

# **COVER SHEET**

**FEDERAL ENERGY REGULATORY COMMISSION**

**FINAL ENVIRONMENTAL IMPACT STATEMENT  
FOR THE LEWIS RIVER PROJECTS**

**Docket Nos. P-2071-000, et al.**

**Section 4  
Developmental Analysis  
Pages 4-1 to 4-40  
FEIS**

## **4.0 DEVELOPMENTAL ANALYSIS**

In this section, we analyze the projects' use of the water resources of the Lewis River Basin to generate power; estimate the economic benefits of the Swift No. 1, Yale, Merwin, and Swift No. 2 projects; and estimate the cost of various environmental measures and the effects of these measures on project operations.

### **4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECTS**

#### **4.1.1 Economic Assumptions**

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of alternatives, we used the assumptions, values, and sources shown in table 4.1-1 for the three PacifiCorp projects and table 4.1-2 for the Cowlitz PUD Swift No. 2 Project. Information updating the assumptions was provided in responses to additional information requests (AIRs) in March and April 2005 (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005; letter from D.M. Gritten MacDonald, Cowlitz PUD, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated April 14, 2005), and by both utilities in their comments on the draft EIS (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, dated November 23, 2005; letter from D.M. Gritten MacDonald, Cowlitz PUD, to M.R. Salas, Secretary, FERC, dated November 22, 2005).

Table 4.1-1. Staff assumptions for economic analysis of the PacifiCorp projects including Swift No. 1, Yale, and Merwin. (Source: Staff)

<b>Assumption</b>	<b>Value</b>	<b>Source</b>
Base year for costs and benefits	2005	Staff
Power value (mills/kWh) <sup>a</sup>	38.04	Staff
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Federal and state tax rate	37.95 percent	PacifiCorp
Local tax rate	0.646 percent	PacifiCorp
Insurance rate on new capital measures and current net investment	Negligible	PacifiCorp
Discount rate	7.5 percent	PacifiCorp
Long-term debt <sup>b</sup>	9.01 percent	Staff
Return on equity	10.50 percent	<sup>c</sup>
Debt:equity ratio <sup>d</sup>	52:48	<sup>c</sup>

<sup>a</sup> Because proposed operations result in shifts from on-peak to off-peak generation, we use 40.25 mills/kWh for on-peak and 33.74 mills/kWh for off-peak resulting in a melded value of 38.04 mills/kWh. This value is reasonably consistent with recent Commission NEPA documents (see Box Canyon Project, FERC No. 2042, for example).

<sup>b</sup> A before tax rate of 9.01 percent combined with a return on equity of 10.5 percent is comparable to an after tax rate of 7.50 percent as provided by PacifiCorp.

<sup>c</sup> Gaines (2004).

<sup>d</sup> This is the ratio of how much of the money is borrowed versus how much is provided by investors (typically a mix of common and preferred stock).

Table 4.1-2. Staff assumptions for economic analysis of the Cowlitz PUD Swift No. 2 Project. (Source: Staff)

<b>Assumption</b>	<b>Value</b>	<b>Source</b>
Base year for costs and benefits	2005	Staff
Power value (mills/kWh) <sup>a</sup>	38.04	Staff
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Federal and state tax rate	N/A	Cowlitz PUD
Local tax rate <sup>b</sup>		Cowlitz PUD
Insurance rate on new capital measures and current net investment	negligible	Cowlitz PUD
Interest rate on net investment	5.125 percent	Cowlitz PUD
Interest rate on environmental measures	6.375 percent	Cowlitz PUD
Discount rate	5.30 percent	Cowlitz PUD

<sup>a</sup> Because proposed operations result in shifts from on-peak to off-peak generation, we use 40.25 mills/kWh for on-peak and 33.74 mills/kWh for off-peak resulting in a melded value of 38.04 mills/kWh.

<sup>b</sup> Cowlitz PUD pays a Generation Privilege Tax in lieu of property taxes (see table 4.1-6).

#### 4.1.2 Current Annual Costs and Future Capital Costs for the Swift No. 1 Project under the No-action Alternative

Total annualized current costs for the no-action alternative for the Swift No. 1 Project amount to \$12,707,000, as table 4.1-3 shows.

Table 4.1-3. Summary of current annual costs and future capital costs for PacifiCorp's Swift No. 1 Project under the No-action Alternative. (Source: Staff)

Cost	Capital and One-Time Costs	Annual Costs, Including O&M	Years Capital or One-time Cost Incurred or Annual Costs Apply	Total Annualized Costs
O&M cost <sup>a</sup>		\$2,606,600	1–30	\$2,606,600
FERC fees <sup>b</sup>		\$550,600	1–30	\$550,600
Subtotal				\$3,157,200
Total original net investment <sup>c</sup>	\$31,958,200			\$3,715,000
Relicensing process costs	\$6,397,000			\$702,300
Runner upgrades/generator rewinds	\$18,683,000		5	\$1,622,300
Transformer replacement	\$850,000		3	\$85,400
Major overhaul	\$1,000,000		24	\$18,700
Major overhaul	\$1,000,000		25	\$17,100
Major overhaul	\$1,000,000		26	\$15,600
Butterfly valve overhaul	\$1,000,000		6	\$80,700
PMF modifications	\$5,600,000		5	\$486,300
Station service/generator breaker	\$2,679,000		1	\$311,400
Controls upgrade	\$946,000		1	\$110,000
Purchase spare GSU transformer	\$850,000		2	\$91,900

<b>Cost</b>	<b>Capital and One-Time Costs</b>	<b>Annual Costs, Including O&amp;M</b>	<b>Years Capital or One-time Cost Incurred or Annual Costs Apply</b>	<b>Total Annualized Costs</b>
Capacity retention	\$14,450,000		1	\$1,679,700
Misc. projects less than \$500,000	\$2,284,000		15	\$92,300
Unidentified future projects	\$12,896,000		15	\$521,000
Subtotal future capital costs				\$5,132,500
Subtotal current and future capital costs and relicensing process				\$9,549,800
Total				\$12,707,000

- <sup>a</sup> Based on PacifiCorp's 2004 estimated O&M cost of \$2,542,000 escalated by 2.5 percent to adjust to 2005 cost.
- <sup>b</sup> Based on PacifiCorp's 2004 estimated FERC fees of \$537,000 escalated by 2.5 percent to adjust to 2005 cost.
- <sup>c</sup> Based on PacifiCorp's March 31, 2004 net depreciated net investment of \$33,075,000 adjusted to the end of 2004 at a composite depreciation rate of 1.68 percent.

### 4.1.3 Current Annual Costs and Future Capital Costs for the Yale Project under the No-action Alternative

Total annualized current costs for the no-action alternative for the Yale Project amount to \$7,612,900, as table 4.1-4 shows.

