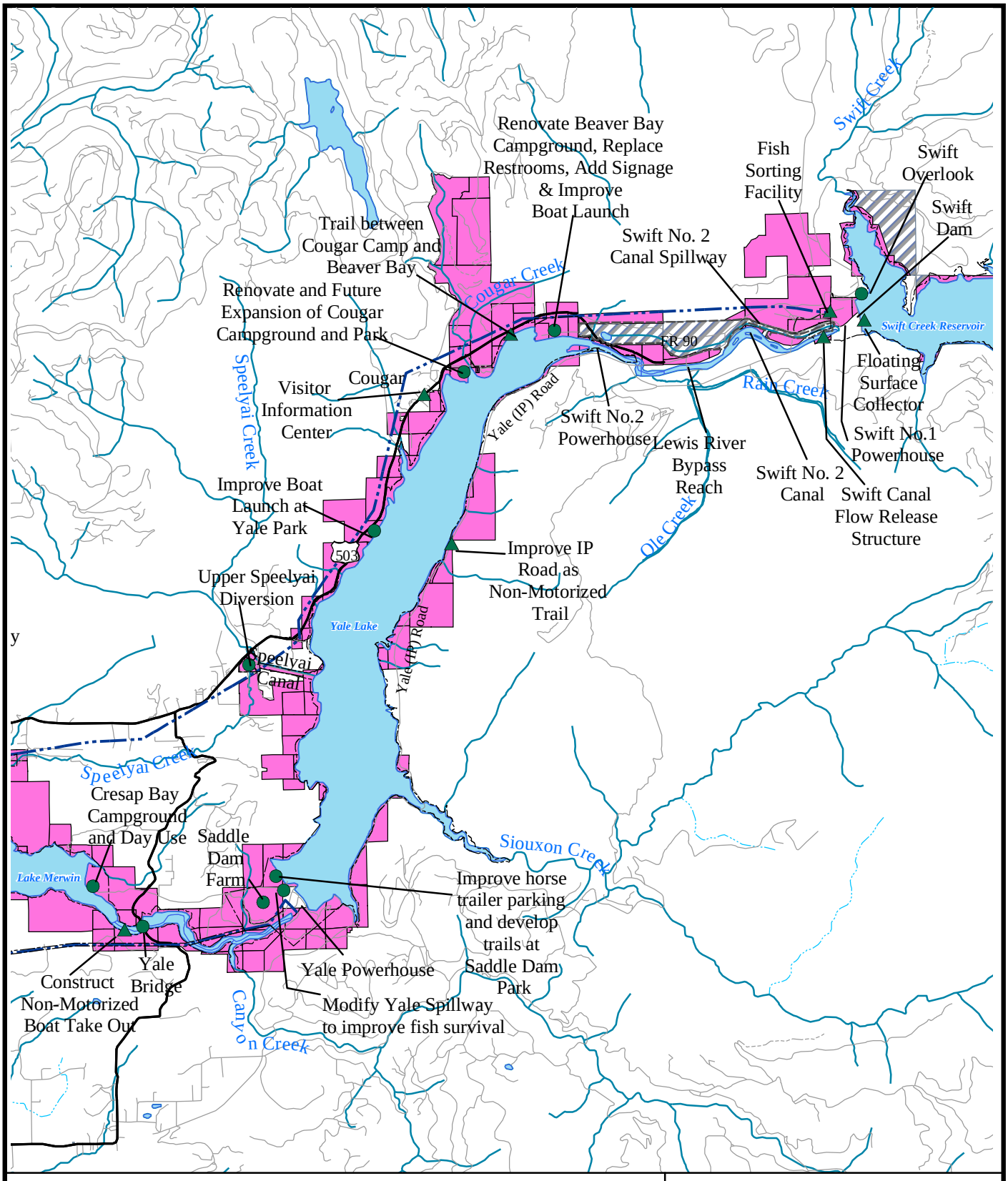

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative B

FERC No. 935, 2071, 2111, 2213

Sheet 3 of 4

Figure 2.3-1

0 1 2 Miles

0 1 2 Kilometers

N

January 23, 2004

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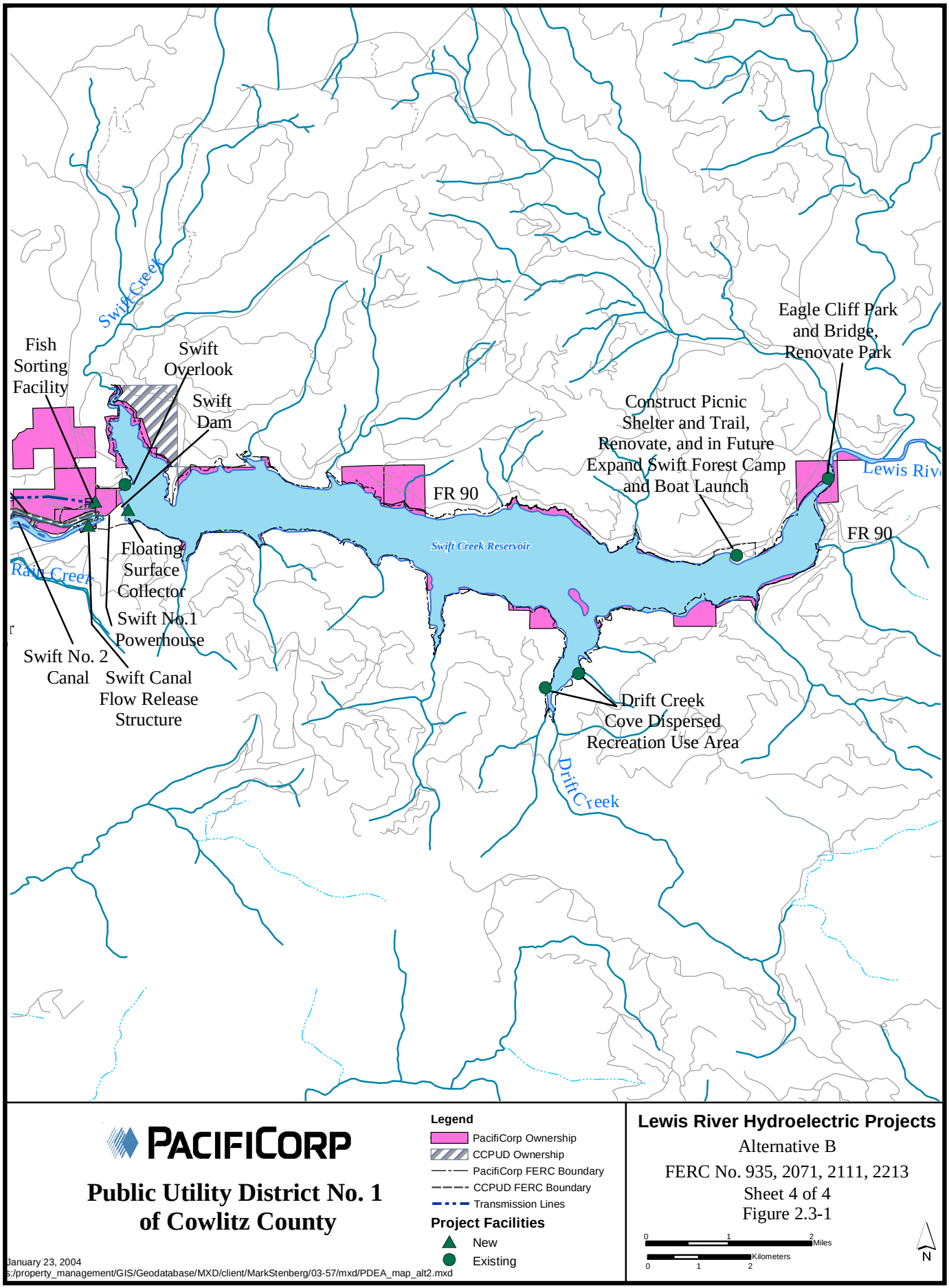
Swift Creek
Fish Sorting Facility
Swift Overlook
Swift Dam
Eagle Cliff Park and Bridge, Renovate Park
Construct Picnic Shelter and Trail, Renovate, and in Future Expand Swift Forest Camp and Boat Launch
Lewis Riv
FR 90
FR 90
Swift Creek Reservoir
Floating Surface Collector
Rain Creek
Swift No.1 Powerhouse
Swift No. 2 Canal
Swift Canal Flow Release Structure
Drift Creek Cove Dispersed Recreation Use Area
Drift Creek
PACIFICORP
Public Utility District No. 1 of Cowlitz County
Legend
PacifiCorp Ownership
CCPUD Ownership
PacifiCorp FERC Boundary
CCPUD FERC Boundary
Transmission Lines
Project Facilities
New
Existing
Lewis River Hydroelectric Projects
Alternative B
FERC No. 935, 2071, 2111, 2213
Sheet 4 of 4
Figure 2.3-1
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January 23, 2004
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2.3.1 Project Facilities, Operations, and Environmental Measures

This section describes modifications that would occur under Alternative B to project facilities or alterations to the way the projects are operated. Environmental and social enhancement measures that would be implemented under Alternative B also are described and summarized. Measures that would be implemented in addition to Alternative A measures are presented in italics in Table 2.3-1; continuing measures are in a standard font. This section also describes measures proposed to reduce possible adverse effects during implementation of these actions.

Table 2.3-1. Measures proposed under Alternative B.

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
Water Quality/Quantity	Water Quality	*Develop a Water Quality Management Plan to monitor compliance with state criteria.*	X	X	X	X
	Water Quantity	*Release 50 cfs continuously to the upper Lewis River bypass reach through a new flow release device in Swift No. 2 canal.*	X	X		
		Maintain downramping rates at Merwin of 2 inches/hour except when flows exceed 8,000 cfs.				X
Flood Management		Maintain 17 feet of flood management storage.	X		X	X
		Develop a forecast-based high runoff procedure.	X		X	X
		Reduce flood management season by 2 weeks.	X		X	X
		Provide funding to authorities responsible for flood notification, including an emergency phone system and weather radio transmitter.				X
Aquatics	Upstream Fish Passage	*Improve efficiency and safety of existing Merwin trap and add a new sorting and truck loading facility.*	X	X	X	X
		Truck spring Chinook, coho & steelhead from the Merwin sorting facility to Swift Creek Reservoir. Truck bull trout to a location to be defined by USFWS and WDFW.	X	X	X	X
		Net bull trout in Yale tailrace and transport to Cougar Creek. *Investigate alternative trapping methods.*			X	
		Net bull trout from Swift No. 2 tailrace and haul to a location defined by USFWS.	X	X		
		Follow NMFS and USFWS facility and handling guidelines for anadromous fish and bull trout.	X	X	X	X

