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4.0 DEVELOPMENTAL ANALYSIS

This section analyzes the use of the Lewis River's water resources by the Swift No. 1, Yale and Merwin projects to generate hydropower, estimates the economic benefits of the projects, and estimates the cost of various environmental measures and the effects of those measures on project operations.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECTS

This power and economic benefits analysis considers the net benefits of the Swift No. 1, Yale and Merwin Projects together because they are operated together to meet the needs of PacifiCorp's customers. This analysis also assumes that Swift No. 2 is operated as described elsewhere in this document. Shaping of power from Swift No. 1 to higher value periods would be impacted if Swift No. 2 were not operated as described. PacifiCorp's three projects have a combined 510 MW capacity, comprising almost 50 percent of PacifiCorp's total hydroelectric resources. However, the power benefits of the Projects are far more significant than megawatts generated. Flexible resources such as the Lewis River Projects are essential to ensure system reliability and to meet fluctuating power requirements. The projects are used to maintain the operational integrity of the regional power system during shifts in the load/resource balance. In short, because of the high degree of interconnectivity in the western United States, this highly flexible and diverse resource helps improve the overall reliability and safety of the regional power grid, particularly because there are a limited number of flexible resources west of the Cascade Mountains along the Interstate 5 corridor.

The economic benefits analysis (Table 4.1-1) is based on current costs, with no assumptions concerning future escalation or de-escalation of the various cost components included in the cost of project power or alternative power. The current cost economic analysis is not entirely a first-year analysis in that certain costs, such as major capital investments, would not be expended in a single year. The analysis period used to analyze such costs is 30 years. Also, some future expenses, such as tax depreciation expenses, are known and measurable, and are, therefore, incorporated into the cost analysis. Although the effects inflation may have on the future cost of electricity are not explicitly accounted for, the fact that hydropower generation is relatively insensitive to inflation compared to fossil-fueled generators is an important economic consideration for power producers and the consumers they serve.

Table 4.1-1 sets forth economic information and parameters common to this section's analysis of all of the alternatives considered. The cost estimates for the various environmental measures analyzed are for the total cost of those measures. PacifiCorp and Cowlitz PUD may jointly implement the measures as described in Section 2 and share in the cost of implementation; however, agreement has not yet been reached on the cost share for those measures.

Alternative B's environmental measures compared to Alternative A would decrease the annual generation at the two Swift projects by approximately 3,500 MWh. PacifiCorp's

share of this generation reduction would be approximately 2,600 MWh. Under this alternative, annualized costs would increase by about $6,598,000. The Levelized Net Benefit of the project would decrease by $3.87/MWh.

Measures proposed under Alternative C compared to Alternative A would decrease the annual generation at the Swift projects in low water years by about 42,200 MWh and by approximately 84,400 MWh in average to high water years. This analysis assumes low water years occur 50 percent of the time, on average, resulting in an average reduction of approximately 63,300 MWh under Alternative C. PacifiCorp's share of the average generation reduction would be approximately 46,800 MWh. Annualized costs would increase under Alternative C by about $14,728,000. The Levelized Net Benefit of the project would decrease by $9.30/MWh.

Table 4.1-1. Assumed values for power and economic benefit analysis.

Assumption	Value
Energy value levelized over analysis period	$38.04 /MWh [a]
Period of analysis	30 years
Interest/discount rate	7.5% [b]
O&M costs (in 2003 dollars)	$7,768,000/year [c,d]
Net investment (on March 31, 2003)	$116,423,178 [e]

[a] Based on Mid-Columbia prices for On-Peak hours ($40.25/MWh) and Off-Peak hours ($33.74/MWh) for 12 months ending March 31, 2004 per Bloomberg.

[b] Reflects PacifiCorp's regulated after-tax cost of capital.

[c] Based on four-year inflation-adjusted average of reported FERC Form 1 O&M costs (1999-2002).

[d] Annual FERC fees assumed included in annual O&M cost.

[e] A project net investment value of $98,599,333 and accumulated relicensing costs of $17,823,845 as of March 31, 2003.

The economic benefits of the projects are more than the low-cost energy produced. As described in the socioeconomics analysis of this PDEA, the projects provide employment, both at the project facilities and recreational facilities, and significant tax revenues. In addition, the projects provide significant flood management benefits to the downstream area which cannot be quantified in terms of economic benefits.