Table 4.1-4. Summary of current annual costs and future capital costs for PacifiCorp's Yale Project under the No-action Alternative. (Source: Staff)

Cost	Capital and One-Time Costs	Annual Costs, Including O&M	Years Capital or One-time Cost Incurred or Annual Costs Apply	Total Annualized Costs
O&M cost <sup>a</sup>		\$1,716,500	1-30	\$1,716,500
FERC fees <sup>b</sup>		\$346,600	1-30	\$346,600
Subtotal				\$2,063,100
Total original net investment <sup>c</sup>	\$27,459,500		1	\$3,192,000
Relicensing process costs	\$9,310,000		1	\$1,022,100
Major turbine Overhaul	\$1,350,000		12	\$69,700
Major turbine Overhaul	\$1,350,000		13	\$64,300
Generator rewind	\$2,500,000		9	\$162,100
Generator rewind	\$2,500,000		10	\$150,600
PMF modifications	\$3,500,000		4	\$326,900
Projects less than \$500k	\$3,085,000		15	\$124,600
Unidentified future projects	\$10,828,000		15	\$437,500
Subtotal future capital costs				\$1,335,700
Subtotal current and future capital costs and relicensing process				\$5,549,800
Total				\$7,612,900

<sup>a</sup> Based on PacifiCorp's 2004 estimated O&M cost of \$1,674,000 escalated by 2.5 percent to adjust to 2005 cost.

<sup>b</sup> Based on PacifiCorp's 2004 estimated FERC fees of \$338,000 escalated by 2.5 percent to adjust to 2005 cost.

<sup>c</sup> Based on PacifiCorp's March 31, 2004 net depreciated net investment of \$28,432,000 adjusted to the end of 2004 at a composite depreciation rate of 1.77 percent.

#### 4.1.4 Current Annual Costs and Future Capital Costs for the Merwin Project under the No-action Alternative

Total annualized current costs for the no-action alternative for the Merwin Project amount to \$10,068,800, as table 4.1-5 shows.

Table 4.1-5. Summary of current annual costs and future capital costs for PacifiCorp's Merwin Project under the No-action Alternative. (Source: Staff)

Cost	Capital and One-time Costs	Annual Costs, Including O&M	Years Capital or One-time Cost Incurred or Annual Costs Apply	Total Annualized Costs
O&M cost <sup>a</sup>		\$2,842,400	1–30	\$2,842,400
FERC fees <sup>b</sup>		\$333,300	1–30	\$333,300
Subtotal				\$3,175,700
Total original net investment <sup>c</sup>	\$35,174,100			\$4,088,800
Relicensing process costs	\$6,782,000			\$744,600
Control room system upgrade	\$500,000		16	\$18,600
Communication system replacement/upgrade	\$1,000,000		17	\$34,200
Runner upgrade	\$3,285,000		8	\$229,100
Generator rewind	\$1,896,000		8	\$132,200
Major overhaul	\$750,000		20	\$19,900
Transformer upgrade	\$530,000		12	\$27,400
Runner upgrade	\$3,285,000		7	\$246,500
Generator rewind	\$1,896,000		7	\$142,300
Major overhaul	\$750,000		21	\$18,300
Transformer upgrades	\$1,060,000		10	\$63,800
Runner upgrade	\$3,285,000		6	\$265,200



<b>Cost</b>	<b>Capital and One-time Costs</b>	<b>Annual Costs, Including O&amp;M</b>	<b>Years Capital or One-time Cost Incurred or Annual Costs Apply</b>	<b>Total Annualized Costs</b>
Generator rewind	\$1,896,000		6	\$153,000
Major overhaul	\$750,000		22	\$16,700
Overhaul governor systems (3 units)	\$750,000		17	\$25,700
Projects less than \$500K	\$6,569,000		15	\$265,400
Unidentified future projects/ contingency	\$9,934,000		15	\$401,400
Subtotal future capital costs				\$2,059,700
Subtotal current and future capital costs and relicensing process				\$6,893,100
Total				\$10,068,800

<sup>a</sup> Based on PacifiCorp's 2004 estimated O&M cost of \$2,772,000 escalated by 2.5 percent to adjust to 2005 cost.

<sup>b</sup> Based on PacifiCorp's 2004 estimated FERC fees of \$325,000 escalated by 2.5 percent to adjust to 2005 cost.

<sup>c</sup> Based on PacifiCorp's March 31, 2004, net depreciated net investment of \$36,474,000 adjusted to the end of 2004 at a composite depreciation rate of 2.09 percent.

#### 4.1.5 Current Annual Costs and Future Capital Costs for the Swift No. 2 Project under the No-action Alternative

Total annualized current costs for the no-action alternative for the Swift No. 2 Project amount to \$6,073,300, as table 4.1-6 shows.

Table 4.1-6. Summary of current annual costs and capital costs for Cowlitz PUD's Swift No. 2 Project under the No-action Alternative. (Source: Staff)

Cost	Capital and One-time Costs	Annual Costs, Including O&M	Total Annualized Costs
O&M		\$294,900	\$294,900
Wheeling		\$510,000	\$510,000
Generation privilege tax		\$57,000	\$57,000
Insurance		\$1,100,000	\$1,100,000
Replacement and renewal fund		\$409,800	\$409,800
Annual FERC fees		\$71,000	\$71,000
Subtotal annual costs			\$2,442,700
Total original net investment <sup>a</sup>	\$7,747,100		\$569,200
Reconstruction net investment <sup>b</sup>	\$43,134,000		\$2,779,200
Total relicensing cost <sup>c</sup>	\$3,841,100		\$282,200
Total			\$6,073,300

<sup>a</sup> Based on Cowlitz PUD's 2001 depreciated net investment of \$8,153,500 adjusted to the end of 2004 by 1.69 percent per year and levelized using an interest rate of 5.125 percent.

<sup>b</sup> Based on Cowlitz PUD's reconstruction investment and levelized using an interest rate of 5.125 percent.

<sup>c</sup> Based on estimated relicensing costs projected by Cowlitz PUD through April 2006 and levelized using a 6.375 percent interest rate.

## 4.2 COST OF ENVIRONMENTAL MEASURES

As proposed by PacifiCorp and Cowlitz PUD under the SA, and as recommended by staff, the Lewis River Projects would experience slightly reduced generation and incur higher annual O&M costs and capital costs associated with the implementation of environmental measures. Because each project is licensed separately, we discuss these costs and effects in the following sections.