Table 2.3-1. Measures proposed under Alternative B (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
	Downstream Fish Passage	*Install a floating surface collector system with guide walls and nets at Swift Dam. Collect fish, sort, mark a sub-sample, and truck to release site below Lake Merwin. Release bull trout as directed by USFWS. Release other resident fish where directed by WDFW.*	X	X	X	X
		Modify Yale spillway to improve downstream resident fish survival (including bull trout) during spill events.			X	
	Hatcheries: Anadromous Fish	*Reduce hatchery production on a 1:1 basis as natural runs become established.*	X	X	X	X
		Produce 1,829,882 smolts to reach goal of 38,626 ocean recruits.	X	X	X	X
		Fund all three hatcheries. Reduce funding as runs become established.	X		X	X
		Partially fund operation of Speelyai Hatchery. *Reduce funding as runs become established.*		X		
	Hatcheries: Resident Fish	Maintain current production levels.	X		X	X
	Fish Monitoring	Support WDFW annual evaluation of fall Chinook in lower Lewis River.				X
		Monitor performance of upstream and downstream passage facilities.	X	X		X
		Monitor anadromous hatchery returns.	X	X	X	X
		Monitor bull trout annually.	X	X	X	
		Monitor kokanee populations annually.			X	
		Evaluate status of ESA listed anadromous species and bull trout.	X	X	X	X
Terrestrial	Habitat Management	Continue implementation of the Merwin Wildlife Habitat Management Plan in the MWHMA.				X
		Buffer sensitive habitat from ground-disturbing activities (timber harvest, construction, etc.).	X		X	X
		Manage PacifiCorp conservation lands on Cougar Creek for the protection of bull trout.			X	
		Reduce dispersed campsites in shoreline and riparian areas and post visitor use rules.	X		X	X
		Cowlitz PUD manages its lands on Devil's Backbone for natural succession.		X		

Table 2.3-1. Measures proposed under Alternative B (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
		Maintain existing road closures through sensitive habitat areas by installing and maintaining gates and *identify additional areas for access control on PacifiCorp lands.*	X		X	X
	Timber Management	Use timber management on PacifiCorp lands outside the MWHMA to benefit wildlife habitat.	X		X	
		Continue to manage roads on project lands to control runoff and erosion. *Develop a culvert replacement plan and schedule to reduce barriers to wildlife and improve aquatic and riparian habitat connectivity at select streams through PacifiCorp lands.*	X		X	X
		Develop and implement measures to maintain existing aquatic connectivity and control runoff and erosion from roads through Cowlitz PUD lands on Devil's Backbone.		X		
	Monitoring	Continue annual raptor surveys on PacifiCorp lands.	X		X	X
		Monitor dispersed camping and day use on PacifiCorp lands.	X		X	X
		Implement BMPs to protect sensitive species and habitats during construction activities.	X	X	X	X
Recreation	Visitor Management	*Implement the RRMP that would include all of PacifiCorp's recreation measures described herein.*	X		X	X
		Increase visitor management controls, such as additional signs, barriers and enforcement.	X		X	X
		Allow managed recreational access to project lands except where conditions are unsafe.	X	X	X	X
		Develop and implement an interpretation and education program.	X		X	X
		Install interpretive signs at the Beaver Bay wetland.			X	
		Provide earlier public notice that project recreation sites are full.	X		X	X
		Dispersed upland camping and motorized use would be discouraged on project lands.	X		X	X

Table 2.3-1. Measures proposed under Alternative B (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
		Funding would be provided to the US Forest Service to manage dispersed camping on its land in the project vicinity.	X			
	Campgrounds	*Shoreline camping would be prohibited at Lake Merwin.*				X
		Some shoreline campsites at Yale and along Swift Creek Reservoir would be hardened. Others would be eliminated.	X		X	
		Expand Swift Camp and Cougar Camp when monitoring establishes a sustained need. At Cougar, accomplish this by closing the boat ramp and converting parking areas to campsites.	X		X	
		Renovate Cougar Camp.			X	
		Redesign Beaver Bay Campground and replace older restrooms.			X	
		Allow public use of RV holding tank dump sites in PacifiCorp campgrounds for a fee.	X		X	X
	Day Use Facilities	*Provide more day use opportunities and sanitation facilities at five river access sites below Merwin Dam.*				X
		Provide new group picnic shelters at Merwin Park and Swift Camp and at one additional site on Yale Lake.	X		X	X
		Renovate Eagle Cliff Park.	X			
		Upgrade restrooms and parking at Speelyai Bay Park.				X
		Provide volleyball courts, horseshoe pits and children's play structure at Merwin Park.				X
		Increase separation between wetland and day use parking area at the Beaver Bay Day Use Area.			X	
		Partially fund a multi-agency supported Visitor Information Center in Cougar.			X	
	Trails	*Bring Marble Creek trail up to ADA-accessibility standards.*				X
		Evaluate feasibility of trail easement to Lake Merwin for Clark County.				X
		Formalize Saddle Dam trailhead parking for horse trailers.			X	
		Develop non-motorized trail from Eagle Cliff to USFS boundary.	X			

Table 2.3-1. Measures proposed under Alternative B (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
		Develop non-motorized trail link from Saddle Dam Park to existing Saddle Dam area trails.			X	
		Develop a shoreline trail from Cougar Camp to Beaver Bay Campground.			X	
		If feasible, improve the Yale-IP Road as a non-motorized recreation trail.			X	
	Access	*Boat launch facilities improved at Speelyai Bay, Yale Park, and Beaver Bay.*			X	X
		Develop a primitive take-out site at Yale Bridge for non-motorized watercraft.				X
		Develop river access at the "Switchback" property when use levels reach capacity below Merwin Dam.				X
Cultural	Resource Management	*Implement Historic Properties Management Plan for Merwin, Yale and Swift No. 1.*	X		X	X
		Protect integrity of properties listed in the National Register of Historic Places (NRHP).	X		X	X
		Preserve tribal access for traditional uses.	X	X	X	X
	Interpretation & Education	*Contribute information to an Interpretation and Education (I&E) program.*	X		X	X
		Curate and interpret artifacts at new Visitor Information Center in Cougar.	X		X	X
Socioeconomics		Continue to fund law enforcement (marine and land-based).	X		X	X
		Partially fund development of the Visitor Information Center.	X		X	X

[1] S1 = Swift No. 1; S2 = Swift No. 2; Y = Yale; M = Merwin

2.3.1.1 Swift No. 1

Under Alternative B, PacifiCorp and Cowlitz PUD would modify Swift Dam to enable migratory fish to be collected for transportation downstream. These facilities are described in Section 2.3.1.10. PacifiCorp would adopt minor modifications to seasonal reservoir operations to continuously release flow to the Lewis River bypass reach (Section 2.3.1.5) and new high runoff procedures that are part of the flood management protocol (Section 2.3.1.6). Detailed analysis of reservoir operations shows relatively little change in the seasonal reservoir levels (see Section 3.2). Swift Creek Reservoir

levels in winter and spring would average about four feet lower than under Alternative A, while average water levels in summer essentially would be unchanged.

2.3.1.2 Swift No. 2

Under Alternative B, Cowlitz PUD and PacifiCorp would modify a segment of the upper end of Swift No. 2 canal to incorporate a new release device. The outlet would be configured to continuously release 50 cfs to the Lewis River bypass reach. It would be constructed approximately 2,000 feet downstream of Swift Dam to prevent potential damage from spillway discharges. Flow would be conveyed to an existing pond and would help maintain its connection to Yale Lake through the bypass reach. Otherwise, the Swift No. 2 Project would operate in the same manner described for Alternative A. Generating capacity would be reduced as a result of releases to the bypass reach (Section 4.1.2).

2.3.1.3 Yale

PacifiCorp would modify the Yale spillway to improve conditions for resident fish passing downstream during spill events. No other facility modifications are proposed to the primary features of the Yale Project under Alternative B. Minor modifications to seasonal reservoir operations would occur as new high runoff procedures are adopted as part of the flood management protocol (Section 2.2.1.7). Detailed analysis of reservoir operations (described in Section 3.2) show little change in the seasonal levels of Yale Lake.

2.3.1.4 Merwin

PacifiCorp and Cowlitz PUD would modify the upstream fish collection facility, as described in Section 2.2.1.10. In addition, PacifiCorp would modify seasonal reservoir operations under the flood management protocol (Section 2.3.1.6). Detailed analysis of reservoir operations (described in Section 3.2) shows essentially no change in the seasonal levels of Lake Merwin.

2.3.1.5 Water Quantity

Under Alternative B, PacifiCorp and Cowlitz PUD would provide a continuous flow of 50 cfs to the Lewis River bypass reach downstream of Swift Dam, as described in Section 2.3.1.2.

PacifiCorp's flow releases from Merwin Dam would be the same as current conditions described in Alternative A except that a critical flow of level of 8,000 cfs would be provided to protect salmonid redds during spawning and fry emergence. Downramping rates would be limited to two inches per hour, except under emergency conditions.

2.3.1.6 Flood Management

Under Alternative B, PacifiCorp would retain the amount of dependable flood control storage during the flood management season at the current 70,000 acre-foot level (17 feet

of storage, or "hole"). Various operational changes would be implemented to make the most effective use of that storage, and improvements would be made in flood notification systems and procedures.

Flood management changes under Alternative B would involve improved forecasting for both weather and project inflows. Forecasts of high flow events up to three days ahead would trigger pre-releases from the projects (i.e., releases in excess of those required for power generation in order to maintain or increase storage capacity). Pre-releases from Merwin Dam normally would be at rates of up to 25,000 cfs. In certain circumstances where exceptionally high severe floods are forecast, pre-releases from Merwin Dam would be increased to a maximum of 40,000 cfs. Should forecasts be found to be sufficiently reliable, they would also be used to improve project operations near the peak of flood events by allowing storage of additional flood flows and reduction in peak project discharges. Other aspects of the existing high runoff procedures would remain unchanged (see Section 2.3.1.6).

Analysis of flow records shows that flood risk on the Lewis River drops significantly after March 1. The length of the flood management season under Alternative B would be reduced by two weeks in years with below average March runoff forecasts. Project refill would start on March 15 instead of April 1. This action would reduce the risk of failing to achieve project refill in dry years.

Under Alternative B, PacifiCorp would contribute to a package of measures to improve flood notification systems and procedures, as follows:

- Provide financial support to Clark County Regional Emergency Services Agency and Cowlitz County Department of Emergency Management for the acquisition and maintenance of a new emergency telephone notification service for areas affected by high runoff from the projects.

- Contribute funding to the National Oceanic and Atmospheric Agency (NOAA) for certain specified costs associated with the operation of a weather radio transmitter that will improve NOAA's ability to transmit to residents of the Lewis River valley.

- Contribute funding to the USGS to provide public dial-in access to real-time flow information on the Lewis River below Merwin Dam.

- Improve coordination between PacifiCorp and emergency management officials and personnel.

Coupled with improved flood forecasting and high flow pre-releases, these measures would increase public access to information on project storage, flows, and weather conditions, and would improve notification procedures in the event of severe floods.

2.3.1.7 Water Quality

Water quality standards are being met; however, PacifiCorp would develop a water quality management plan to ensure continued compliance at its projects with Washington

Department of Ecology (WDOE) standards. Cowlitz PUD would develop a water quality management plan for operation of its Swift No. 2 facility. The objective of these plans would be to provide WDOE with a clear understanding of the proposed monitoring program, QA/QC measures, and protocols for reporting data. Each utility would apply for Section 401 Water Quality Certification for their projects within 60 days of FERC's notice that the projects are ready for environmental analysis.