4.2 COST OF ENVIRONMENTAL MEASURES

Most of the measures included as part of the action alternatives would affect project economics by requiring capital outlays for construction, equipment and studies, as well as annual operation and maintenance (O & M) costs. In addition, releasing flow to the Lewis River bypass reach would result in loss of generation at Swift No. 1 and Swift No. 2. In this section, capital costs and O & M expenditures are presented in 2003 dollars for the environmental measures described in Chapters 2 and 3. Where O & M costs would be invested other than on an annual basis, the likely schedule is identified. It is important to note that the costs presented in the following tables for Alternatives B and C are additive to the Alternative A costs, unless otherwise noted.

4.2.1 Geology and Soils Measures

Erosion control plans would be developed for all new project facilities to minimize erosion during their construction and operation. These measures would be more extensive under Alternative C than Alternative B because more extensive construction is proposed.

Geology and Soils Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
Alternative A Measures		
▪ (none)	$0	$0
Alternative A Total Cost	**$0**	**$0**
Alternative B Measures		
▪ Develop Erosion Control Plans (erosion control measures are included in construction cost)	$20,000	0
Alternative B Total Cost	**$20,000**	**$0**
Alternative C Measures		
▪ Develop Erosion Control Plans (erosion control measures are included in construction costs)	$40,000	$0
Alternative C Total Cost	**$40,000**	**$0**

4.2.2 Water Quantity Measures

Annual costs of flood management under Alternative A are more or less inseparable from the costs of day to day operation of the projects for power generation. For the purpose of this analysis, estimated costs for flood management under Alternative A assume the following: six person-months per year of staff time in support of flood management; and annual expenditures of $50,000 to cover costs of equipment maintenance (including monitoring equipment), communication charges, computer hardware and software, etc. The total recurring annual cost of flood management operations is estimated at $140,000.

Costs for flood management under Alternatives B and C involve on-going costs similar to Alternative A plus additional costs for development and implementation of forecast-based high runoff operating procedures, and financial contributions to local authorities for improved flood notification systems and procedures.

The estimated cost to develop and implement a forecast-based high runoff procedure under Alternatives B and C assumes the following: (1) procure flow forecasts at an annual cost of $72,000; (2) PacifiCorp provides three person-months per year of staff for forecast-based operations, including archiving forecasts and periodic assessments of forecast accuracy; (3) acquire, operate and maintain one additional weather station and one additional stream flow station to provide data in support of forecast-based operations; and (4) fund initial development and testing of forecast-based high runoff procedures, including obtaining regulatory approval for such procedures. The total initial investment

for implementation of forecast-based high runoff procedures is estimated at $150,000 with a recurring annual cost of $112,000.

The estimated cost to support improved notification systems and procedures under Alternatives B and C assumes the following: (1) contribution to local emergency management authorities of $25,000 to fund acquisition and first year maintenance of a new emergency telephone notification system; (2) annual payment of $4,500, estimated to be half the annual maintenance cost of the system after the first year of operation; (3) annual payment of $9,000 for mechanical operation and maintenance of a new weather radio transmitter; and (4) fund one person-month per year to coordinate with other parties having flood management interests and responsibilities. The initial contribution for improved flood notification is estimated at $25,000. Total recurring annual cost is estimated to be $22,000.

Under Alternative B, a new release mechanism would be constructed from Swift No. 2 canal that would continuously release a minimum of 50 cfs to a large pool in the Lewis River bypass reach. Flows would be released continuously to the upstream end of this reach under Alternative C in amounts typically ranging from 100 to 400 cfs. These releases would be reduced under low water years to the range of 50 to 200 cfs.

Generation losses under Alternative B are primarily a result of the increased flows directed to the Lewis River bypass reach as discussed above. Under Alternative B, relative to Alternative A there would be a reduction in annual generation from the combined Swift No. 1 and Swift No. 2 generation of about 3,500 MWh. Approximately 79 percent of this reduction in generation would be on peak hours. Further analysis of generation losses is provided in Section 4.3.

