

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

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

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

**Table of Contents, List of Tables, List of Figures,
Acronyms and Abbreviations**

Pages vii to xviii

FEIS

TABLE OF CONTENTS

LIST OF TABLES.....	xiii
LIST OF FIGURES	xvi
ACRONYMS AND ABBREVIATIONS.....	xvii
EXECUTIVE SUMMARY	xix
1.0 PURPOSE AND NEED FOR ACTION	1-1
1.1 PURPOSE OF ACTION	1-1
1.2 NEED FOR POWER	1-2
1.2.1 PacifiCorp Operations.....	1-2
1.2.2 Cowlitz PUD Operations	1-3
1.2.3 Regional Demand.....	1-4
1.3 SCOPING PROCESS	1-5
1.4 AGENCY CONSULTATIONS	1-6
1.4.1 Settlement Agreement.....	1-6
1.4.2 Interventions.....	1-8
1.4.3 Comments on the Draft Environmental Impact Statement.....	1-8
2.0 PROPOSED ACTION AND ALTERNATIVES.....	2-1
2.1 APPLICANTS' PROPOSALS	2-1
2.1.1 General Project Descriptions and Operations	2-1
2.1.1.1 Swift No. 1	2-3
2.1.1.2 Swift No. 2	2-5
2.1.1.3 Yale	2-7
2.1.1.4 Merwin	2-9
2.1.1.5 Project Safety	2-9
2.1.1.6 Lewis River Hatchery Complex	2-11
2.1.1.7 Flood Management Operations	2-12
2.1.2 Existing Environmental Measures to Be Continued.....	2-14
2.1.2.1 Water Quantity	2-18
2.1.2.2 Water Quality	2-18
2.1.2.3 Aquatic Resources	2-18
2.1.2.4 Terrestrial Resources	2-19
2.1.2.5 Cultural Resources	2-19
2.1.2.6 Recreation.....	2-20
2.1.3 Measures Proposed Under the Lewis River Settlement Agreement.....	2-21
2.1.3.1 Swift No. 1 and Swift No. 2	2-37
2.1.3.2 Yale	2-38
2.1.3.3 Merwin	2-39

2.1.3.4	Flow Releases	2-39
2.1.3.5	Flood Management.....	2-39
2.1.3.6	Water Quality	2-40
2.1.3.7	Aquatic Resources	2-41
2.1.3.8	Hatchery Facilities and Operations	2-46
2.1.3.9	Terrestrial Resources	2-47
2.1.3.10	Cultural Resources	2-49
2.1.3.11	Recreation Facilities	2-49
2.1.3.12	Socioeconomics.....	2-52
2.2	MODIFICATIONS TO APPLICANTS' PROPOSALS	2-52
2.2.1	Water Quality Certification.....	2-52
2.2.2	Section 18 Fishway Prescriptions	2-53
2.2.3	Section 4(e) Federal Land Management Conditions	2-53
2.2.4	Section 10(j) Recommendations	2-53
2.2.5	Staff's Modification to the Proposed Action	2-54
2.3	NO-ACTION ALTERNATIVE.....	2-56
2.4	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY.....	2-56
2.4.1	Project Decommissioning	2-56
2.4.2	Federal Government Takeover of the Projects	2-57
2.4.3	Issuing Nonpower Licenses	2-57
3.0	ENVIRONMENTAL CONSEQUENCES.....	3-1
3.1	GENERAL DESCRIPTION OF THE LEWIS RIVER BASIN.....	3-1
3.2	CUMULATIVELY AFFECTED RESOURCES.....	3-2
3.2.1	Geographic Scope	3-2
3.2.2	Temporal Scope	3-3
3.3	PROPOSED ACTION AND ACTION ALTERNATIVES	3-3
3.3.1	Geology and Soils	3-3
3.3.1.1	Affected Environment	3-3
3.3.1.2	Environmental Effects	3-5
3.3.1.3	Cumulative Effects	3-7
3.3.1.4	Unavoidable Adverse Effects	3-7
3.3.2	Water Resources	3-7
3.3.2.1	Affected Environment	3-7
3.3.2.2	Environmental Effects	3-28
3.3.2.3	Cumulative Effects	3-42
3.3.2.4	Unavoidable Adverse Effects	3-42
3.3.3	Aquatic Resources.....	3-42
3.3.3.1	Affected Environment	3-42
3.3.3.2	Environmental Effects	3-64
3.3.3.3	Cumulative Effects	3-97
3.3.3.4	Unavoidable Adverse Effects	3-98