PacifiCorp and Cowlitz PUD would implement erosion control measures to reduce erosion during construction of the canal water outlet structure, fish passage and recreation facilities. These measures would protect soil and geologic resources from erosion as well as protecting water quality and aquatic habitat from degradation.

2.3.1.8 Aquatics

One of the primary components of Alternative B is to establish anadromous fish production in the upper Lewis River basin using an adult trap-and-haul facility at Merwin Dam and juvenile collection facility at Swift Dam with downstream transport. PacifiCorp and Cowlitz PUD would gradually reduce production (on a 1:1 basis) of anadromous species at the existing hatcheries as natural runs of anadromous fish are established. PacifiCorp and Cowlitz PUD would continue to stock hatchery rainbow trout and kokanee to maintain angling opportunities in the project area reservoirs. Cowlitz PUD and PacifiCorp would continuously release 50 cfs to the Lewis River bypass reach to provide additionally aquatic habitat.

Measures proposed as part of Alternative B to benefit the fishery resources of the Lewis River basin are described in Sections 2.3.1.9 through 2.3.1.11. Measures to mitigate the effects of construction activities on aquatic resources, such as construction timing restrictions and other Best Management Practices (BMPs), would be developed in consultation with the appropriate resource agencies. These BMPs may include, but would not be limited to, the following:

- Implementing measures to reduce construction-related adverse effects (i.e., turbidity and the introduction of potentially hazardous materials) on aquatic resources during construction activities;

- Limiting in-channel work to periods that are not critical to the spawning and incubation of resident and anadromous salmonids; and

- Minimizing the removal of existing vegetative cover in the riparian zone.

2.3.1.9 Upstream Fish Passage Facilities

Under Alternative B, PacifiCorp and Cowlitz PUD would introduce anadromous fish into the Lewis River basin above Swift Dam using a trap-and-haul system. Anadromous fish would be collected in the existing trap below Merwin Dam and transported via tanker trucks to a release site in upper Swift Creek Reservoir. Bull trout captured in the Merwin trap would be transported as directed by the USFWS. Lake Merwin, Yale Lake, and

much of Swift Creek Reservoir would be bypassed to expedite movement of adult migratory fish to the spawning and rearing habitat in the upper river tributaries. This approach would provide access to 67 percent of the habitat above Swift Dam and would significantly reduce the potential for delay or loss of upstream migrating fish in the Yale and Merwin reservoirs. The adult collection system would operate year round. Illustrations of the facilities described here are presented in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU 5, Appendix 1). No access to Lake Merwin or Yale Lake is proposed under Alternative B because there is limited potential habitat and because passage through these two projects may reduce natural returns to the upper basin due to reservoir and passage mortality. Also, introduction of coho to Yale Lake could adversely affect bull trout populations through competition for spawning habitat.

Fish would enter the existing adult collection facilities (trap) at Merwin Dam through entrance weirs located over the powerhouse draft tubes. Currently, the facility is configured with one entrance weir, operating at about 33 cfs. Fish enter the collection channel by swimming over an entrance weir fitted with a V-trap that prevents them from swimming out of the facility. Once in the channel, they swim into a holding chamber where they can then be crowded into a fish elevator hopper. A hoist lifts the hopper from the holding chamber level below ground to a truck loading pad near the east end of the powerhouse. The fish and water are then loaded directly into a tanker truck parked below the hopper using water-to-water transport protocol so the fish are always submerged.

Under Alternative B, improvements would be made to the fish trap entrance for better collection efficiency at all operating flows, and to improve conditions for facility operators. At least two additional entrance weirs over the tailrace would be opened to collect fish over a broader range of operating conditions. Each of these weirs would operate at about 33 cfs, for a total attraction flow of 100 cfs leading into the collection facility. The holding chamber would be modified to include an automated fish crowder so that personnel do not have to work in an underground chamber and to reduce stress to fish.

It is expected that the final trap entrance configuration would be refined based on observations of hydraulic conditions at the trap entrance, in the Merwin tailrace area, and from collection efficiency records. Because project operations vary based on total flow through the powerhouse and on which turbine-generator units are running, an operational protocol for the trap entrance would be developed to identify the best weir settings and flows for various operating conditions. Operators would adjust the entrance weirs to maintain proper hydraulic conditions under various flows.

The existing fish lift would be enlarged and operations improved. A new hopper unloading station would be provided that would direct fish to a 300-foot-long flume leading to a new sorting and truck loading facility. This approximately 40-foot-wide by 80-foot-long facility would be about 300 feet downstream of the existing powerhouse on a rock bench on the left bank of the river (see drawing MU2-1, PacifiCorp and Cowlitz PUD 2004: AQU 5, Appendix 1). Fish from the flume would enter a holding pond with a false weir on one end. Sorting would be performed by visual observation of each fish as it jumps over the false weir and slides down a wetted sorting flume. Automatic gates

activated by the fish sorting operator would direct fish downstream to the river or into one of four circular holding tanks, to be constructed over a truck loading area.

Fish tanker trucks would drive on a new access road leading to a truck loading station underneath the tanks. The existing truck loading station would be maintained for use as a back-up facility, and to allow direct transfer of fish to trucks if sorting is not desired. It is expected that 1,000-gallon trucks would be used to haul the fish; however, smaller trucks and trailers could be used to optimize the transport process based on established protocol. During peak fish runs, up to 20 truck round trips could be made per day when anadromous fish runs are established. Water-to-water transfer protocol would be provided at every transfer point in the system to minimize stress on fish.

Anadromous fish and bull trout would be collected and transported in this system. Sorted tanks of fish would be trucked to any desired location via the tanker trucks and released to the upper end of Swift Creek Reservoir at existing access areas, such as boat ramps. Both NMFS and U.S. Fish and Wildlife Service (USFWS) handling and facility guidelines would be followed for anadromous fish and bull trout transport.

Under Alternative B, bull trout would continue to be netted periodically from the Yale tailrace and hauled to Cougar Creek for release. PacifiCorp would evaluate alternative methods to collect these fish at Yale. PacifiCorp and Cowlitz PUD would also continue a bull trout net and haul program at the Swift No. 2 tailrace, with fish hauled to a location directed by the USFWS.

2.3.1.10 Downstream Fish Passage Facilities

Under Alternative B, PacifiCorp and Cowlitz PUD would provide downstream fish passage using a floating surface collector system just upstream of the existing intake and spillway channel at Swift Dam. The collector would lead fish to a sorting and truck loading facility, where a subset of the fish would be tagged for monitoring purposes. Tanker trucks then would transport the outmigrants to a release site below Merwin Dam. No downstream fish passage facilities would be placed at Yale or Merwin dams. This approach is intended to minimize potential losses, delay, or injury resulting from migration through the Yale and Merwin reservoirs and downstream passage past the three dams. The juvenile collection system would be operational from March 15 through October 15, the period when out-migrating anadromous fish are present. Facilities described in this section are illustrated in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU 5, Appendix 1).

A floating surface collector is a floating barge fitted with a fish screen and a low-head/high volume pump system. The pumps provide an attraction flow field that attracts fish behaviorally, based on observed outmigration patterns, into the screen. Fish swim with the flow into the screen intake that would extend approximately 15 to 20 feet below the water surface. Flows ranging from 600 to 1,000 cfs (approximately 10 percent of the turbine capacity) are anticipated for this facility. After passing through the pumps, screened attraction flow would be discharged downward toward the existing project

intake. The floating barge would accommodate the 40- to 60-foot reservoir fluctuation associated with Swift Creek Reservoir operations.

A guide wall would be constructed approximately 250 feet offshore in an alignment parallel to the shoreline, beginning from the face of Swift Dam and extending into the reservoir (see drawing S1D-4.1, PacifiCorp and Cowlitz PUD 2004: AQU 5, Appendix 1). The wall would protect the floating surface collector from debris and wave action and would provide an attachment point for floating guide nets. Guide nets would effectively contain the entire intake flow, maximizing fish collection efficiency. The guide net assembly would resemble an open-top funnel, essentially covering 100 percent of the turbine intake and spillway during operational periods. The mesh opening would be sized for juvenile salmonids, which would also protect adult and juvenile bull trout and steelhead kelts.

After entering the floating surface collector intake, adult and juvenile fish would traverse the primary dewatering screen and move through a secondary dewatering screen into a 30-inch-diameter transport pipe. The pipe would lead to a live box suspended upstream of the intake. The live box would be hoisted up to a level where fish would be transferred into a flume system leading to a sorting/sampling facility located approximately 400 feet downstream of the dam on the north side of the spillway channel. A truck loading station at the downstream end of the sorting/sampling facility would facilitate water-to-water transfer of fish into tanker trucks. The entire sorting/sampling facility would be approximately 300 feet long by 80 feet wide.

Fish entering the sorting/sampling facility would be directed via wetted flumes either to a sampling station or to short-term holding ponds where they would be held for transport and sub-sampled for monitoring purposes. Fish in the ponds would be transferred using water-to-water protocol into tanker trucks for transport and release below Merwin Dam. Bull trout could be taken in different trucks and placed in Yale Lake, or a location selected by the USFWS. Facilities described in the section are illustrated in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU 5, Appendix 1).

If spill were imminent, the floating surface collector and net system would be removed. This would occur during the high flow season (October 16 through March 15) to prevent it from being entrained in the spillway during spill events. A docking station would be located on the reservoir upstream from the intake to moor the floating surface collector when it is not in use and to accommodate annual maintenance.

2.3.1.11 Hatchery Facilities and Operations

Under Alternative B, physical hatchery facilities would be unchanged, with the exception of improvements to the sorting facilities at the Lewis River Hatchery. The three hatcheries would produce both resident and anadromous species as they currently do. Resident fish production would not change, supporting the recreational fishery in the river and reservoirs. Anadromous production would decrease on a one-to-one basis coinciding with ocean recruit numbers. Initial production goals under Alternative B are 1,829,882 smolts, including 621,514 spring Chinook, 1,126,286 coho and 82,082

steelhead. This production level is expected to result in 38,626 pre-harvest ocean recruits (9,855 adult spring Chinook; 21,753 adult coho; and 7,018 adult winter steelhead), representing a 58 percent reduction from the adult anadromous fish production goal in Alternative A. Under alternative B, PacifiCorp and Cowlitz PUD would jointly fund operations of Speelyai Hatchery and PacifiCorp would fund the Lewis River and Merwin hatcheries; however, funding would decrease as natural production increases and runs are established.

2.3.1.12 Terrestrial Resources

PacifiCorp's and Cowlitz PUD's terrestrial resource measures described under Alternative A would continue to be implemented under Alternative B. Cowlitz PUD would manage its wildlife land to allow natural succession to continue. In addition, sensitive riparian and shoreline areas on PacifiCorp lands would be targeted for additional protection, particularly from the effects of recreational use. Recreation-related disturbance to vegetation and wildlife in shoreline and riparian areas would be reduced by evaluating and monitoring existing dispersed camping and day use sites on PacifiCorp lands. Undesirable sites would be eliminated and allowable sites would be posted. Rules or guidelines concerning dispersed camping use would be developed and enforced to prevent site pioneering and expansion in non-designated areas. Some sites might be targeted for temporary restoration closure or seasonal closure to prevent disturbance during wildlife breeding seasons.