Generation losses under Alternative C are primarily a result of the increased flows directed to the Lewis River bypass reach as discussed above. Under Alternative C, relative to Alternative A there would be a reduction in annual generation from the Swift No. 1 project during an average or high water year of about 65,300 MWh, and a reduction in the Swift No. 2 generation of about 19,100 MWh, for a total generation loss of about 84,400 MWh. In low water years, when releases to the bypass reach would be lower, the generation losses would amount to about 32,500 MWh from the Swift No. 1 project and about 9,700 MWh from Swift No. 2 for a total generation loss of about 42,200 MWh. Approximately 79 percent of this reduction in generation would be on peak hours. Further analysis of generation losses is provided in Section 4.3.

Water Quantity Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
Alternative A Measures		
▪ Flood management operations	$0	$140,000
Alternative A Total Cost	**$0**	**$140,000**
Alternative B Measures		
▪ All measures described under Alternative A would continue		
▪ Develop and implement forecast-based high runoff procedure	$150,000	$112,000
▪ Improve flood notification systems and procedures	$25,000	$22,000
▪ Construct outlet from Swift No. 2 canal to continuously supply flow to the bypass reach	$500,000	$15,000
Alternative B Incremental Cost	**$675,000**	**$149,000**
Alternative C Measures		
▪ All measures described under Alternative A would continue		
▪ Develop and implement forecast-based high runoff procedure	$150,000	$112,000
▪ Improve flood notification systems and procedures	$25,000	$22,000
▪ Provide a continuous variable flow regime to the Lewis River bypass reach.	$1,800,000	$45,000[a]
Alternative C Incremental Cost	**$1,975,000**	**$179,000**

[a] Additional economic cost for this measure is reflected in Table 4.3-2 as lost generation to be replaced from other sources.

4.2.3 Water Quality Measures

Costs associated with water quality monitoring assume the implementation of monitoring stations at all three project tailraces, as well as implementation of automated controls to reduce the risk of exceedances of the TDG standard at Merwin and Swift No. 1. Costs for an automated TDG control system at Yale are included under Alternative A because this system has been installed and is in the testing and evaluation phase. In addition to TDG, monitored parameters would include temperature, dissolved oxygen, and pH. Alternatives B and C have the same monitoring costs.

Capital costs assume $10,000 per station and replacement at 10-year intervals (initial installation and three replacements over a 30-year period). Annual O&M for Alternative B and C include data management, reporting, and maintenance of equipment at the three projects ($20,000 for Merwin, Yale, and Swift No. 1).

Water Quality Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003$)
Alternative A Measures		
▪ Ongoing TDG and water quality monitoring	$10,000	$10,000
Alternative A Total Cost	**$10,000**	**$10,000**
Alternative B Measures		
▪ Water Quality Management Plan, with Alternative A monitoring	$120,000	$20,000
Alternative B Incremental Cost	**$120,000**	**$20,000**
Alternative C Measures		
▪ Water Quality Management Plan, with Alternative A monitoring	$120,000	$20,000
Alternative C Incremental Cost	**$120,000**	**$20,000**

4.2.4 Fish Habitat Measures

Under all alternatives, the PacifiCorp would continue to fund lower Lewis River fall Chinook spawning ground surveys, tagging of juvenile wild fall Chinook, investigations of predation on juvenile fall Chinook, and annual fall Chinook population estimates. Under Alternatives A and B, PacifiCorp would also fund bull trout and kokanee evaluations in Yale Lake and other measures to protect anadromous salmonids. Similarly, this would be conducted under Alternative C, but the effort would target only bull trout because kokanee stocking would cease.

Fish Habitat Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003$)
Alternative A Measures		
▪ Lower Lewis River fall Chinook evaluations	$0	$80,000
▪ Bull trout/kokanee evaluations	$0	$30,000
Alternative A Total Cost	**$0**	**$110,000**
Alternative B Measures		
▪ All measures described under Alternative A would continue.		
Alternative B Incremental Cost	**$0**	**$0**
▪ *Alternative C Measures*		
▪ Continue bull trout evaluations but discontinue kokanee evaluations.		($15,000)
Alternative C Total Cost	**$0**	**($15,000)**