### 4.2.1 Operations and Maintenance Costs of Environmental Measures for the Three PacifiCorp Projects

PacifiCorp operates the Lewis River system essentially as a single system. Operations at one plant are highly dependent on those at the others. As such, PacifiCorp allocates O&M costs associated with new environmental measures for the Lewis River in proportion to the relative generating capacity of each plant to the total system. Generating capacities are 240 MW at Swift No. 1, 136 MW at Merwin, and 134 MW at Yale, resulting in allocating 47 percent of the O&M costs to Swift No. 1, 26.3 percent to Yale, and 26.7 percent to Merwin (see table 4.2-1). Costs are taken from PacifiCorp's AIR response (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005) and communications clarifying its response (F. Shrier, May 2, 2005 and H. Harwood, May 6, 2005). Staff escalated these 2003 costs by 4.24 percent to adjust costs to 2005 dollars.

Table 4.2-1. Summary of operations and maintenance costs for measures included in the SA for the three PacifiCorp Projects. (Source: Staff)

<b>Environmental Measure</b>	<b>O&amp;M Cost in Year It Occurs</b>	<b>Timing<sup>a</sup></b>	<b>Annualized O&amp;M Cost</b>	<b>Endorsed by Staff</b>
Develop erosion control plans (measures included in estimated construction costs)	\$41,700	1	\$3,300	Yes
Develop and implement forecast- based high runoff procedure	\$116,700	1–30	\$116,700	Yes
Improve flood notification systems and procedures, including emergency phone system, NOAA weather transmitter and Pine Creek communication link.	\$22,900	1–30	\$22,900	Yes

<b>Environmental Measure</b>	<b>O&amp;M Cost in Year It Occurs</b>	<b>Timing<sup>a</sup></b>	<b>Annualized O&amp;M Cost</b>	<b>Endorsed by Staff</b>
Construct outlet immediately below the Swift No. 1 powerhouse, to continuously supply flow to the Lewis River bypassed reach <sup>b</sup>	\$35,400	2–30	\$32,600	Yes
Implement water quality management plan	\$20,800	1–30	\$20,800	Yes
Store LWD from Swift Creek reservoir	\$7,300	1–30	\$7,300	Yes
Annual gravel monitoring and augmentation	\$52,100	2–30	\$48,000	Yes
Annual LWD monitoring and augmentation	\$10,400	2–30	\$9,600	Yes
Conduct a LWD study downstream of Merwin dam	\$62,500	1	\$4,900	Yes
Conduct a spawning gravel study downstream of Merwin dam to establish baseline conditions	\$83,400	1	\$6,600	Yes
Conduct predation study on anadromous fish released above Merwin dam	\$83,400	10	\$3,400	Yes
Conduct annual monitoring of wild fall Chinook and chum downstream of Merwin dam	\$78,200	2–30	\$72,000	Yes
Conduct anadromous fish adult migration and spawning assessment upstream of Merwin dam	\$104,200	5	\$6,100	Yes
Conduct resident fish assessment	\$62,500	2	\$4,600	Yes
Conduct annual monitoring of Bull Trout	\$52,100	1–30	\$52,100	Yes
Conduct bull trout limiting factors analysis in Swift Creek reservoir and Lake Merwin	\$62,500	2	\$4,600	Yes
Conduct anadromous fish stranding and habitat study downstream of Merwin dam	\$312,700	3	\$21,300	Yes

<b>Environmental Measure</b>	<b>O&amp;M Cost in Year It Occurs</b>	<b>Timing<sup>a</sup></b>	<b>Annualized O&amp;M Cost</b>	<b>Endorsed by Staff</b>
Aquatics Coordination Committee	\$52,100	1–30	\$52,100	Yes
Downstream modular floating surface collector at Swift with guidewall, guide nets, sorting and transport facilities	Varies	4–30	\$315,300	Yes
Seasonally install spring Chinook modular screw trap upstream of Swift Creek reservoir	\$2,100	1–30	\$2,100	Yes
Install barrier nets in Yale forebay to reduce fish entrainment up to and until the modular surface collector is installed	\$26,100	1–12	\$17,100	Yes
Install barrier nets in Merwin forebays to reduce fish entrainment up to and until the modular surface collector is installed	\$26,100	1–16	\$20,200	Yes
Install modular floating surface collector, sorting and truck transport facilities at Yale dam by Year 13	\$336,200	13–30	\$116,000	Yes
Install modular floating surface collector, sorting and truck transport facilities at Merwin dam by Year 17	\$336,200	17–30	\$76,000	Yes
Develop stress release pond downstream of Merwin dam near Pekins Ferry by Year 4	\$52,100	4–30	\$40,600	Yes
Monitor and evaluate downstream fish passage	\$182,400	4–30	\$142,200	Yes

<b>Environmental Measure</b>	<b>O&amp;M Cost in Year It Occurs</b>	<b>Timing<sup>a</sup></b>	<b>Annualized O&amp;M Cost</b>	<b>Endorsed by Staff</b>
Trap and transport, from Merwin tailrace to Swift Creek reservoir (Chinook, coho & steelhead), and to Yale Lake or as directed by FWS (bull trout) with improved trap entrance and new sorting/truck loading facility	\$371,100	4–30	\$289,400	Yes
Periodically net bull trout from Yale tailrace	\$15,600	1–30	\$15,600	Yes
Construction trap & transport and sorting/truck loading facility at Yale in Year 17	\$300,200	17–30	\$67,800	Yes
Construct trap and transport and sorting/truck loading facility at Swift in Year 17	\$300,200	17–30	\$67,800	Yes
Monitor and evaluate upstream fish passage	\$166,800	1–30	\$166,800	Yes
Develop the hatchery supplementation plan	\$78,200	1	\$6,200	Yes
Update and repeat the Habitat Evaluation Procedure in Year 17	\$104,200	17	\$2,600	Yes
Develop and implement a WHMP on all suitable project lands using HEP as a baseline <sup>c</sup>	Varies	1–30	\$366,600	Yes
Terrestrial Coordination Committee	\$52,100	1–30	\$52,100	Yes
Monitoring and protection measures, artifact curation, staff training and agency and tribal coordination	\$61,500	1–30	\$61,500	Yes
Provide earlier notice to visitors that project recreation sites are full	\$5,200	1–30	\$5,200	Yes
Discourage dispersed upland camping and motorized use on project lands	\$36,500	1–30	\$36,500	Yes