3.3.4	Terrestrial Resources.....	3-98
3.3.4.1	Affected Environment	3-98
3.3.4.2	Environmental Effects	3-112
3.3.4.3	Cumulative Effects	3-123
3.3.4.4	Unavoidable Adverse Effects.....	3-124
3.3.5	Federally Listed Threatened and Endangered Species	3-124
3.3.5.1	Affected Environment	3-124
3.3.5.2	Environmental Effects	3-129
3.3.5.3	Cumulative Effects	3-136
3.3.5.4	Unavoidable Adverse Effects.....	3-136
3.3.6	Recreational Resources	3-136
3.3.6.1	Affected Environment	3-136
3.3.6.2	Environmental Effects	3-147
3.3.6.3	Cumulative Effects	3-160
3.3.6.4	Unavoidable Adverse Effects.....	3-160
3.3.7	Land Management and Use	3-160
3.3.7.1	Affected Environment	3-160
3.3.7.2	Environmental Effects	3-169
3.3.7.3	Unavoidable Adverse Effects.....	3-176
3.3.8	Cultural Resources	3-176
3.3.8.1	Affected Environment	3-176
3.3.8.2	Environmental Effects	3-179
3.3.8.3	Unavoidable Adverse Effects.....	3-182
3.3.9	Socioeconomic Resources.....	3-183
3.3.9.1	Affected Environment	3-183
3.3.9.2	Environmental Effects	3-191
3.3.9.3	Unavoidable Adverse Effects.....	3-195
3.4	NO-ACTION ALTERNATIVE.....	3-195
3.5	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES.....	3-195
3.6	RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY.....	3-195
4.0	DEVELOPMENTAL ANALYSIS	4-1
4.1	POWER AND ECONOMIC BENEFITS OF THE PROJECTS	4-1
4.1.1	Economic Assumptions.....	4-1
4.1.2	Current Annual Costs and Future Capital Costs for the Swift No. 1 Project under the No-action Alternative	4-4
4.1.3	Current Annual Costs and Future Capital Costs for the Yale Project under the No-action Alternative.....	4-6
4.1.4	Current Annual Costs and Future Capital Costs for the Merwin Project under the No-action Alternative.....	4-7

4.1.5	Current Annual Costs and Future Capital Costs for the Swift No. 2 Project under the No-action Alternative	4-9
4.2	COST OF ENVIRONMENTAL MEASURES	4-10
4.2.1	Operations and Maintenance Costs of Environmental Measures for the Three PacifiCorp Projects	4-10
4.2.2	Capital Cost of Environmental Measures for PacifiCorp's Swift No. 1 Project	4-15
4.2.3	Effect of Proposed Operations on PacifiCorp's Swift No. 1 Project	4-20
4.2.4	Cost of Environmental Measures for PacifiCorp's Yale Project	4-21
4.2.5	Effect of Proposed Operations on PacifiCorp's Yale Project	4-27
4.2.6	Cost of Environmental Measures for PacifiCorp's Merwin Project	4-28
4.2.7	Effect of Proposed Operations on PacifiCorp's Merwin Project	4-34
4.2.8	Cost of Environmental Measures for Cowlitz PUD's Swift No. 2 Project	4-34
4.2.9	Effect of Proposed Operations on Cowlitz PUD's Swift No. 2 Project	4-37
4.3	COMPARISON OF ALTERNATIVES	4-38
4.3.1	Economic Comparison for PacifiCorp's Swift No. 1 Project	4-38
4.3.2	Economic Comparison for PacifiCorp's Yale Project	4-38
4.3.3	Economic Comparison for PacifiCorp's Merwin Project	4-39
4.3.4	Economic Comparison for Cowlitz PUD's Swift No. 2 Project	4-40
5.0	STAFF'S CONCLUSIONS	5-1
5.1	COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE	5-1
5.1.1	Swift No. 1 Project	5-2
5.1.2	Swift No. 2 Project	5-8
5.1.3	Yale Project	5-11
5.1.4	Merwin Project	5-17
5.1.5	Rationale for Staff Recommendations	5-23
5.1.6	Summary of Economic Effects on the Projects	5-35
5.2	CUMULATIVE EFFECTS SUMMARY	5-37
5.3	FISH AND WILDLIFE AGENCY RECOMMENDATIONS	5-38
5.4	CONSISTENCY WITH COMPREHENSIVE PLANS	5-40
5.5	RELATIONSHIP OF LICENSE PROCESS TO LAWS AND POLICIES	5-41
5.5.1	Water Quality Certification	5-41
5.5.2	Essential Fish Habitat	5-41
5.5.3	Columbia River Fish and Wildlife Program	5-42
5.5.4	Endangered Species Act	5-42
5.5.5	National Historic Preservation Act	5-43