Alternative B would include improvements to riparian and aquatic habitat connectivity on PacifiCorp lands. Relicensing studies documented at least 176 stream culverts on PacifiCorp lands (PacifiCorp and Cowlitz PUD 2003f). Of those, about 46 percent of the culverts show some level of damage and 32 percent have rust on at least one end. In addition, many have a drop from the outlet to the ground, which presents a migration barrier to fish and can restrict the movement of some aquatic and riparian dependent wildlife species, especially when moving upstream. About 80 percent of the culverts on PacifiCorp lands are full of water during high flow conditions and may not be useable by small mammals or amphibians moving along stream edges (PacifiCorp and Cowlitz PUD 2003f).

Under Alternative B, PacifiCorp would develop a plan and schedule to prioritize and guide culvert replacements using WDNR's forest practice road standards as a reference. Over time, undersized and damaged culverts on streams through PacifiCorp lands would be replaced, with the smallest and/or most damaged culverts having the highest priority. New culverts would be larger and configured to carry high flows and provide passage for fish and wildlife. In some locations, pipe arch culverts may be most appropriate. These flat-bottomed culverts can retain some bed material and may be less of a barrier to fish and wildlife movement. In addition to improving conditions for wildlife and fish, installing larger, new culverts would reduce the risk of culvert failure and/or blockage, and consequent flooding and erosion. Erosion problems at the inlets and outlets of existing culverts would also be remedied.

A number of best management practices (BMPs) would be implemented to reduce disturbance to wildlife and prevent the establishment of exotic/invasive plant species during construction associated with Alternative B measures. These may include, but would not be limited to, the following:

- Coordinate construction activities to avoid take of migrating birds or their eggs and to minimize disturbance to nesting birds during the breeding season (approximately April 15 to August 1). Measures could include avoiding construction during the primary breeding season (approximately May 1 to August 1); surveying to determine the presence of nesting birds prior to initiating construction; clearing vegetation within the construction footprint outside of the breeding season to prevent nesting in the construction area; and limiting extreme construction noise and equipment access during the breeding season;

- Treating nearby infestations of exotic/invasive plant species prior to construction;

- Revegetating disturbed areas immediately following construction; and

- Washing construction equipment prior to use in the project area.

2.3.1.13 Cultural Resources

Under Alternative B, PacifiCorp would implement a Historic Properties Management Plan (HPMP) for the Merwin, Yale, and Swift No. 1 projects. This plan would guide the treatment of known cultural resources, outline inventory procedures should additional development actions occur during the new license periods, and guide the evaluation and treatment of additional resources that might be identified. Archaeological artifacts recovered from the project area and associated documentation would be curated in a newly designed facility. If funded and constructed, this Visitor Information Center, proposed in the Town of Cougar, would provide centralized curation space for cultural artifacts. Special facilities could be included to safely store artifacts and documentation. Public interpretation and education functions that include cultural resource topics could occur at this new facility. If the Visitor Information Center is not constructed, then PacifiCorp would retrofit an existing project building to safely store the artifacts.

Changes contemplated to National Register-eligible facilities within the Swift No. 1 Historic District or the Ariel (Merwin) Historic District would be limited in order to protect their historic value.

Tribal access to project lands for traditional cultural practices would be provided by both PacifiCorp and Cowlitz PUD except where unsafe conditions exist. Such activities could include berry picking and fishing.

2.3.1.14 Recreation Facilities

Under Alternative B, PacifiCorp's existing voluntarily operated recreation facilities in the project area would be formally included in the new FERC licenses, upgraded, modernized, and expanded over the term of the new licenses. In general, recreation

facility changes would improve accessibility, provide additional and improved day use and trail facilities (parking areas, group day use shelters, picnic tables, sanitation facilities), provide limited campground expansion (Cougar Camp and Swift Camp), create two new recreation sites (partial funding for a Visitor Information Center in Cougar; and if needed in the future, a river access site below Merwin Dam at the Switchback property), and an Americans with Disabilities Act (ADA)-accessible bank fishing site (Table 2.3-1). Each of these measures is described in greater detail below.

Visitor Management

Under Alternative B, non-motorized recreational use of project lands would be allowed except where conditions are determined to be unsafe. Vehicular access to sensitive areas, such as Cresap Bay, would continue to be restricted during sensitive periods. Controls would be implemented to discourage dispersed camping in upland areas that might conflict with agency wildlife and vegetation management objectives. Management goals would be communicated to the public through an interpretation and education program (I & E) that also would share resource information with the public. This program would include interpretive signs or kiosks at locations such as the Beaver Bay wetland.

PacifiCorp would enhance the experience of visitors by promptly posting signs when recreation sites are at capacity. The utility also would partially fund USFS efforts to reduce dispersed camping on lands it manages in the project areas.

Campgrounds and Day Use Facilities

PacifiCorp would continue to operate its voluntarily constructed day use and overnight recreation facilities in the Lewis River basin and include these measures in the new licenses. Under Alternative B, measures outlined in PacifiCorp's draft Recreation Resources Management Plan (Appendix B to the Swift No. 1 and Merwin license applications) would be implemented in accordance with the schedule presented therein. These measures would include two campgrounds at Yale Lake and Swift Creek Reservoir would be enlarged and expanded when monitoring demonstrates that there is a sustained need. At Yale Lake, Cougar Camp would be expanded to provide 78 - 90 new RV and/or tent campsites, as well as RV accessible group campsites. Swift Camp also would be expanded and would provide approximately 27 - 50 new RV and/or tent campsites, and 1 or 2 new group sites. In addition to future expansion, Cougar Camp and Park, Beaver Bay Campground and Eagle Cliff Park would be renovated. Measures at Beaver Bay would include replacing restrooms and increasing separation between the adjacent wetland and parking areas. RV holding tank dump sites at existing PacifiCorp campgrounds (Beaver Bay, Swift, Cougar, and Cresap Bay) would be made available for public use, reducing illegal dumping in the basin. A nominal fee would be charged for this use. At Swift Camp, a group picnic shelter would be constructed. Restrooms and parking areas would be renovated at Speelyai Bay Park. Restrooms would be provided or upgraded at PacifiCorp's five lower Lewis River access sites. In addition, modifications at Merwin Park would provide more activities for visitors, including volleyball courts, horseshoe pits, children's play area, and an additional group picnic shelter.

PacifiCorp would provide partial funding for a visitor information center in the Town of Cougar to provide recreation information and house cultural artifacts. The center would provide about 1,000 to 1,200 square feet of space for interpretive and educational materials and secure storage for historic and archeological artifacts and documents. The USFS has expressed an interest in taking the lead in developing this property with support from PacifiCorp.

Steps would be taken to reduce the impact of dispersed camping along sensitive shoreline areas. Dispersed shoreline camping would be prohibited around Lake Merwin. At Yale Lake and Swift Creek Reservoir, some shoreline campsites would be hardened to more clearly delineate each site, reduce disturbance to adjacent vegetation, and minimize soil erosion. Several sanitation facilities also would be provided. Dispersed camping would be prohibited at some shoreline sites on the upper two reservoirs.

Trails

In the Lake Merwin area, the Marble Creek Trail would be improved to provide a 1/4-mile ADA-accessible path to a scenic overlook. In addition, PacifiCorp would evaluate granting a trail easement across project lands to Lake Merwin for a potential development being considered by the Vancouver-Clark Parks and Recreation Department.

If appropriate easements can be obtained, recreational use of the Yale-IP Road would be secured and a non-motorized trail developed along the existing paved roadway and shoulder. Barricades would be erected to prohibit vehicular access to the trail. Trailheads with signs, single-vault toilet buildings, and gravel parking areas would be provided at each end of the trail. In addition, a mid-point rest stop would be provided.

In the Yale vicinity, two trail segments would be developed. A new trail would link Saddle Dam Park with the existing Saddle Dam area trail. Parking for equestrian trail riders would also be formalized at a Saddle Dam trailhead, providing space for horse trailers. The second trail would link Beaver Bay Campground and Cougar Camp, a two-mile multiple use segment that would be sited along the shoreline but away from SR 503.

If an easement can be obtained from the WDNR, a non-motorized trail at Eagle Cliff Park on Swift Creek Reservoir would link the park with the USFS boundary. This proposed trail would cross the FR 90 bridge and then proceed above Eagle Cliff, and then extend along the southern bank of the Lewis River.

Access

Boat launches would be improved at Speelyai Park, Yale Park, and Beaver Bay. One lane of these existing ramps would be extended from approximately 10 to 45 horizontal feet to enable boat launching during lower reservoir levels. A new non-motorized boat take-out site would be developed at the Yale Bridge. This site currently is a roadside pullout. Development would include a stairway with railing from the pullout to the shoreline. Users primarily would be Cedar Creek kayakers and other non-motorized boaters seeking an alternative take-out to the Cresap Bay boat launch.

During the term of the new licenses, should other lower river access sites exceed capacity, PacifiCorp would develop a new site below Merwin Dam known as the "Switchback" property. Monitoring would determine when this point has been reached. The site would include an existing switchback road, a small gravel parking area, and an access trail to the river.