<b>Environmental Measure</b>	<b>O&amp;M Cost in Year It Occurs</b>	<b>Timing<sup>a</sup></b>	<b>Annualized O&amp;M Cost</b>	<b>Endorsed by Staff</b>
Provide funding to the Forest Service to manage dispersed camping on its land in the project vicinity	\$5,400	1–30	\$5,400	No
Prohibit shoreline dispersed camping at Lake Merwin	\$2,800	4–30	\$2,200	Yes
Harden some shoreline dispersed campsites at Yale Lake and along Swift Creek reservoir, eliminate others	\$5,500	1–30	\$5,500	Yes
Operate future voluntarily constructed recreation facilities	\$27,900	1–30	\$27,900	Yes
Provide annual O&M at dispersed shoreline sites	\$57,300	1–30	\$57,300	Yes
Fund addition marine patrol and land-based enforcement costs	\$151,100	1–30	\$151,100	No
Contribute to maintenance of FR 90	\$20,800	1–30	\$20,800	No
Construct new barrier-free fishing site <sup>d</sup>	\$25,000	10-30	\$12,600	Yes
Total			\$2,639,300	
Total endorsed by staff			\$2,462,000	
<b>Allocations<sup>e</sup></b>			<b>Applicant's Proposal</b>	<b>Endorsed by staff</b>
Swift No. 1 (47.0 percent)			\$1,240,500	\$1,157,200
Yale (26.3 percent)			\$694,100	\$647,500
Merwin (26.7 percent)			\$704,600	\$657,300

<sup>a</sup> A single number indicates an O&M expense in those years alone. A dash between numbers indicates an O&M expense over that range of years.

<sup>b</sup> Cowlitz PUD would contribute to this measure under a voluntary cost sharing agreement outside of any Commission license issued; hence, the entire cost is allocated to PacifiCorp.

<sup>c</sup> The actual annual cost of this measure would increase over time as more lands are purchased or conservation easement are acquired.

<sup>d</sup> Staff estimated this cost included in the SA and expect any such expenditure would occur within the project boundary.

<sup>e</sup> Small roundoff errors of \$100 may occur in these computations.

#### 4.2.2 Capital Cost of Environmental Measures for PacifiCorp's Swift No. 1 Project

PacifiCorp provided capital costs for environmental measures in 2003 dollars. Staff escalated these costs by 4.24 percent to adjust the costs to 2005 dollars. An additional 20 percent adjustment to the cost to cover PacifiCorp's internal administrative costs including interest during construction was allocated to each individual measure rather than as a final adjustment as was done by PacifiCorp (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005). The timing of both the initial and subsequent capital cost varies by measure and is shown in table 4.2-2 along with the costs.

Table 4.2-2. Summary of initial and subsequent capital cost and annualized costs for measures included in the SA for PacifiCorp's Swift No. 1 Project. (Source: Staff)

Environmental Measure	Initial Capital Cost	Timing Initial Capital Cost	Subsequent Capital Cost	Timing Subsequent Capital Cost <sup>a</sup>	Annualized Capital Cost	Endorsed by Staff
Construct outlet to continuously supply flow to the Lewis River bypassed reach <sup>b</sup>	\$2,420,400	2			\$261,600	Yes
Water Quality Management Plan	\$12,500	1	\$25,000	11, 21	\$2,500	Yes
Enhance side channel in Lewis River bypassed reach	\$1,023,200	3			\$102,800	Yes
Establish aquatic habitat enhancement fund	\$125,100	1	\$2,043,100	2–23	\$137,500	Yes



<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Downstream modular floating surface collector at Swift with guidewall, guide nets, sorting and transport facilities	\$71,449,300	3	\$6,619,500	8, 14, 19, 21-30 <sup>c</sup>	\$7,493,500	Yes
Seasonally install spring Chinook modular screw trap upstream of Swift Creek reservoir	\$52,500	8			\$3,700	Yes
Develop stress release pond downstream of Merwin dam	\$4,026,500	5	\$250,200	12, 22	\$358,900	Yes
Evaluate alternative trapping and collection methods for bull trout passage	\$62,500	3			\$6,300	Yes
Construction trap & transport and sorting/ truck loading facility at Swift in Year 17	\$28,388,200	17	\$625,400	27	\$980,400	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Measures in lieu of fish passage if facilities not constructed <sup>d</sup>	\$5,211,900	14-17			\$210,600	No
Hatchery Upgrades including juvenile fish acclimation release structures at Swift, Yale and Merwin	\$5,643,900	2	\$1,117,000	5–14, 23 <sup>e</sup>	\$655,900	Yes
Develop and implement a WHMP on all suitable project lands using HEP as baseline	\$147,000	1			\$17,100	Yes
Swift No. 1 and Swift No. 2 habitat acquisition and protection	\$4,027,800	1	\$5,353,700	2–9 <sup>f</sup>	\$930,600	Yes
Lewis River habitat acquisition and protection <sup>g</sup>	\$688,000	4	\$688,000	6	\$119,800	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Match contributions from other sources to protect habitat in project area	\$29,400	1	\$852,500	2–30	\$41,800	Yes
Implement visitor management controls (signs, barriers, enforcement)	\$48,200	1			\$5,600	Yes
Develop and implement an I&E program	\$47,000	1	\$224,900	2–7 <sup>h</sup>	\$27,600	Yes
Harden some shoreline dispersed campsites at Yale Lake and along Swift Creek reservoir, eliminate others	\$100,100	1			\$11,600	Yes
Expand Swift Camp campground when use levels reach capacity	\$2,257,800	24			\$42,200	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Allow public use of RV holding tank dump sites in project campgrounds for a fee	\$2,900	1			\$300	Yes
Provide new group picnic shelter	\$100,100	4			\$9,400	Yes
Renovate Eagle Cliff Park	\$93,800	11			\$5,300	Yes
Provide funding for a multi-agency supported Visitor Information Center in Cougar	\$38,400	1			\$4,500	Yes
Develop non-motorized trail from Eagle Cliff Park to Forest Service boundary	\$196,400	4			\$18,300	Yes
Barrier-free fishing access site	\$83,300	9			\$5,400	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Funding contribution for reconstruction of Canal Bridge	\$7,800	1			\$900	Yes
Total					\$11,243,500	
Total endorsed by staff					\$11,243,500	

- <sup>a</sup> A single number indicates a subsequent capital cost in that year. A dash between numbers indicates a subsequent capital expense over that range of years. Commas separate irregular cashflows. An asterisk indicates that the cash flow varies with the years shown, otherwise it is assumed to be distributed uniformly over the years shown. If the cash flow is variable a note is provided below.
- <sup>b</sup> This measure may also include voluntarily cost sharing by Cowlitz PUD in support of facilities to built at PacifiCorp's Swift No.1 Project. However, because this facility is on PacifiCorp's project lands, these costs are reflected herein as a PacifiCorp cost.
- <sup>c</sup> Subsequent cash flow is variable.
- <sup>d</sup> This item is contingent upon future actions or decisions and it is not clear if it will happen, and therefore is not included in the total. We allocated the \$30,000,000 capital cost between projects based on the allocations shown in the SA, and assumed the cash flow would occur at the midpoint of the range of years indicated.
- <sup>e</sup> Subsequent cash flow is 26.32% in years 13 and 23, and 5.26% in the other years.
- <sup>f</sup> Subsequent cash flow is 18.22% in year 2, and 11.68% in the other years.
- <sup>g</sup> This measure includes matching funds of \$29,400 in year 1 with subsequent matching fund costs of \$852,500 in years 2-30. Cashflow for basic Lewis River habitat protection includes \$688,000 in both years 4 and 6.
- <sup>h</sup> Subsequent cash flow is 49.67% in year 2, 6.41% in year 7, and 10.98% in the other years.