4.2.5 Downstream Fish Passage Measures

Capital cost estimates for proposed downstream fish passage measures are based on designs developed in the Engineering Feasibility Study for Fish Passage Facilities - Phase 2 (PacifiCorp and Cowlitz PUD 2003f and 2004: AQU 5, Appendix 1). Cost estimates are based on quantity take-offs from the conceptual drawings, a comparison of past projects of similar scope and the 2001 Means estimating manual. The estimates include a 30 percent contingency to the construction subtotal to cover unforeseen items and to address issues not yet analyzed in detail. The estimates also include an additional 25 percent to address engineering, permitting, construction management and administrative costs. In addition, costs assume upgrades to the fish passage facilities in years 11, 17, and 22 for an additional $7,500,000. Costs listed in this section were escalated to 2003 dollars from the 2001 Phase 2 Report estimates using the Engineering News Records (ENR) construction cost index, which equated to a 6 percent adjustment. Additionally, costs presented in the 2001 Phase 2 report for the floating surface collector alternative were updated based on new information regarding the as-built cost of similar fish collection facilities.

Operation and maintenance costs were developed assuming a Full Time Equivalent (FTE) rate of $60/hour during the fish migration season. The period of juvenile downstream migration used for the estimates extends from mid-March to mid-October. Costs were generally based on knowledge of operations and maintenance activities of similar facilities currently under operation. Off-season docking facilities for the floating surface collectors in Alternatives B and C were based on the use of a tug and mobile crane.

Downstream Fish Passage Measures	**Capital Cost (in 2003 $)**	**Annual O&M Cost (in 2003 $)**
Alternative A Measures		
▪ No measures	$0	$0
Alternative A Total Cost	**$0**	**$0**
Alternative B Measures		
▪ Downstream floating surface collector at Swift with guidewall, guide nets, sorting and transport facilities.	$60,340,000	$322,500
▪ Passage monitoring and evaluation	$0	$140,000
Alternative B Total Cost	**$60,340,000**	**$462,500**
Alternative C Measures		
▪ Floating surface collector at Swift Dam, with fish bypass pipe to tailrace.	$47,700,000	$201,400
▪ Floating surface collector at Yale with fish bypass pipe to tailrace.	$19,910,000	$145,500
▪ Floating surface collector at Merwin with fish bypass pipe to tailrace.	$18,980,000	$145,500
▪ Passage monitoring and evaluation	$0	$201,000
Alternative C Total Cost	**$86,590,000**	**$693,400**

4.2.6 Upstream Fish Passage Measures

Capital cost estimates for upstream fish passage facilities were developed in the same manner as the downstream fish passage facilities described in Section 4.2.5. Similarly, O&M costs were also developed as described in Section 4.2.5, except the period of adult upstream migration used for the estimates runs year round.

Upstream Fish Passage Measures	**Capital Cost (in 2003 $)**	**Annual O&M Cost (in 2003$)**
Alternative A Measures		
▪ No measures		
Alternative A Total Cost	**$0**	**$0**
Alternative B Measures		
▪ Trap & haul, from Merwin tailrace to Swift Creek Reservoir with improved trap entrance and new sorting/truck loading facility.	$6,000,000	$356,000
▪ Periodically net bull trout from Yale tailrace.	$0	$15,000
▪ Passage monitoring and evaluation	$0	$94,000
Alternative B Total Cost	**$6,000,000**	**$465,000**
Alternative C Measures		
▪ Trap & tram at Merwin, with sorting/ emergency backup truck loading facility.	$8,170,000	$334,500
▪ Trap & tram at Yale, with sorting/ emergency backup truck loading facility.	$17,920,000	$288,000
▪ Trap & tram at Swift No. 2, with sorting/ emergency backup truck loading facility.	$17,050,000	$288,000
▪ Passage monitoring and evaluation	$0	$134,000
Alternative C Total Cost	**$43,140,000**	**$1,044,500**

4.2.7 Fish Hatchery Measures

Costs for fish hatchery measures are summarized in the table below, including both capital and associated operations and maintenance costs for hatchery Alternatives A, B, and C. Costs for Alternative A (existing conditions) are based on recent budget information for the Lewis River Hatchery complex.

Measures included for Alternative B would reduce current hatchery production. Hatchery operations and management would be consistent with ESA species management. As natural runs are established above Merwin Dam, hatchery production gradually would decrease for both supplementation and mitigation purposes.

Hatchery goals for Alternative C would increase production of anadromous fish using rearing space created by reducing production of resident fish. Hatchery operations and management would be consistent with ESA species management.