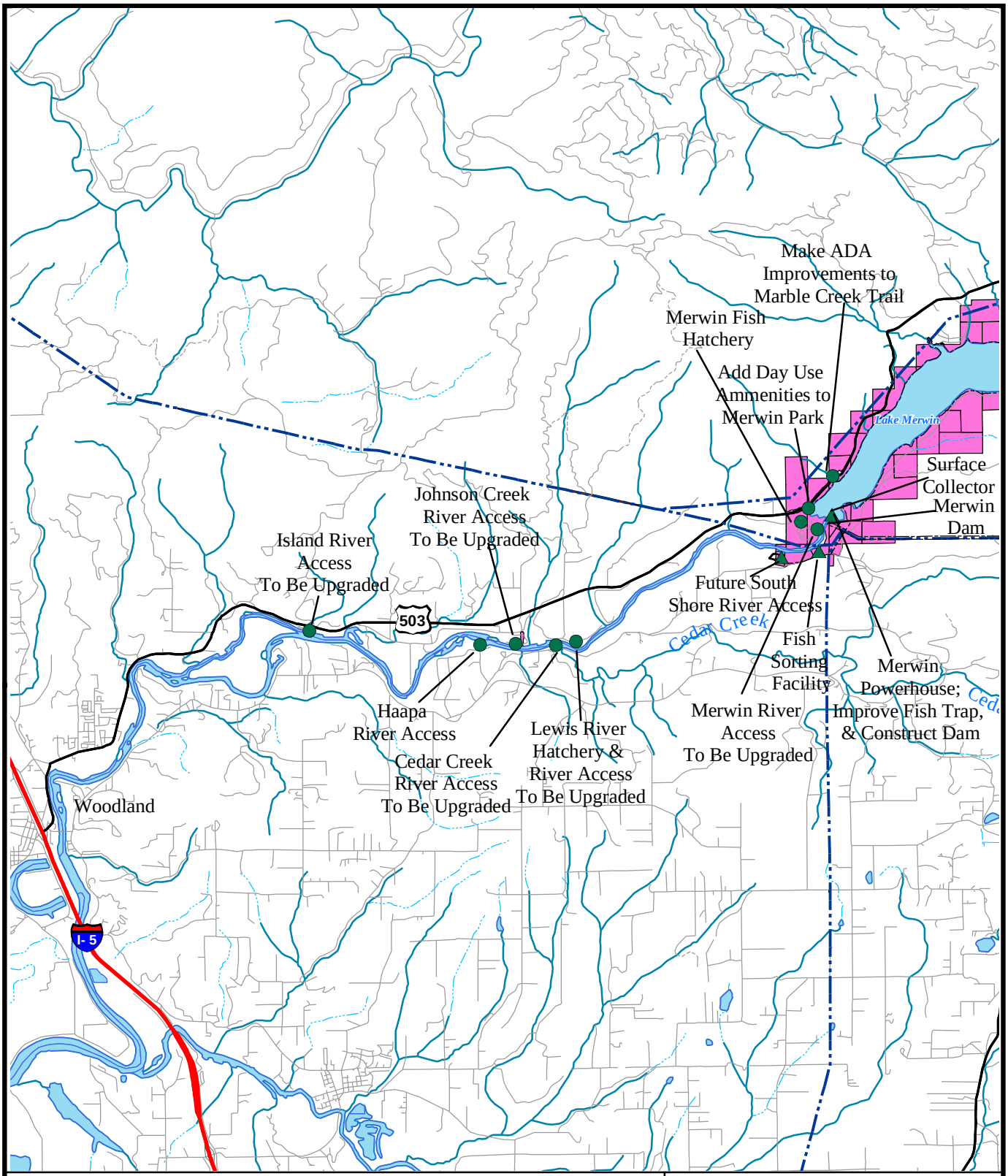
2.3.1.15 Socioeconomics

Existing funding for marine patrols and land-based law enforcement would be maintained, and funding support would be provided for a visitor information facility in Cougar.

2.4 ALTERNATIVE C

Alternative C was developed to analyze the impacts and effects of certain actions requested by some ALP stakeholders but not included in the Preferred Alternative. It builds from the baseline described in Alternative A. Under Alternative C, different or additional facility and operational changes from Alternative B would be implemented to establish anadromous fish production in all three of the Lewis River Project reservoirs. Facilities proposed to be modified or constructed are shown on Figure 2.4-1, and proposed enhancement measures are listed by resource category in Table 2.4-1. This table includes measures that are part of Alternative A plus additional measures specific to Alternative C. Unless otherwise specified, it is generally assumed that the Applicants would implement these measures within the first five years after the new licenses become final.

In general terms, the framework of Alternative C introduces anadromous fish to all three reservoirs with trap-and-tram facilities constructed at the base of Merwin and Yale dams and at the Swift No. 2 powerhouse. All fish entering the adult fish traps would be sorted and transported via overhead trams to the waterbody immediately upstream of where they were collected. Downstream migrants would be captured in floating surface collectors located just upstream of each dam and would be transported via pipelines to the waterbody directly below each dam. Hatchery production of anadromous fish would increase, using space created by eliminating rainbow trout and kokanee production. Operational changes include providing a variable flow regime in the Lewis River bypass reach; releasing pulsed flows from Merwin Dam four months per year; and adopting new downramping rates below Merwin Dam. Flood management, terrestrial measures, recreation enhancements, cultural resource and socioeconomic measures would be the same as described for Alternative B and, accordingly, are not further described here.



PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative C

FERC No. 935, 2071, 2111, 2213

Sheet 1 of 4

Figure 2.4-1

0 1 2 Miles

0 1 2 Kilometers

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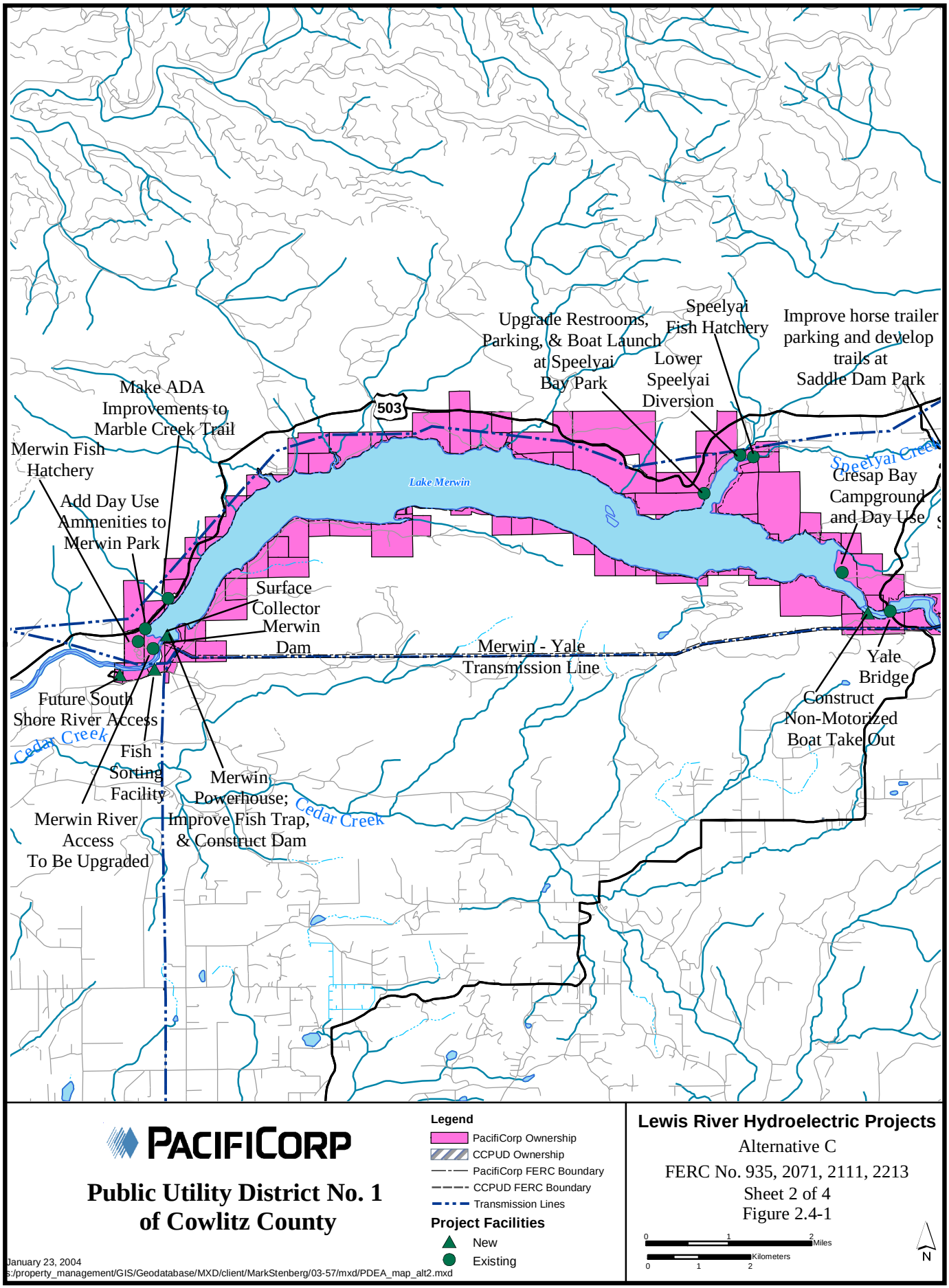
Upgrade Restrooms, Parking, & Boat Launch at Speelyai Bay Park
Speelyai Fish Hatchery
Lower Speelyai Diversion
Improve horse trailer parking and develop trails at Saddle Dam Park
Make ADA Improvements to Marble Creek Trail
503
Merwin Fish Hatchery
Speelyai Creek
Lake Merwin
Add Day Use Ammenities to Merwin Park
Cresap Bay Campground and Day Use
Surface Collector
Merwin Dam
Merwin - Yale Transmission Line
Yale Bridge
Construct Non-Motorized Boat Take Out
Future South Shore River Access
Cedar Creek
Fish Sorting Facility
Merwin Powerhouse; Improve Fish Trap, & Construct Dam
Cedar Creek
Merwin River Access To Be Upgraded
PACIFICORP
Public Utility District No. 1 of Cowlitz County
Legend
PacifiCorp Ownership
CCPUD Ownership
PacifiCorp FERC Boundary
CCPUD FERC Boundary
Transmission Lines
Project Facilities
New
Existing
Lewis River Hydroelectric Projects
Alternative C
FERC No. 935, 2071, 2111, 2213
Sheet 2 of 4
Figure 2.4-1
0 1 2 Miles
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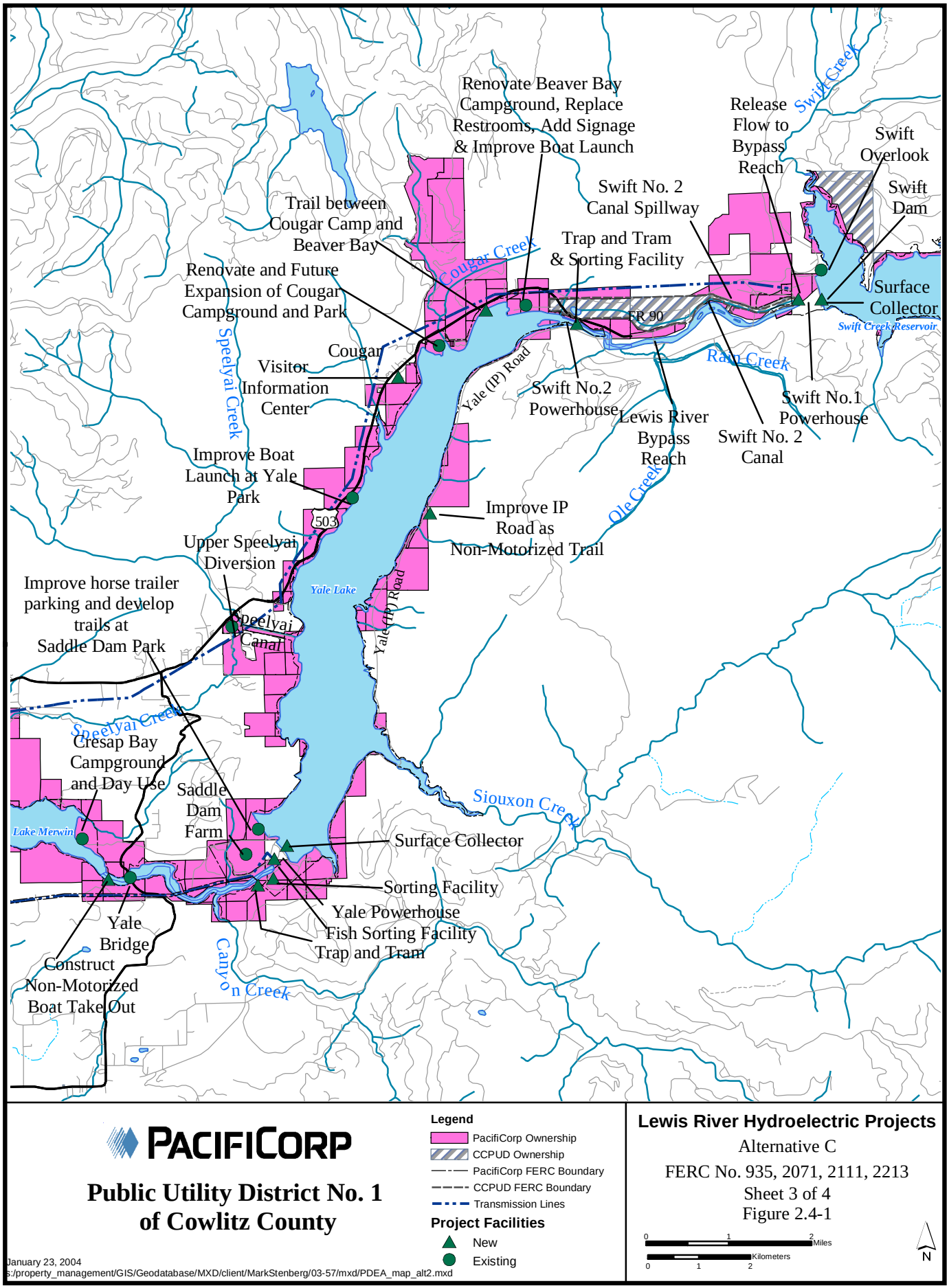