#### **4.2.3 Effect of Proposed Operations on PacifiCorp's Swift No. 1 Project**

Under the proposed operation, during years with below average March runoff forecasts, the flood management season would be shortened by 2 weeks, ending on March 15 instead of April 1. Significant effects on either dependable capacity or energy production are not anticipated as a result of this measure (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005).

The construction and operation of a new structure at a location just downstream of the Swift No. 1 powerhouse, to release flows to the Lewis River bypassed reach, would reduce the amount of flow available for generation at the Swift No. 2 powerhouse. The flow schedule would be as follows:

- 7/1–10/31: 60 cfs
- 11/1–1/31: 100 cfs
- 2/1–6/30: 75 cfs.

Because both utilities are affecting flows in the bypassed reach, we have adopted their estimates for effects on project generation. At Swift No. 1, PacifiCorp estimates that energy generation would be reduced by 3,874 MWh, and that 57 percent of this energy loss would be on-peak energy and 43 percent would be off-peak energy.

#### 4.2.4 Cost of Environmental Measures for PacifiCorp's Yale Project

PacifiCorp provided capital costs for environmental measures in 2003 dollars. Staff escalated these costs by 4.24 percent to adjust the costs to 2005 dollars. An additional 20 percent load to the cost to cover PacifiCorp's internal administrative costs including interest during construction was allocated to each individual measure rather than as a final adjustment as was done by PacifiCorp (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005). The timing of both the initial and subsequent capital cost varies by measure and is shown in table 4.2-3 along with the costs.

Table 4.2-3. Summary of initial and subsequent capital cost and annualized costs for measures included in the SA for PacifiCorp's Yale Project. (Source: Staff)

Environmental Measure	Initial Capital Cost	Timing Initial Capital Cost	Subsequent Capital Cost	Timing Subsequent Capital Cost <sup>a</sup>	Annualized Capital Cost	Endorsed by Staff
Water Quality Management Plan	\$12,500	1	\$25,000	11, 21	\$2,500	Yes
Establish aquatic habitat enhancement fund	\$125,100	1	\$2,043,100	2-23 <sup>b</sup>	\$137,500	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Modify Yale spillway to improve downstream resident fish survival during spill events	\$2,395,400	5			\$208,000	Yes
Conduct bull trout entrainment reduction study at Yale and Merwin	\$62,500	1			\$7,300	Yes
Install barrier nets or other entrainment reduction measure in Yale and Merwin forebays to reduce fish entrainment until modular surface collectors are installed	\$437,800	1			\$50,900	Yes
Install modular floating surface collector, sorting and truck transport facilities at Yale dam by Year 13	\$46,469,300	13	\$3,002,100	23, 27	\$2,264,100	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Evaluate alternative trapping and collection methods for bull trout passage	\$62,500	3			\$6,300	Yes
Construction trap & transport and sorting/truck loading facility at Yale in Year 17	\$28,388,200	17	\$625,400	27	\$980,400	Yes
Measures in lieu of fish passage if facilities not constructed <sup>c</sup>	\$15,635,700	11-17			\$685,900	No
Hatchery Upgrades including juvenile fish acclimation release structures at Swift, Yale and Merwin	\$3,158,200	2	\$625,100	5-14, 23 <sup>d</sup>	\$367,100	Yes
Develop and implement a WHMP on all suitable project lands using HEP as baseline	\$82,200	1			\$9,600	Yes
Yale habitat acquisition and protection	\$1,876,300	1	\$1,250,900	2	\$353,300	Yes



<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Lewis River habitat acquisition and protection	\$16,400	1	\$1,853,000	2-30 <sup>e</sup>	\$143,200	Yes
Implement visitor management controls, such as signs, barriers and enforcement	\$27,000	1			\$3,100	Yes
Develop and implement an I&E program	\$26,300	1	\$125,800	2-7 <sup>f</sup>	\$15,500	Yes
Expand Cougar Camp when monitoring indicates use levels have reached capacity	\$4,127,800	14			\$181,100	Yes
Harden some shoreline dispersed campsites at Yale Lake and along Swift Creek reservoir, eliminate others.	\$137,600	1			\$16,000	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Renovate Cougar Campground, including renovation / replacement of day-use restroom	\$906,900	14			\$39,800	Yes
Redesign Beaver Bay Campground and replace older restrooms	\$3,708,800	13			\$176,500	Yes
Allow public use of RV holding tank dump sites in project campgrounds for a fee	\$1,600	1			\$200	Yes
Provide new group picnic shelter at Swift Park	\$100,100	5			\$8,700	Yes
Increase separation between wetland and day-use parking area at Beaver Bay	\$25,000	4			\$2,300	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Provide funding for a multi-agency supported Visitor Information Center in Cougar	\$21,500	1			\$2,500	Yes
Formalize Saddle Dam Trailhead parking for vehicles with horse trailers	\$93,800	5			\$8,100	Yes
Develop non-motorized trail link from Saddle Dam Park to existing Saddle Dam trails	\$31,300	5			\$2,700	Yes
Develop a shoreline trail from Cougar Campground to Beaver Bay Campground; provide a restroom loop trail at Cougar Restrooms	\$192,600	5			\$16,700	Yes
Improve the Yale-IP Road as a non-motorized recreation trail	\$625,400	4	\$1,077,000	7, 12, 17 <sup>g</sup>	\$126,200	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Improve boat launch facilities at Yale Park, and Beaver Bay	\$425,300	4			\$39,700	Yes
Barrier-free fishing access site	\$83,300	9			\$5,400	Yes
Total					\$5,174,700	
Total endorsed by staff					\$5,174,700	

<sup>a</sup> A single number indicates a subsequent capital cost in that year. A dash between numbers indicates a subsequent capital expense over that range of years. Commas separate irregular cashflows. An asterisk indicates that the cash flow varies with the years shown, otherwise it is assumed to be distributed uniformly over the years shown. If the cash flow is variable a note is provided below.

<sup>b</sup> Subsequent cash flow is 6.12 percent in years 2-10, 2.04 percent in years 11-14, and 4.08 percent in the remaining years.