Fish Hatchery Measures	**Capital Cost (in 2003 $)**	**Annual O&M Cost (in 2003$)**
Alternative A Measures		
▪ Lewis River Hatchery Complex continued operation	$500,000	$1,700,000
Alternative A Total Cost	**$500,000**	**$1,700,000**
Alternative B Measures		
▪ Hatchery production would be reduced under this alternative with further reductions as natural runs are reestablished.	Same as Alternative A	($850,000)
Alternative C Measures		
▪ Production of anadromous fish would increase. Production of resident fish would be eliminated.	Same as Alternative A	Same as Alternative A

4.2.8 Terrestrial Habitat Measures

Estimated costs for terrestrial resource measures are provided below; capital costs range from $695,000 for Alternative A to about $1.7 million for Alternative C. Annual O&M costs vary from $325,000 for Alternative A to $356,000 and $556,000 for Alternatives B and C, respectively.

The Merwin Wildlife Habitat Management Plan (MWHMP) is a major component of Alternatives A and B. Large capital projects, such as culvert replacements would occur over the first five years of the new licenses. Based on past cost for implementing the MWHMP, future annual O&M cost of $100,000 is expected to cover routine maintenance of gates, roads, farm fields, orchards, and culverts, as well as contracts for weed control. Net costs associated with pre-commercial thinning and timber harvests for habitat improvement on PacifiCorp lands outside the MWHMP are estimated at $200,000 annually.

An Integrated Wildlife Habitat Management Plan (IWHMP) would be developed for all PacifiCorp lands under Alternative C and include improvements to habitat management procedures in the MWHMP. Capital costs associated with developing and implementing this plan are estimated at $200,000 and $500,000, respectively. Since the plan will be applied across all PacifiCorp owned lands and will probably include a wide variety of habitat improvement measures, annual O&M is estimated at $300,000. This amount also covers the monitoring program for the IWHMP, which would include re-application of the Habitat Evaluation Procedure about halfway through the next license period to evaluate the success of the plan.

All of the alternatives include measures to incorporate spatial and/or temporal buffers, close roads, reduce barriers to movement along stream corridors, and manage roads to reduce erosion. Alternatives B and C, however, provide more measures to improve aquatic and riparian habitat connectivity than Alternative A. Costs for these measures were estimated using information provided by PacifiCorp and from several web sites. Combined, these measures are expected to require a capital investment of about $375,000 for Alternative A and $900,000 for Alternatives B and C. Estimated annual O&M costs range from $10,000 for Alternative A to $40,000 for Alternatives B and C.

Alternatives B and C also propose to reduce the number of dispersed campsites along project reservoirs. Closure and rehabilitation of 30 sites is assumed to require about $100,000 over the first five years of the new licenses. O&M associated with monitoring the closures (e.g., reinstalling signs, repairing barriers) is estimated at $1,000 annually.

Terrestrial Habitat Measures	**Capital Cost (in 2003 $)**	**Annual O&M Cost (in 2003 $)**
Alternative A Measures		
▪ Continue to manage the MWHMA in accordance with the MWHMP	$250,000 ($50,000/yr inyears 1-5)	$100,000
▪ Manage other lands using timber management to benefit wildlife value	N/A	$200,000
▪ Incorporate spatial and/or temporal buffers for timber harvest and construction disturbance around sensitive habitats including necessary mapping	$10,000	$5,000
▪ Control access by maintaining existing road closures through sensitive habitat areas and identifying additional areas for access control. Closures would involve installation and maintenance of gates to restrict vehicle access.	$60,000	$10,000
▪ Manage roads to reduce erosion and maintain existing aquatic connectivity.	$375,000 ($75,000/yr in years 1-5)	$10,000
Alternative A Total Cost	**$695,000**	**$325,000**
Alternative B Measures		
▪ All measures described under Alternative A would continue, except where noted.		
▪ Develop a culvert replacement plan and schedule to improve aquatic and riparian habitat connectivity at select streams. (This replaces road management measure in Alternative A above.)	Incremental Cost $525,000	$30,000
▪ Reduce the number of dispersed campsites through improved management	$100,000 ($20,000/yr in years 1-5)	$1,000
Alternative B Incremental Cost	**$625,000**	**$31,000**