PACIFICORP

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- PacifiCorp Ownership
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- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative C

FERC No. 935, 2071, 2111, 2213

Sheet 3 of 4

Figure 2.4-1

0 1 2 Miles

0 1 2 Kilometers

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January 23, 2004

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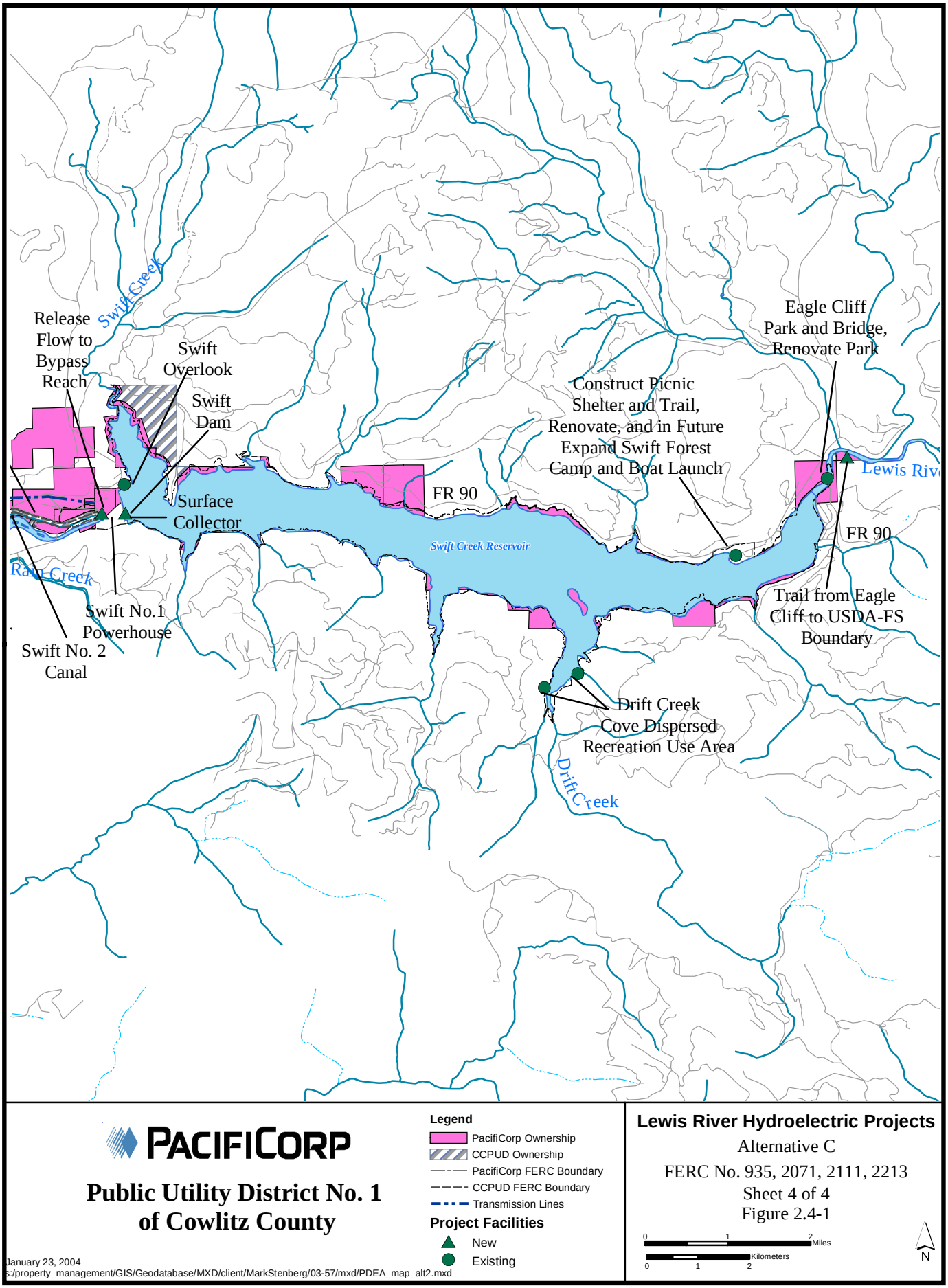

PACIFICORP

Public Utility District No. 1 of Cowlitz County

Legend

- PacifiCorp Ownership
- CCPUD Ownership
- PacifiCorp FERC Boundary
- CCPUD FERC Boundary
- Transmission Lines

Project Facilities

- New
- Existing

Lewis River Hydroelectric Projects

Alternative C

FERC No. 935, 2071, 2111, 2213

Sheet 4 of 4

Figure 2.4-1

0 1 2 Miles

0 1 2 Kilometers

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January 23, 2004

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2.4.1 Project Facilities, Operations, and Environmental Measures

This section describes modifications to project facilities or alterations to project operations under Alternative C. Environmental and social enhancement measures that would be implemented also are described in this section and summarized in Table 2.4-1. Measures that would be implemented in addition to Alternative A measures are presented in italics in Table 2.4-1; continuing measures (Alternative A) are in a standard font.

Table 2.4-1. Measures proposed under Alternative C.

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
Water Quality/Quantity	Water Quality	*Develop a Water Quality Management Plan to monitor compliance with state criteria.*	X	X	X	X
	Water Quantity	*Provide continuous variable flow release into the upper Lewis River bypass reach ranging from 100 to 400 cfs under average water conditions, and from 50 to 200 cfs under low water conditions.*	X	X		
		Maintain flow releases from the Merwin Project and provide pulse flows 1 day/week for 12 hours from 3/1 – 6/30. At flows over 5,000 cfs, pulses would be 120% of current flows, if this would be higher.				X
		Establish new downramping rates at Merwin: *Rate* *Dates* *2 in/hr* *2/16 – 10/31* *6 in/hr* *11/1 – 2/15* *No requirement at flows over 8,000 cfs or for pulsed flow releases.*				X
Flood Management		Maintain 17 feet of flood management storage.	X		X	X
		Improve the high runoff procedures.	X		X	X
		Reduce flood management season by 2 weeks.	X		X	X
		Provide funding to authorities responsible for flood notification, including emergency phone system and weather radio transmitter.	X		X	X
Aquatics	Upstream Fish Passage	*Construct a trap-and-tram, adult sorting facility, and back-up truck loading facility at Merwin. Transport salmonids to Lake Merwin. Return bull trout to the river or transport via truck to locations determined by agencies.*				X

Table 2.4-1. Measures proposed under Alternative C (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
		Construct a trap-and-tram, sorting facility and backup truck loading facility at Yale Dam. Transport anadromous fish to Yale Lake. Transport bull trout to locations as directed by the USFWS.			X	
		Construct a trap-and-tram, sorting, and back-up truck loading facility at Swift No. 2 and transport anadromous fish to Swift Creek Reservoir. Return bull trout and other non-hatchery resident fish to Yale Lake, or transport via truck to locations as directed by the agencies.	X	X		
		Follow NMFS and USFWS facilities and handling guidelines for anadromous fish and bull trout.	X	X	X	X
	Downstream Fish Passage	*Install floating surface collector systems at Swift, Yale, and Merwin dams to collect and direct fish through pipes penetrating the dams to the water body below.*	X	X	X	X
	Hatcheries: Anadromous	*Increase smolt production to 3,902,957 to meet objective of 106,000 pre-harvest ocean recruits. Adult species breakdown is 12,800 spring Chinook, 80,000 coho, and 13,200 steelhead.*	X		X	X
		Continue to partially fund operation of Speelyai Hatchery		X		
	Hatcheries: Resident	*Eliminate production of rainbow trout and kokanee.*	X			X
	Fish Monitoring	Support WDFW annual evaluation of fall Chinook in lower Lewis River.				X
		Monitor bull trout annually.	X	X	X	
		PacifiCorp monitors kokanee populations annually.			X	
		Monitor hatchery returns.	X		X	X
		Monitor fish passage facilities.	X	X	X	X
		Evaluate status of ESA listed anadromous species and bull trout.	X	X	X	X
Terrestrial	Habitat Management	*Develop and implement an integrated wildlife habitat management plan (IWHMP) for PacifiCorp lands using HEP data as baseline.*	X		X	X
		Buffer sensitive habitat from ground-disturbing activities (timber harvest, construction, etc.).	X		X	X

Table 2.4-1. Measures proposed under Alternative C (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
		Reduce dispersed campsites in shoreline and riparian areas, post rules and monitor on PacifiCorp lands.	X		X	X
		Maintain existing road closures through sensitive habitat areas and *identify additional areas for access control on PacifiCorp lands. Closures would involve installation and maintenance of gates to restrict vehicle access.*	X		X	X
		Cowlitz PUD manages its lands on Devil's Backbone to allow natural succession.		X		
	Timber Management	*Implement a timber management program on PacifiCorp lands, if applicable under the IWHMP.*	X		X	X
		Continue to manage roads on project lands to control runoff and erosion. Develop a culvert replacement plan and schedule to reduce barriers to wildlife and improve aquatic and riparian habitat connectivity at select streams through PacifiCorp lands.	X		X	X
		Develop and implement measures to maintain existing aquatic connectivity and control runoff and erosion from roads through Cowlitz PUD lands on Devil's Backbone.		X		
	Habitat Monitoring	Conduct annual raptor surveys on PacifiCorp lands.	X		X	X
		Monitor dispersed camping and day use on PacifiCorp lands.	X		X	X
		Implement BMPs to protect sensitive species and habitats during construction activities.	X	X	X	X
		Monitor the effectiveness of the IWHMP in improving wildlife habitat using the HEP in Year 17 of the new PacifiCorp licenses.	X		X	X
Recreation		*All recreation measures proposed under Alternative B would be implemented under Alternative C (see Table 2.3-1).*	X		X	X
Cultural	Resource Management	*Implement HPMP for Merwin, Yale and Swift No. 1.*	X		X	X
		Protect the integrity of properties listed in the NRHP.	X		X	X
		Preserve tribal access for traditional uses.	X	X	X	X

Table 2.4-1. Measures proposed under Alternative C (cont.).