<sup>c</sup> This item is contingent upon future actions or decisions and it is not clear if it will happen, and therefore is not included in the total. We allocated the \$30,000,000 capital cost between projects based on the allocations shown in the SA, and assumed the cash flow would occur at the midpoint of the range of years indicated.

<sup>d</sup> Subsequent cash flow is 26.32 percent in years 13 and 23 and 5.26 percent in the other years.

<sup>e</sup> This measure includes matching funds of \$26,400 in year 1 with subsequent matching fund costs of \$477,000 in years 2-30. Cashflow for basic Lewis River habitat protection includes \$688,000 in both years 4 and 6.

<sup>f</sup> Subsequent cash flow is 49.67 percent in year 2, 6.41 percent in year 7, and 10.98 percent in the other years.

<sup>g</sup> Subsequent cash flow is 58.07 percent in year 7, 29.04 percent in year 12, and 11.68 percent in year 17.

#### **4.2.5 Effect of Proposed Operations on PacifiCorp's Yale Project**

Under proposed operations, prereleases (turbine flows plus spill) from Merwin dam, based on flow forecasts, would be made about once a year on average, ranging in magnitude from about 15,000 to 25,000 cfs. Pre-releases would be made up to about 48 hours in advance of forecasted high flow events and would temporarily lower pool elevations at Merwin and, to a lesser extent, at Yale Lake. Under the proposed operation during years with below average March runoff forecasts, the flood management season would be shortened by 2 weeks, ending on March 15 instead of April 1. Significant effects on either dependable capacity or energy production are not anticipated as a result

of either of these measures (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005).

#### 4.2.6 Cost of Environmental Measures for PacifiCorp's Merwin Project

PacifiCorp provided capital costs for environmental measures in 2003 dollars. Staff escalated these costs by 4.24 percent to adjust the costs to 2005 dollars (USDOC, 2005). An additional 20 percent load to the cost to cover PacifiCorp's internal administrative costs including interest during construction was allocated to each individual measure rather than as a final adjustment as was done by PacifiCorp (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005). The timing of both the initial and subsequent capital cost, which would vary by measure, is shown in table 4.2-4 along with the costs.

Table 4.2-4. Summary of initial and subsequent capital cost and annualized costs for measures included in the SA for PacifiCorp's Merwin Project. (Source: Staff)

Environmental Measure	Initial Capital Cost	Timing Initial Capital Cost	Subsequent Capital Cost	Timing Subsequent Capital Cost <sup>a</sup>	Annualized Capital Cost	Endorsed by Staff
Develop and implement forecast-based high runoff procedure	\$208,900	1			\$24,300	Yes
Improve flood notification systems and procedures, including emergency phone system, NOAA weather transmitter and Pine Creek communication link.	\$31,300	1			\$3,600	Yes
Water Quality Management Plan	\$12,500	1	\$25,000	11, 21	\$2,500	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Establish aquatic habitat enhancement fund	\$125,100	1	\$2,043,100	2-23 <sup>b</sup>	\$137,500	Yes
Conduct entrainment reduction study for bull trout at Yale and Merwin dams	\$62,500	1			\$7,300	Yes
Install barrier nets or other entrainment reduction measure in Yale and Merwin forebays to reduce fish entrainment until the modular surface collectors are installed	\$437,800	1			\$50,900	Yes
Install modular floating surface collector, sorting and truck transport facilities at Merwin dam by Year 17	\$48,845,900	17	\$1,063,200	27	\$1,686,600	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Trap & transport from Merwin tailrace to Swift Creek reservoir (Chinook, coho & steelhead), and to Yale Lake or as directed by FWS (bull trout) with improved trap entrance and new sorting/truck loading facility	\$11,883,100	5	\$4,055,300	17	\$1,170,700	Yes
Measures in lieu of fish passage if facilities not constructed <sup>c</sup>	\$10,423,800	14-17			\$421,200	No
Hatchery Upgrades including juvenile fish acclimation release structures at Swift, Yale, and Merwin	\$3,206,200	2	\$634,600	5-14, 23 <sup>d</sup>	\$372,600	Yes
Develop and implement a WHMP on all suitable project lands using HEP as baseline	\$83,500	1			\$9,700	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Lewis River habitat acquisition and protection <sup>e</sup>	\$16,700	1	\$484,300	2-30	\$23,700	Yes
Implement visitor management controls (signs, barriers, and enforcement)	\$27,400	1			\$3,200	Yes
Develop and implement an I&E program	\$26,700	1	\$127,700	2-7 <sup>f</sup>	\$15,600	Yes
Prohibit shoreline dispersed camping at Lake Merwin	\$12,500	4			\$1,200	Yes
Allow public use of RV holding tank dump sites in project campgrounds for a fee	\$1,700	1			\$200	Yes
Provide more day-use opportunities and sanitation facilities at the five river access sites below Merwin dam	\$437,800	1	\$9,400	11	\$51,400	No



<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Provide new group picnic shelter at one additional site on Yale Lake	\$225,200	7			\$16,900	Yes
Upgrade restrooms and parking at Speelyai Bay Park	\$763,000	6			\$61,600	Yes
Provide volleyball courts, horseshoe pits, and children's play structure at Merwin Park	\$312,700	4			\$29,200	Yes
Provide funding for a multi-agency supported Visitor Information Center in Cougar	\$21,800	1			\$2,500	Yes
Bring Marble Creek trail up to ADA-accessibility standards	\$148,200	4			\$13,800	Yes
Evaluate granting a trail easement to Lake Merwin to provide linkage to future uphill VCPRD park	\$12,500	1			\$1,500	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost<sup>a</sup></b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Improve boat launch facilities at Speelyai Bay	\$100,100	4			\$9,400	Yes
Develop a take-out at the Yale Bridge for non-motorized watercraft	\$93,800	6			\$7,600	Yes
Develop river access site at the “Switchback” property when the need is demonstrated	\$43,800	15			\$1,800	Yes
Barrier-free fishing access site	\$83,300	9			\$5,400	Yes
Total					\$3,710,700	
Total endorsed by staff					\$3,659,300	

- <sup>a</sup> A single number indicates a subsequent capital cost in that year. A dash between numbers indicates a subsequent capital expense over that range of years. Commas separate irregular cashflows. An asterisk indicates that the cash flow varies with the years shown, otherwise it is assumed to be distributed uniformly over the years shown. If the cash flow is variable, a note is provided below.
- <sup>b</sup> Subsequent cash flow is 6.12 percent in years 2-10, 2.04 percent in years 11-14, and 4.08 percent in the remaining years.
- <sup>c</sup> This item is contingent upon future actions or decisions and it is not clear if it will happen, and therefore is not included in the total. We allocated the \$30,000,000 capital cost between projects based on the allocations shown in the SA, and assumed the cash flow would occur at the midpoint of the range of years indicated.
- <sup>d</sup> Subsequent cash flow is 26.32 percent in years 13 and 23 and 5.26 percent in other years.
- <sup>e</sup> This measure only includes funds that PacifiCorp would contribute if matching funds were available.
- <sup>f</sup> Subsequent cash flow is 49.67 percent in year 2, 6.41 percent in year 7, and 10.98 percent in the other years.