Terrestrial Habitat Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
Alternative C Measures		
▪ All measures described under Alternative A would continue, except where noted.		
▪ Develop and implement an IWHMP on all suitable project lands and a monitoring program that includes application of the HEP to evaluate plan success. (The IWHMP includes improvements to the Merwin Wildlife Habitat Management Program in Alt. A.)	Incremental Cost $450,000	Incremental Cost $200,000 (includes $100,000 to re-apply the HEP mid-way through the next license)
▪ Reduce the number of dispersed campsites through improved management	$100,000 ($20,000/yr in years 1-5)	$1,000
▪ Develop a culvert replacement plan and schedule to improve aquatic, terrestrial and riparian habitat connectivity at select streams.	Incremental Cost $525,000	$30,000
Alternative C Incremental Cost	**$1,100,000**	**$231,000**

4.2.9 Cultural Resources Measures

PacifiCorp's costs under Alterative A would include an estimated average of $5,000 per year (in 2003 dollars) for cultural resource surveys of project operation and maintenance actions. Curating artifacts and documentation resulting from the relicensing studies would amount to about $10,000 initially, followed by about $2,000 per year.

The cost assumptions for the action alternatives primarily involve elements of the Historic Properties Management Plan (HPMP). Additional costs include funding a part-time position for a PacifiCorp Cultural Resource Coordinator and cultural resource planning for curation facilities that would be located in a new visitor structure at Cougar that would partially be funded by PacifiCorp (Alternatives B and C).

Cultural Resource Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003$)
Alternative A Measures		
▪ Conduct professional assessments as needed	$0	$5,000
▪ Curate artifacts/records from relicensing studies	$10,000	$2,000
Alternative A Total Cost	**$10,000**	**$7,000**

Alternative B Measures		
▪ All measures described under Alternative A would continue.		
▪ Implement HPMP		
▪ Consult tribes & agencies	$0	$1,000
▪ Develop monitoring plan	$6,000	$0
▪ Monitor archaeological sites	$0	$5,000
▪ Train CRC and project staff	$18,500	$8,000
▪ Conduct professional assessments of developments	$0	$5,000
▪ Prepare curation standards and artifacts/records	$15,000	$1,500
▪ Protect archaeological sites/data recovery as needed	$0	$7,500
▪ Historic structure preservation assessments	$0	$2,500
▪ Develop cultural I&E materials	$20,000	$500
▪ Fund PacifiCorp Cultural Resource Coordinator	$0	$35,000
▪ Curation facilities at Cougar visitor structure	$8,000	$0
Alternative B Incremental Cost	**$67,500**	**$66,000**
Alternative C Measures		
▪ All measures described under Alternative A would continue.		
▪ All measures proposed under Alternative C would be the same as those under Alternative B. All associated costs would be the same.	Same as Alternative B	Same as Alternative B

4.2.10 Recreational Resource Measures

PacifiCorp's ongoing capital and O&M expenditures for recreation resources total approximately $463,000 annually for all project recreation facilities at the three reservoirs and five river access sites below Merwin Dam. Alternatives B and C are identical and would include higher levels of recreation capital development and associated annual O&M costs than Alternative A. The precise timing and implementation of several measures are unknown at this time (dependent on the monitoring of use levels to demonstrate a sustained need for new facilities); however, the total capital development cost is expected to be approximately $15,000,000 for Alternatives B and C. Estimated O&M costs are expected to be approximately $598,500 annually, an increase over Alternative A of approximately 22.6 percent.

Several measures are identified as "Yale Interim Measures." Because the PacifiCorp's license for the Yale project expired earlier than those of the other Lewis River projects, a placeholder license application was filed with FERC in 1999. It included a number of

"interim" recreation measures that PacifiCorp agreed to implement earlier than otherwise would have occurred. These measures are included in the list that follows.