Resource Area	Resource Component	Proposed Measure	S1[1]	S2[1]	Y[1]	M[1]
	Interpretation & Education	*Contribute information to an I & E plan.*	X		X	X
		Curate and interpret artifacts at a new Visitor Information Center in Cougar.	X		X	X
Socioeconomics		Continue to fund law enforcement (marine and land-based).	X		X	X
		Partially fund development of Visitor Information Center.	X		X	X

[1] S1 = Swift No. 1; S2 = Swift No. 2; Y = Yale; M = Merwin

2.4.1.1 Swift No. 1

Under Alternative C, PacifiCorp and Cowlitz PUD would modify Swift Dam to enable collection of migratory fish for downstream transport. Facilities include a surface collector, a fish sorting building, and other structural modifications described in Section 2.4.1.10. Upstream migrating fish would reach Swift Dam through facilities originating at Swift No. 2 as described in Section 2.4.1.9.

PacifiCorp and Cowlitz PUD also would modify Swift No. 1 to enable flow to be released to the upper end of the Lewis River bypass reach. A valve and pipe system would extend from one of the penstocks to a small diffusion structure at the base of Swift Dam. The diffuser would reduce the pressure of flow being released into the Lewis River bypass reach. Flows ranging from 50 to 400 cfs would be released continuously, reducing the amount of water entering both the Swift No. 1 powerhouse and the Swift No. 2 canal and powerhouse.

Modifications to seasonal reservoir operations would occur to provide continuous flow in the Lewis River bypass reach (Section 2.4.1.5) and as new high runoff procedures are adopted as part of the flood management protocol (Section 2.4.1.6). These modifications could occur in one of two ways: (1) by reducing flows for power generation in order to meet the bypass release objectives and retain the water surface level of Swift Creek Reservoir; or (2) by maintaining flows for power generation and meeting bypass reach objectives by drafting Swift Creek Reservoir.

While the second option is most attractive from a power generation perspective, it would not meet various environmental resource objectives. Under Option 2, if Swift No. 1 and Swift No. 2 were operated according to current practices (with no reduction in generation) and continuous flow provided to the bypass reach, Swift Creek Reservoir could reach critically low levels by the end of a water year. Such effects would be particularly severe during summer when electricity demand is high and reservoir inflows are low. In this circumstance, bypass reach releases combined with generation requirements would exceed inflow to the reservoir; consequently Swift Creek Reservoir storage levels would drop, significantly affecting reservoir management and access,

aquatic habitat, archaeological resources and recreation. The Applicants determined that this option could only be achieved at the expense of these other resource values; therefore, option (1) described above is included in Alternative C and analyzed in Section 3. Detailed analysis of reservoir operations described in Section 3.2 show relatively little change in the seasonal level of Swift Creek Reservoir while meeting the bypass reach release objectives, although at significant cost to generation at Swift No. 1 and Swift No. 2 (see Section 4.1.2). In the winter and early spring, water surface levels would average about four feet lower than under Alternative A, while average water levels in summer would be essentially unchanged.

2.4.1.2 Swift No. 2

PacifiCorp and Cowlitz PUD would construct a trap-and-tram facility originating adjacent to the Swift No. 2 tailrace and powerhouse to transport fish seeking to migrate upstream from Yale Lake to Swift Creek Reservoir. This new feature and ancillary structures are described in Section 2.4.1.9.

Operationally, less water would be discharged into the Swift No. 2 canal from Swift No. 1 because flow continuously would be released to the Lewis River bypass reach from a Swift No. 1 penstock. The generating capacity of Swift No. 1 and Swift No. 2 would be reduced.

2.4.1.3 Yale

PacifiCorp would construct a trap-and-tram at the base of Yale Dam, extending up the adjacent slope to a discharge pipe on the top of the dam to transport fish seeking to migrate upstream from Lake Merwin to Yale Lake. This new feature and ancillary structures are described in Section 2.4.1.9. Downstream-migrating fish would encounter a new surface collector that is described in Section 2.4.1.10.

Minor modifications to seasonal reservoir operations would occur as new high runoff procedures are adopted as part of the flood management protocol (Section 2.3.1.6). Detailed analysis of reservoir operations described in Section 3.2 shows little change in the seasonal levels of Yale Lake.

2.4.1.4 Merwin

PacifiCorp would construct a trap-and-tram facility originating at the base of Merwin Dam, extending up the adjacent slope to a discharge pipe on the top of the dam to transport fish seeking to migrate upstream from the lower Lewis River to Lake Merwin. This new feature and ancillary structures, including a modified fishway entrance, are described in Section 2.4.1.9. Downstream-migrating fish would encounter a new surface collector at Merwin Dam that is described in Section 2.4.1.10.

Operational modifications also would occur to assist fish migrating downstream. From March 1 through June 30, PacifiCorp would discharge pulses of higher flows from Merwin Dam to help flush the young fish downstream more quickly (see Section 2.4.1.5).

Other seasonal operational modifications could occur as new high runoff procedures are adopted as part of the flood management protocol (Section 2.4.1.6). Detailed analysis of reservoir operations described in Section 3.2 shows essentially no change in the seasonal level of Lake Merwin. Finally, PacifiCorp would adopt new down-ramping rates, modifying the rate at which flow is released from Merwin Dam, maintaining the current 2 inches per hour from February through October, and increasing this rate to six inches per hour the remainder of the year (Section 2.4.1.5).

2.4.1.5 Water Quantity

Under Alternative C, PacifiCorp and Cowlitz PUD would provide additional flow to the Lewis River bypass reach. Flows would be released near the base of Swift Dam through a diffusion structure that would withdraw flow from a Swift No. 1 penstock. Flows would range from 100 to 400 cfs in average water years and from 50 to 200 cfs in low water years (Table 2.4-2).

Table 2.4-2. Flow contribution to Lewis River bypass reach under Alternative C.

Month	Average Water Year Release (cfs)	Low Water Year Release (cfs)
January-March	300	150
April-May	400	200
June	300	150
July	200	100
August-October	100	50
November	200	100
December	300	150

PacifiCorp would release flow from Merwin Dam similar to current conditions, with two exceptions. To assist outmigrating smolts, pulsed releases of 5,000 cfs would be provided one day per week for 12 hours between March 1 and June 30. When flows are higher than 5,000 cfs, releases would be 120 percent of the current release. In addition, downramping rates would be modified. From February 16 through October 31, downramping would be limited to two inches per hour. The remainder of the year, down ramping would not exceed six inches per hour. During flow conditions over 8,000 cfs and during pulsed releases, ramping criteria would not apply.

2.4.1.6 Flood Management

Under Alternative C, PacifiCorp would adopt the same flood management measures as described for Alternative B (Section 2.3.1.6).

2.4.1.7 Water Quality

Water quality measures proposed for Alternative C would be the same as those proposed by PacifiCorp and Cowlitz PUD for Alternative B.

2.4.1.8 Aquatics

Alternative C attempts to establish anadromous fish production in the Lewis River and tributaries above all three dams. Fish would reach these waterbodies via overhead trams, as described in Section 2.4.1.9. Downstream migrants would be captured in floating surface collectors located just upstream of each dam and would be transported via pipelines to the waterbody below each dam. Hatchery production of anadromous fish would increase, using space created by eliminating rainbow trout and kokanee production. A variable flow regime in the Lewis River bypass reach would be provided and downramping rates below Merwin Dam would be modified. Pulsed flows would be released from Merwin Dam four months each year, releases that would not be subject to the new ramping rate restrictions.

Measures proposed as part of Alternative C to benefit fishery resources are described in Sections 2.4.1.9 through 2.4.1.11. Construction BMPs described in Section 2.3.1.8 also would be adopted under Alternative C.

2.4.1.9 Upstream Fish Passage

Upstream fish passage under Alternative C would be accomplished with new trap-and-tram, sorting, and back-up truck loading facilities at Merwin and Yale dams and at the Swift No. 2 Project. Anadromous fish and bull trout entering the adult traps would be sorted and segregated into short-term holding ponds for transport via overhead trams. These species would be discharged in the water body upstream of where they were collected. Species not intended to be passed upstream would be released to the stream downstream of where they were collected. Many of the measures described in this section are illustrated in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU5, Appendix 1). NMFS, WDFW, and USFWS design guidelines would be followed for each adult fish passage facility.

At Merwin Dam, PacifiCorp would improve the existing adult fish collection facility entrance and provide new sorting/transport facilities, as described in Alternative B. In addition to the truck loading stations beneath each circular holding tank, an additional tram loading station would be provided at the sorting/transport facility. An overhead cable tram (similar to a ski lift) would transport 500-gallon fish carriers approximately 500 feet to Lake Merwin. An unloading station at the top of this 150-vertical-foot rise would release fish from the carriers in their transport water through a pipe to the reservoir. Fish collected at the trap but not desired to be transported to Lake Merwin would be returned to the river downstream of the dam.

PacifiCorp would construct similar facilities at Yale Dam. Collection and sorting facilities at the Yale Project would be located on the south side of the river below the powerhouse. An entrance would be constructed southeast of the existing powerhouse, directing fish to a ladder leading to a sorting facility. Collected fish destined for the upper watershed would be transported via an overhead tram to a release point near the middle of Yale Dam. Fish collected but not desired to be passed to the upper watershed would be returned to Lake Merwin or the river downstream of the dam. The tram would

be approximately 1,500 feet long with a 260-foot vertical rise. An unloading station upstream of the dam would transfer fish directly to the reservoir via a fish release pipe.

PacifiCorp and Cowlitz PUD would construct similar fish collection facilities on the northeast side of the Swift No. 2 powerhouse, with a short fish ladder leading from the river to a sorting facility. An entrance near the Swift No. 2 powerhouse is preferred over a location in the Lewis River bypass reach to take advantage of the high attraction flow from the Swift No. 2 tailrace. This site also avoids potential damage to the entrance facilities that could be caused by spill from Swift No. 1. Sorted fish destined for the upper watershed would be moved via a flume to short-term holding ponds for loading into an overhead cable tram. Back-up truck loading facilities would be provided in the tram loading station. Fish collected but not desired to be passed to the upper watershed would be returned to Yale Lake. The cableway tram alignment would generally follow the Swift No. 2 canal towards Swift Dam, where it would cross the canal and ascend the dam to an unloading station at the north side of the dam. The alignment would be configured to avoid interference with the existing high voltage transmission lines along the north side of the canal. The length of the tram would be approximately 3.2 miles with a 520-foot vertical rise. An unloading station would transfer fish directly to the reservoir near the northeast side of Swift Dam via a fish release pipe.

2.4.1.10 Downstream Fish Passage

Under Alternative C, floating surface collectors at Swift, Yale, and Merwin dams would direct downstream migrants to the water body below each dam via pipes penetrating the dams. The floating collector at Swift Dam would be operational from March 15 through October 15 each year, and removed or secured during peak runoff months. Given their location away from the spillways, the floating surface collectors at Yale and Merwin would be capable of operating nearly year round, except for scheduled maintenance periods or extreme flood events. Additional detail for each site is provided below.