5.5.6	Americans with Disabilities Act	5-44
6.0	LITERATURE CITED	6-1
7.0	LIST OF PREPARERS	7-1
8.0	LIST OF RECIPIENTS	8-1
APPENDIX A STAFF RESPONSE TO COMMENTS ON THE DRAFT EIS.....		A-1

This page intentionally left blank.

LIST OF TABLES

Table 2.1-1.	Existing flood management storage and releases for the three-reservoir system.....	2-13
Table 2.1-2.	Measures to be continued by PacifiCorp and Cowlitz PUD under the proposed action.....	2-14
Table 2.1-3.	Summary of PacifiCorp's Swift No. 1, Yale, and Merwin developed recreation facilities.....	2-20
Table 2.1-4.	Measures proposed under the Lewis River SA (in italics), with some of the existing measures shown in normal font	2-22
Table 3.3.1-1.	Summary of reservoir shoreline bank heights	3-5
Table 3.3.2-1.	Streamflow statistics for Lewis River stream gages	3-8
Table 3.3.2-2.	Magnitude and frequency of spill from Swift Creek reservoir	3-14
Table 3.3.2-3.	Flood magnitude and frequency for Lewis River below Merwin dam	3-17
Table 3.3.2-4.	Natural and regulated peak flows for specific Lewis River flow events at Ariel (below Merwin dam).....	3-17
Table 3.3.2-5.	Summary of WDOE surface water quality standards for Class A, Class AA, and Lake Class water bodies	3-19
Table 3.3.2-6.	Monthly median water temperatures (°C) for Speelyai Creek, June 1999-September 1999.....	3-35
Table 3.3.2-7.	Summary of draft water quality certification conditions for the four Lewis River Projects, issued by WDOE in February 2006.....	3-37
Table 3.3.3-1.	Resident and anadromous fish species present in the Lewis River Basin	3-43
Table 3.3.3-2.	Current aquatic habitat metrics in measured stream reaches in the Lewis River watershed	3-59
Table 3.3.3-3.	Minimum flow provisions downstream of Merwin, as stipulated in Article 49 of the existing Merwin Project license.	3-61
Table 3.3.3-4.	WDFW interim ramping rate criteria	3-61
Table 3.3.3-5.	WDFW fish production goals for the Lewis River Basin in 2003	3-63
Table 3.3.3-6.	The average number of salmon and steelhead harvested in the Lewis River recreation fishery based on punch card returns to WDFW	3-64
Table 3.3.3-7.	Length of potentially accessible anadromous fish habitat and the percent of total accessible habitat in the three reaches of the Lewis River upstream of Merwin dam.....	3-66
Table 3.3.3-8.	EDT estimates of potential spring Chinook, coho, and steelhead adult abundance under current habitat conditions by geographic area (introduction reach).....	3-67
Table 3.3.3-9.	Lewis River fish passage model estimates of adult coho production for the proposed action	3-68