#### **4.2.7 Effect of Proposed Operations on PacifiCorp's Merwin Project**

Under proposed operations, prereleases (turbine flows plus spill) from Merwin dam, based on flow forecasts, would be made about once a year on average, ranging in magnitude from about 15,000 to 25,000 cfs. Pre-releases would be made up to about 48 hours in advance of forecasted high flow events and would temporarily lower pool elevations at Merwin and, to a lesser extent, at Yale Lake. Under the proposed operation during years with below average March runoff forecasts, the flood management season would be shortened by 2 weeks, ending on March 15 instead of April 1. Significant effects on either dependable capacity or energy production are not anticipated as a result of either of these measures (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005).

The proposed action would include minimum flows below Merwin dam for the purpose of maintaining and enhancing habitat for species downstream of the dam. The proposed action also provides for restrictions on ramping and plateau operations to protect anadromous fish from the adverse effects of stranding. Neither of these measures is anticipated to affect either dependable capacity or energy production significantly (letter from F. Shrier, PacifiCorp, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated March 28, 2005). These measures are described more fully in section 3.3.2.2.

#### **4.2.8 Cost of Environmental Measures for Cowlitz PUD's Swift No. 2 Project**

Cowlitz PUD provided costs for environmental measures in 2003 dollars. Staff escalated these costs by 4.24 percent to adjust the costs to 2005 dollars (USDOC, 2005). Most of the environmental measures proposed by Cowlitz PUD are being jointly funded and executed by both applicants, although funding for some measures is exclusively by PacifiCorp but with Cowlitz PUD participation (such as the Swift No. 1 and No. 2 Land Acquisition and Habitat Protection Fund). We note those measures in table 4.2-5 that are strictly Cowlitz PUD measures. Costs are taken from Cowlitz PUD's AIR response (letter from D.M. Gritten MacDonald, Cowlitz PUD, to M.R. Salas, Secretary, FERC, in response to request for additional information, dated April 14, 2005) and communications clarifying its response (personal communication from D.M. Gritten MacDonald, Cowlitz PUD, to J. Cofrancesco, FERC, dated April 29, 2005). Cowlitz PUD has voluntarily agreed to contribute both capital costs and operations and maintenance costs to the Swift No. 1 surface collector and to the new structure to release flows to the Lewis River bypassed reach, located just downstream of the Swift No. 1 powerhouse. Because these features would be part of the Swift No. 1 Project license, if issued, and would be located in that project's boundary, we have not taken these items into account for the Swift No. 2 Project.

Table 4.2-5. Summary of initial and subsequent capital cost and annualized costs for measures included in the SA for Cowlitz PUD's Swift No. 2 Project.  
(Source: Staff)

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost</b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Swift No. 2 upstream collector	\$2,084,800	1	\$4,169,600	16-17	\$177,600	Yes
Lewis River Hatchery Complex	\$67,800	1			\$5,000	Yes
Enhance side channel aquatic habitat in bypass reach	\$189,700	1			\$13,900	Yes
Conduct water quality monitoring <sup>a</sup>	\$10,400	1	\$10,400	16	\$1,100	Yes
Renovate Eagle Cliff Park	\$198,300	11 <sup>b</sup>			\$8,700	Yes
Expand the Swift Camp campground when use levels have reached capacity.	\$417,000	24 <sup>b</sup>			\$4,400	Yes
Funding contribution for reconstruction of Canal Bridge	\$2,700	1			\$200	Yes
Contribute to Visitor Information Center	\$10,200	10			\$500	Yes

<b>Environmental Measure</b>	<b>Initial Capital Cost</b>	<b>Timing Initial Capital Cost</b>	<b>Subsequent Capital Cost</b>	<b>Timing Subsequent Capital Cost</b>	<b>Annualized Capital Cost</b>	<b>Endorsed by Staff</b>
Wildlife Habitat/Road Management <sup>a</sup>	\$218,900	1			\$16,100	Yes
Wildlife Habitat Review <sup>a</sup>	\$9,900	18			\$200	Yes
Devil's Backbone Acquisition <sup>a</sup>	\$1,026,700	1			\$75,400	Yes
Devil's Backbone Management <sup>a</sup>	\$31,300	1			\$2,300	Yes
Total	\$4,267,700		\$4,180,000		\$305,400	
Total endorsed by staff	\$4,267,700		\$4,180,000		\$305,400	

<sup>a</sup> Solely a Cowlitz PUD measure. Other measures are shared funding with PacifiCorp.

<sup>b</sup> Timing was altered slightly to match our analysis of the same measure for PacifiCorp.

Table 4.2-6. Summary of operations and maintenance costs for measures included in the SA for Cowlitz PUD's Swift No. 2 Project. (Source: Staff)

<b>Environmental Measure</b>	<b>Annualized O&amp;M Cost (\$)</b>	<b>Timing<sup>a</sup></b>	<b>Endorsed by Staff</b>	<b>Notes</b>
Fish passage O&M and monitoring	\$73,900	1–30	Yes	b
Lewis River Hatchery Complex	\$100,100	1–30	Yes	
Establish aquatic habitat enhancement fund	\$21,800	1–21	Yes	c
Water Quality O&M	\$10,400	1–30	Yes	d
Implement WHMP, property management	\$20,800	1–30	Yes	d

<b>Environmental Measure</b>	<b>Annualized O&amp;M Cost (\$)</b>	<b>Timing<sup>a</sup></b>	<b>Endorsed by Staff</b>	<b>Notes</b>
Maintain Swift Forest Camp and Eagle Cliff Park trail	\$10,700	1–30	Yes	<sup>e</sup>
Interpretation & Education	\$500	1–30	Yes	
Manage dispersed camping	\$800	1–30	No	
Maintain Forest Service FR 90	\$7,300	1–30	No	
Maintain Swift No. 2 Canal fishing facility and parking	\$4,800	1–30	Yes	<sup>d</sup>
Conduct unanticipated discovery training	\$1,600	1–30	Yes	<sup>d</sup>
Total	\$252,700			
Total endorsed by staff	\$244,600			

<sup>a</sup> A single number indicates an O&M expense in those years alone. A dash between numbers indicates an O&M expense over that range of years. Commas separate irregular cashflows. An asterisk indicates that the cash flow varies with the years shown; otherwise, it is assumed to be distributed uniformly over the years shown. If the cash flow is variable a note is provided below.