PacifiCorp and Cowlitz PUD would construct a floating surface collector, guide wall, intake net system, and docking station at Swift Dam. These facilities would be the same as those described for Alternative B, without the live box hoist or sorting and truck loading facilities. All fish entering the floating surface collector would be transported in a new pipeline through the dam, constructed at a level to accommodate a 60-foot forebay fluctuation. The bypass pipe would be designed to safely pass fish at reservoir elevations ranging from 1000 feet to 940 feet. An 18-inch-diameter, 12,000-foot-long pipeline would be required to pass 10 cfs from the forebay to the river below. The pipeline would traverse the south shore, where it would be buried or anchored to the rock walls to a “fish friendly” outfall release point at an approximate elevation of 605 feet.

PacifiCorp would construct a collection system at Yale Dam similar to that at Swift Dam, sized for 600 to 1,000 cfs. The floating barge would be located near the intakes on the south side of Yale Dam, but unlike the Swift system, it would be designed for permanent installation because it would not impair the spillway flow path. The barge would be designed to be moved upstream to a docking station for maintenance if needed. Given the configuration of Yale Dam, no guide wall is proposed, and guide nets leading to the

intake would be tethered to the dam, the reservoir bottom, and the shoreline. The bypass pipeline would penetrate the dam at a level accommodating reservoir fluctuations between elevations 490 and 474 feet. An 18-inch-diameter, 7,800-foot-long pipeline would pass 10 cfs from the forebay to the reach below the dam at approximately elevation 241 feet.

PacifiCorp would construct a surface collector and guide net system for Merwin Dam similar to that described for Yale Dam. The floating barge would be located approximately 150 feet from the face of the dam and 400 feet from the south shore. A single guide net would extend from the shoreline to the floating surface collector to enhance the collection performance. This collector would also use attraction flows of 600 to 1,000 cfs, which would be reduced to about 10 cfs to carry fish into the bypass pipeline. A 30-inch-diameter pipeline would penetrate the dam at an elevation to accommodate reservoir levels of between 239.6 and 227 feet. This would transition to an 18-inch-diameter, 5,800-foot-long pipeline carrying 10 cfs to the river below the dam. The fish friendly outfall would be anchored at approximately elevation 55 feet. This facility could be left in place year round, or could be moved to an upstream docking station along the south shore during high flow, off-migration periods, or for maintenance.

2.4.1.11 Hatchery Facilities and Operations

Under Alternative C, hatchery facilities would be unchanged from Alternative A, with the exception of improvements to the sorting facilities at the Lewis River Hatchery and cessation of the resident fish production program (rainbow and kokanee) to accommodate greater anadromous production. Anadromous production objectives at the three hatcheries would increase to 106,000 pre-harvest anadromous adults (12,800 adult spring Chinook; 91,000 adult coho; and 13,200 adult steelhead) representing a 13 percent increase over Alternative A.

2.4.1.12 Terrestrial Resources

Terrestrial measures proposed under Alternative C would include most of the actions described for Alternative B (Section 2.3.1.12). In addition, Alternative C includes an integrated wildlife habitat management program that would replace the MWHMP and would cover all PacifiCorp lands over the next license periods. This program would use the data collected during the Habitat Evaluation Procedure (HEP) as the baseline for developing an Integrated Wildlife Habitat Management Plan (IWHMP) and monitoring the results. The IWHMP would include, but is not limited to, the following measures: (1) managing forests to improve habitat for big game and other native species; (2) planting native hydrophytic species to enhance wetlands; (3) installing water control structures, if needed, to improve or protect wetland hydrology; (4) planting shrubs along roads, rights-of-way (ROWs), and open areas to provide wildlife cover; (5) managing existing grasslands and pastures, as appropriate, to meet specific objectives to enhance wildlife habitat; (6) creating/protecting habitat for species that use cavities and snags for reproduction and foraging; (7) developing and managing additional big game forage areas; (8) maintaining and/or increasing areas of late-successional forest (large trees); (9) controlling bullfrog populations in created wetlands, if feasible; and (10) developing a

noxious weed control program. The IWHMP may preclude or limit timber harvest on some PacifiCorp project lands.

2.4.1.13 Cultural Resources

Enhancement measures and operational protocols described for Alternative B (Section 2.3.1.13) each would be implemented under Alternative C.

2.4.1.14 Recreation Facilities

Recreation measures proposed under Alternative C would be the same as those proposed for Alternative B (Section 2.3.1.14).

2.4.1.15 Socioeconomics

Measures proposed as part of Alternative B also would be implemented under Alternative C (Section 2.3.1.15).

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

As part of this analysis, two other alternatives to these alternatives were initially considered. Project decommissioning was evaluated but eliminated from detailed investigation as was an alternative framed around the construction of fish ladders and installation of exclusionary screens at Swift, Yale and Merwin dams. A brief description of these potential alternatives is presented in this section, along with an explanation of why they were not considered further.

2.5.1 Project Decommissioning

Under a project decommissioning alternative, one or more of the Swift No. 1, Swift No. 2, Yale and Merwin projects would be decommissioned by removing the dams and removing or securing powerhouses, switchyards, substations, and other associated project features. Fish hatcheries would either be removed or sold. Funding for the Lewis River Hatchery would be discontinued, and if it were to be abandoned by WDFW, the property would revert to PacifiCorp ownership.

Removal of one or more project dams would not meet the need for power and project purposes, which include: providing reliable and least cost electric service to customers; serving as peaking and regulation facilities to provide necessary operational flexibility and to manage system reliability requirements; satisfying a projected increase in future energy needs at least cost; and providing flood management capabilities.

On average, Swift No. 1, Yale and Merwin together generate approximately 1,715,406 MWh of electrical energy per year. Swift No. 2 will generate an average of 217,300 MWh per year. Removing one or more of the projects would reduce or eliminate generating capability, thus frustrating or entirely precluding the utilities' ability to use the projects as peaking and regulation facilities, which is critical to meeting system reliability

requirements. Furthermore, a reduction or elimination of generating capability would increase customer reliance on more expensive sources of alternative power, thus increasing the total cost of electric service to customers. Finally, removing one or more project dams would decrease or eliminate flood storage capability in the basin. Significant flood damage currently occurs about every 25 years. Partial dam removal would cause more frequent flooding, while removal of all project dams would result in major flooding approximately every five years. Removing one or more project dams would therefore not meet the needs identified in Section 1.

Removal of one or more of the project dams would also be inconsistent with FERC policy on decommissioning, which states that decommissioning is appropriate when a project, "no matter how conditioned, could no longer meet the comprehensive development standard of the Federal Power Act," or "where the licensee of an already marginal project is confronted with additional costs at relicensing that render the project uneconomic" 60 Fed. Reg. 339 at 339, 340, 342 (Jan. 4, 1995). On the contrary, appropriate license terms can ensure that the projects are consistent with the Federal Power Act's comprehensive development standard without rendering the projects uneconomic.

Because removing one or more project dams would not meet the need for power and project purposes and would be inconsistent with FERC policy, this alternative has been rejected as unreasonable and eliminated from further evaluation.

2.5.2 Fish Ladders and Criteria Screens

Under this alternative, fish ladders would be constructed at Swift No. 2 and at Yale and Merwin dams, and exclusionary fish screens with bypass pipelines would be constructed at Swift, Yale, and Merwin dams. The objective would be to provide volitional passage for upstream and downstream migrating fish to each project reservoir.

Designs that were analyzed for upstream passage included three concrete ladders with minimal fish sorting capabilities, conceptually illustrated in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU 5, Appendix 1). This series of ladders would be the tallest in the world in rise over length dimensions. From the base of Merwin Dam, upstream migrants would navigate a 2,300-foot-long ladder with a total rise of 197 feet, exiting through a structure designed to adjust to the fluctuating level of Merwin Lake. A 3,900-foot-long ladder around Yale Dam would have a total rise of 259 feet, with similar design requirements to accommodate a 16-foot fluctuation in Yale Lake. Fish passage around Swift Dam would commence adjacent to the Swift No.2 powerhouse, with a combination conventional ladder and canal totaling 16,950 feet in length. The overall rise of this feature would be 530 feet, culminating in a large exit structure to accommodate the 40-foot fluctuation of Swift Creek Reservoir. The overall construction cost for this series of ladders is estimated at $83.4 million, including back-up trap-and-haul facilities.

Designs analyzed for downstream passage included two types of full exclusionary V-screen systems at each dam: a "criteria" screen system, and an increased velocity screen

system. These alternatives are conceptually illustrated and described in PacifiCorp and Cowlitz PUD (2003f and 2004: AQU 5, Appendix 1).

For the "criteria" exclusionary system, the fish screens were sized to meet NMFS criteria for an approach velocity of 0.4 fps, with a 60 second maximum travel time to a bypass system for each site. The screens were developed to accommodate flows and reservoir fluctuations of: 9,120 cfs / 40 feet; 9,760 / 16 feet; and 11,470 cfs / 10 feet at Swift, Yale, and Merwin dams, respectively. Fish and water leaving the bank of V-screens would flow to a secondary dewatering facility that would release about 30 cfs to a bypass pipeline. The bypass pipelines would be routed through a subsampling facility, and then directly to the reservoir or river below each project. Fish would be released to the receiving water body through an outfall structure designed to accommodate the tailwater fluctuation at the release point.

To accommodate high flows, the criteria screens were laid out in a bank of four parallel V-screens, resulting in a complex about 240 feet wide by 600 feet long including the secondary dewatering screens. The banks of screens were envisioned to be located on a bench excavated into the shoreline near the intakes of each dam. The construction cost for the screen systems alone was estimated at $192.5 million. An additional $30 to $40 million would be required for the bypass pipelines, subsampling and head dissipation facilities to allow operation with the specified forebay fluctuations, resulting in a total system cost of about $232 million for all three dams.

Due to the large size, difficult and costly site work necessary, the need to accommodate large reservoir fluctuations and the untested nature of this magnitude of a screening system, resource agency comments during the conceptual design phase indicated a willingness to examine a higher velocity screen system. Specifically, concepts were developed to examine screens with an approach velocity of 0.8 fps, with a 120 second maximum travel time to a bypass system for each site. This approach resulted in banks of two parallel V-screens that were half the size of the criteria screens. Costs were estimated at $156.8 million for the screen system, and about $196 million for the entire system with bypass and subsampling facilities for all three dams.

Given the height and length of the studied ladder system, there is biological risk that significant numbers of fish may not be capable of successfully migrating past this series of ladder and reservoir complexes relative to other alternatives. The fish ladder alternative is very costly relative to other upstream passage options. Similarly, the exclusionary screens considered are unprecedented in the industry at the 10,000 cfs flow range and noted reservoir fluctuations, and current knowledge of downstream fish passage technology does not indicate that anticipated biological performance of this type system would be any better than other systems described in the PDEA. Additionally, the logistics of screening 100 percent of the turbine flows would create significant operational difficulties with debris handling, especially at the upstream most projects.

The fish ladder and exclusionary screening alternative is substantially more costly than other alternatives with respect to capital facilities and in annual operating cost considering power generation losses caused by water diversions to the ladders and

screens. Because this alternative is not expected to perform any better than other less costly alternatives, and because the ladder system has significant risk associated with even meeting the biological goals, the fish ladder and exclusionary fish screen alternative has been eliminated from further evaluation.

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