Recreational Enhancement Measure	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
Alternative A Measures		
▪ Allow recreational access to project lands except where conditions are unsafe.	$0	$0
▪ PacifiCorp would continue to operate its voluntarily constructed recreation sites.	$0	$432,400
▪ Re-gravel group campsites and roads at Beaver Bay Campground and Cougar Park (Yale interim measure)	$100,000	$0
▪ Install playground equipment and repair picnic tables at Beaver Bay Campground (Yale interim measure)	$150,000	$0
▪ Continue to operate the five river access sites below Merwin Dam.	$0	$30,600
▪ Upgrade ADA-accessible facilities when developed recreation sites are improved.	$887,500	$0
Alternative A Total Cost	**$1,137,500**	**$463,000**
Alternative B Measures		
▪ All measures described under Alternative A would continue.		
▪ Implement visitor management controls, such as signs, barriers, and enforcement.	$82,000	$0
▪ Allow recreational access to project lands except where conditions are unsafe.	$0	$0
▪ Develop and implement an interpretation and education program.	$382,500	$0
▪ Install interpretive signs at the Beaver Bay wetland.	$80,000	$0
▪ PacifiCorp would provide earlier notice to visitors that project recreation sites are full.	$0	$5,000
▪ Dispersed upland camping and motorized use would be discouraged on project lands.	$0	$35,500
▪ Funding would be provided to the USFS to manage dispersed camping on its land in the project vicinity.	$0	$5,200
▪ Expand Cougar Camp when monitoring indicates use levels have reached capacity (accomplish by closing the boat ramp and converting parking areas to camp sites).	$3,300,000	$0
▪ Shoreline dispersed camping would be prohibited at Lake Merwin.	$30,000	$2,700

Recreational Enhancement Measure	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
▪ Some shoreline dispersed campsites at Yale Lake and along Swift Creek Reservoir would be hardened. Others would be eliminated.	$330,000	$5,300
▪ PacifiCorp would operate its future voluntarily constructed recreation facilities (future O&M).	$0	$26,800
▪ PacifiCorp would provide annual O&M at dispersed shoreline sites.	$0	$55,000
▪ Expand the Swift Camp campground when use levels have reached capacity thereby establishing a need.	$1,805,000	$0
▪ Renovate Cougar Campground, including renovation/replacement of day use restroom.	$725,000	$0
▪ Redesign Beaver Bay Campground and replace older restrooms.	$2,965,000	$0
▪ Allow public use of RV holding tank dump sites in PacifiCorp campgrounds for a fee.	$5,000	$0
▪ Provide more day use opportunities and sanitation facilities at the five river access sites below Merwin Dam.	$357,500	$0
▪ Provide new group picnic shelters at Merwin and Swift parks and at one additional site on Yale Lake.	$340,000	$0
▪ Renovate Eagle Cliff Park.	$75,000	$0
▪ Upgrade restrooms and parking at Speelyai Bay Park.	$610,000	$0
▪ Provide volleyball courts, horseshoe pits and children's play structure at Merwin Park.	$250,000	$0
▪ Increase separation between wetland and day use parking area at Beaver Bay.	$20,000	$0
▪ Provide funding to the USFS for a multi-agency supported Visitor Information Center in Cougar.	$75,000	$0
▪ Bring Marble Creek trail up to ADA-accessibility standards.	$118,500	$0
▪ Formalize Saddle Dam trailhead parking for vehicles with horse trailers.	$75,000	$0
▪ Develop non-motorized trail from Eagle Cliff Park to the USFS boundary.	$157,000	$0
▪ Develop non-motorized trail link from Saddle Dam Park to existing Saddle Dam trails.	$25,000	$0

Recreational Enhancement Measure	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003 $)
▪ Develop a shoreline trail from Cougar Campground to Beaver Bay Campground; provide a restroom loop trail at Cougar Restrooms	$154,000	$0
▪ PacifiCorp to evaluate granting a trail easement to Lake Merwin to provide linkage to a future uphill VCPRD park.	$10,000	$0
▪ Improve the Yale-IP Road as a non-motorized recreation trail.	$1,361,000	$0
▪ Boat launch facilities would be improved at Speelyai Bay, Yale Park, and Beaver Bay.	$420,000	$0
▪ Develop a take-out at the Yale Bridge for non-motorized watercraft.	$75,000	$0
▪ Develop river access site at the "Switchback" property when the need is demonstrated.	$35,000	$0
Alternative B Incremental Cost	**$13,862,500**	**$135,500**
Alternative C Measures		
▪ All measured proposed under Alternative C are the same as those under Alternative B. All associated costs would also be the same.	Same as Alternative B	Same as Alternative B

4.2.11 Aesthetic Resource Measures

There are no proposed aesthetic/visual resource measures in any of the alternatives.

4.2.12 Socioeconomic Measures

Many of the enhancement measures that benefit other resources also provide a social or economic benefit to the local community. These include measures such as additional employment related to construction or operation of fish passage facilities or recreation facilities. The capital and operating costs of these other measures are defined in their respective resource sections. Measures that directly benefit socioeconomics are summarized briefly and listed below.