<sup>b</sup> O&M cashflow is \$54,200 years 1–30 plus \$68,800 years 17–30.

<sup>c</sup> O&M cashflow is \$26,100 years 1–20 and \$20,800 in year 21.

<sup>d</sup> Strictly a Cowlitz PUD measure.

<sup>e</sup> O&M cashflow is \$7,900 years 1–30 and an additional \$5,200 in years 10–30.

#### **4.2.9 Effect of Proposed Operations on Cowlitz PUD's Swift No. 2 Project**

The construction of a new flow release structure just downstream of the Swift No. 1 powerhouse, to release flows into the Lewis River bypassed reach, would reduce the amount of flow available for generation at Cowlitz PUD's Swift No. 2 powerhouse. The flow schedule is as follows:

- 7/1–10/31: 60 cfs
- 11/1–1/31: 100 cfs
- 2/1–6/30: 75 cfs.

Because both utilities would affect flows in the bypassed reach, we have adopted their estimates for effects on project generation. Cowlitz PUD estimates that energy generation at the Swift No. 2 Project would be reduced by 1,361 MWh, and that 57 percent of this energy loss would be on-peak energy and 43 percent would be off-peak energy.

## 4.3 COMPARISON OF ALTERNATIVES

### 4.3.1 Economic Comparison for PacifiCorp's Swift No. 1 Project

Table 4.3-1 compares the power value, annual costs, and net benefits of the no-action alternative and the proposed action for the Swift No. 1 Project. In section 5, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the proposed action and explain why we conclude the environmental benefits are worth these costs. The decrease in net benefits from 18.71 to -0.50 mills/kWh for the proposed action with staff modifications represents a drop of 102.7 percent. However, the proposed action with staff modifications has minimal effects on net benefits when compared to the proposed action, because staff modifications do not affect generation or annual power value or result in significant changes in project costs.

Table 4.3-1. Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Swift No. 1 Project. (Source: Staff)

	No Action	Proposed Action	Proposed Action With Staff Modifications
Dependable capacity (MW)	30.3	30.3	30.3
Generation (MWh)	657,514	653,640	653,640
Annual power value (\$ and mills/kWh)	25,011,800 38.04	24,866,700 38.04	24,866,700 38.04
Annual cost(\$ and mills/kWh)	12,707,000 19.33	25,191,000 38.54	25,107,700 38.41
Annual net benefit (\$ and mills/kWh)	12,304,800 18.71	-324,300 -0.50	-241,000 -0.37

### 4.3.2 Economic Comparison for PacifiCorp's Yale Project

Table 4.3-2 compares the power value, annual costs, and net benefits of the no-action alternative and the proposed action for the Yale Project. In section 5, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the proposed action and explain why we conclude the environmental benefits are worth these costs. The decrease in net benefits from 24.23 to 13.58 mills/kWh for the proposed action with staff modifications represents a drop of 44.0 percent. However, the proposed action with staff modifications has minimal effects on net benefits when compared to the proposed action, because staff modifications do not affect generation or annual power value or result in significant changes in project costs.

Table 4.3-2. Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Yale Project. (Source: Staff)

	No Action	Proposed Action	Proposed Action With Staff Modifications
Dependable capacity (MW)	35.4	35.4	35.4
Generation (MWh)	551,250	551,250	551,250
Annual power value (\$ and mills/kWh)	20,969,600 38.04	20,969,600 38.04	20,969,600 38.04
Annual cost (\$ and mills/kWh)	7,612,900 13.81	13,481,700 24.46	13,435,100 24.37
Annual net benefit (\$ and mills/kWh)	13,356,700 24.23	7,487,900 13.58	7,534,500 13.67

### 4.3.3 Economic Comparison for PacifiCorp's Merwin Project

Table 4.3-3 compares the power value, annual costs, and net benefits of the no-action alternative and the proposed action for the Merwin Project. In section 5, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the proposed action and explain why we conclude the environmental benefits are worth these costs. The decrease in net benefits from 18.17 to 9.45 mills/kWh for the proposed action with staff modifications represents a drop of 48.0 percent. However, the proposed action with staff modifications has minimal effects on net benefits when compared to the proposed action, because staff modifications do not affect generation or annual power value or result in significant changes in project costs.

Table 4.3-3. Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Merwin Project. (Source: Staff)

	No Action	Proposed Action	Proposed Action with Staff Modifications
Dependable capacity (MW)	31.9	31.9	31.9
Generation (MWh)	506,642	506,642	506,642
Annual power value (\$ and mills/kWh)	19,272,700 38.04	19,272,700 38.04	19,272,700 38.04
Annual cost(\$ and mills/kWh)	10,068,800 19.87	14,484,100 28.59	14,385,400 28.39
Annual net benefit (\$ and mills/kWh)	9,203,900 18.17	4,788,600 9.45	4,887,300 9.65



#### 4.3.4 Economic Comparison for Cowlitz PUD's Swift No. 2 Project

Table 4.3-3 compares the power value, annual costs, and net benefits of the no-action alternative, the proposed action, and the proposed action with staff modifications for the Swift No. 2 Project. In section 5, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the proposed action with staff modifications and explain why we conclude the environmental benefits are worth these costs. The decrease in net benefits from 10.09 to 7.37 mills/kWh represents a drop of 27.0 percent. The Cowlitz PUD proposed action results in a decrease in net benefits from 10.09 to 7.33 mills/kWh, representing a drop of 27.3 percent.

Table 4.3-4. Summary of annual net benefits for the No-action Alternative and proposed action for Cowlitz PUD's Swift No. 2 Project. (Source: Staff)

	<b>No Action</b>	<b>Proposed Action</b>	<b>Proposed Action with Staff Modifications</b>
Dependable capacity (MW)	5 to 72	5 to 72	5 to 72
Generation (MWh)	217,299	215,938	215,938
Loss of generation		1,361	1,361
Lost on-peak generation (MWh)		776	776
Lost on-peak energy value (\$)		31,200	31,200
Lost off-peak generation (MWh)		585	585
Lost off-peak energy value (\$)		19,800	19,800
Annual power value (\$ and mills/kWh)	8,266,100 38.04	8,215,100 38.04	8,215,100 38.04
Annual cost(\$ and mills/kWh)	6,073,300 27.95	6,631,400 30.71	6,623,300 30.67
Annual net benefit (\$ and mills/kWh)	2,192,800 10.09	1,583,700 7.33	1,591,800 7.37