Under Alternative A, PacifiCorp currently pays $75,000 in annual operating costs to provide marine patrols and land based law enforcement and to support a telephone link at Pine Creek for emergencies. Alternatives B and C would continue those measures.

Socioeconomic Measures	Capital Cost (in 2003 $)	Annual O&M Cost (in 2003$)
Alternative A Measures		
▪ Continue to fund marine patrols and land-based law enforcement		$70,000
▪ Support Pine Creek phone link		$5,000
Alternative A Total Cost	**$0**	**$75,000**
Alternative B Measures		
▪ All measured proposed under Alternative B are the same as those under Alternative A. All associated costs would also be the same.	Same as Alternative A	Same as Alternative A
Alternative C Measures		
All measured proposed under Alternative C are the same as those under Alternative A. All associated costs would also be the same.	Same as Alternative A	Same as Alternative A

4.3 COMPARISON OF ALTERNATIVES

Table 4.3-1 presents a comparison of the annual net benefits for Alternatives A through C for the Merwin, Yale and Swift No. 1 projects. Alternative B would decrease annual net benefits by $6,696,000 from the No Action Alternative (Alternative A). Alternative C reduces annual net benefits by $16,521,000 from Alternative A. Annual generation changes according to the amount of flow routed through the Lewis River bypass reach specified in each alternative.

Table 4.3-1. Summary of the levelized annual net benefits for Alternatives A through C for Swift No. 1, Yale and Merwin.

	Alternative A[a]	Alternative B	Alternative C
Installed capacity (mW)	510	510	510
Annual generation (MWh)	1,715,406	1,712,806[b]	1,668,606[b]
Levelized Annual Power Benefit ($/MWh)	$65,254,000 $38.04[c]	$65,156,000 $38.04[c]	$63,461,000 $38.03[c d]
Levelized Annual Cost of PM&E Measures ($/MWh)	$0	$6,598,000 $3.85	$14,728,000 $8.82
Levelized Annual Cost of Operations ($/MWh)	$28,693,000 $16.73	$28,693,000 $16.75	$28,693,000 $17.20
Levelized Net Benefit ($/MWh)	$36,561,000 $21.31	$29,865,000 $17.44	$20,040,000 $12.01

[a] Includes cost of existing environmental measures and O&M.

[b] Average annual generation less the impact of lost generation from PM&E measures.

[c] Based on Mid-Columbia prices for On-Peak hours ($40.25/MWh) and Off-Peak hours ($33.74/ MWh) for 12 months ending March 31, 2004 per Bloomberg.

[d] $/MWh are less than under Alternatives A and B because the mix of Peak and Off-peak production is different.

Table 4.3-2 Summary of the annual lost generation and replacement power cost for Alternatives A through C for Swift No. 1, Yale and Merwin.

	Alternative A	Alternative B	Alternative C
Lost generation to be replaced from other sources (MWh)	0	2,600	46,800
Annual Cost of Replacement Power ($/MWh)	$0	$101,000 $38.90 [a]	$1,821,000 $38.90 [a]

[a] Based on Mid-Columbia prices for On-Peak hours ($40.25/MWh) and Off-Peak hours ($33.74/ MWh) for 12 months ending March 31, 2004 per Bloomberg.

4.4 POLLUTION ABATEMENT

By producing hydroelectricity, PacifiCorp's three Lewis River Projects displace the need for other power plants, primarily fossil-fueled facilities, thereby avoiding some power plant emissions. If the 1,715,406 megawatt hours of electricity generated annually by these projects were replaced with fossil fuel-powered facilities, greenhouse gas emissions could potentially increase in the amounts shown in Table 4.4-1.

Table 4.4-1. Equivalent amount of pollutants emitted annually (tons) if the Lewis River projects were replaced by fossil fuel generated energy.

	Merwin	Yale	Swift No. 1
SO_2	1.2	1.3	1.5
NO_X	27.8	30.2	36.0
CO_2	216,627.6	235,700.9	281,136.7
CO	9.8	10.6	12.7
Particulates	4.3	4.7	5.6
VOC	3.1	3.4	4.1
Total (tons)	**216,673.8**	**235,751.1**	**281,196.7**

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