Table 3.3.3-10. Proposed minimum flow releases downstream of the Merwin Project	3-77
Table 3.3.3-11. Summary of NMFS and Interior’s Section 18 Fishway Prescriptions for the Merwin Project.....	3-86
Table 3.3.3-12. Initial Lewis River Hatchery Complex targets	3-95
Table 3.3.3-13. Broodstock sources to be used for supplementation above and below Merwin dam.....	3-95
Table 3.3.3-14. Numbers governing modifications to hatchery targets.....	3-96
Table 3.3.4-1. Summary of cover type acreages in the study area for the Lewis River Projects	3-100
Table 3.3.4-2. Special status species documented or potentially occurring in the study area for the Lewis River Projects.....	3-108
Table 3.3.5-1. Federally listed fish species in the Lewis River Basin	3-125
Table 3.3.5-2. Numbers of bald eagles recorded during PacifiCorp’s late-winter aerial surveys	3-128
Table 3.3.5-3. Bald eagle nest activity and productivity recorded during PacifiCorp’s summer aerial surveys	3-129
Table 3.3.6-1. Percent activity participation at project reservoirs	3-140
Table 3.3.6-2. Project recreational facility total annual visitation for 1998–2000	3-145
Table 3.3.6-3. Project visitation	3-145
Table 3.3.6-4. Percent of holiday weekend occupancy (July 4) at PacifiCorp’s five campgrounds at the Lewis River Projects from 1996 to 2000	3-146
Table 3.3.6-5. Day-use area parking occupancy	3-146
Table 3.3.6-6. Proposed measures to improve and expand campgrounds and day-use facilities	3-152
Table 3.3.6-7. Proposed measures to improve trails in the project areas	3-158
Table 3.3.7-1. Major landowners within the Lewis River watershed	3-161
Table 3.3.7-2. Proposed measures to improve management of visitors within the project area.....	3-170
Table 3.3.7-3. Summary of applicant-proposed measures related to public safety.....	3-172
Table 3.3.9-1. Recent growth rates in the project vicinity.....	3-183
Table 3.3.9-2. Population estimates and forecasts for selected areas of Washington	3-184
Table 3.3.9-3. 2000 and 2002 labor force and employment estimates for Clark, Cowlitz, and Skamania counties.....	3-185
Table 3.3.9-4. Year 2000 occupancy status by area	3-187
Table 3.3.9-5. Comparison of northwest utility electricity rates for 2002.....	3-187
Table 3.3.9-6. Cowlitz PUD and PacifiCorp customer base.....	3-189
Table 3.3.9-7. Combined Cowlitz PUD and PacifiCorp tax payment in 1999.....	3-190
Table 4.1-1. Staff assumptions for economic analysis of the PacifiCorp projects including Swift No. 1, Yale and Merwin	4-2

Table 4.1-2.	Staff assumptions for economic analysis of the Cowlitz PUD Swift No. 2 Project	4-3
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	4-4
Table 4.1-4.	Summary of current annual costs and future capital costs for PacifiCorp's Yale Project under the No-action Alternative	4-6
Table 4.1-5.	Summary of current annual costs and future capital costs for PacifiCorp's Merwin Project under the No-action Alternative	4-7
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	4-9
Table 4.2-1.	Summary of operations and maintenance costs for measures included in the SA for the three PacifiCorp Projects	4-10
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	4-15
Table 4.2-3.	Summary of initial and subsequent capital cost and annualized costs costs for measures included in the SA for PacifiCorp's Yale Project	4-21
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	4-28
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	4-35
Table 4.2-6.	Summary of operations and maintenance costs for measures included in the SA for Cowlitz PUD's Swift No. 2 Project	4-36
Table 4.3-1.	Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Swift No. 1 Project.....	4-38
Table 4.3-2.	Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Yale Project.....	4-39
Table 4.3-3.	Summary of annual net benefits for the no-action and proposed action alternative for PacifiCorp's Merwin Project	4-39
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	4-40

LIST OF FIGURES

Figure 2.1.1-1. Lewis River Hydroelectric Project area map.....	2-2
Figure 2.1.1-2. Swift No. 1 Project features.....	2-4
Figure 2.1.1-3. Swift No. 2 Project features.....	2-6
Figure 2.1.1-4. Yale Project features.....	2-8
Figure 2.1.1-5. Merwin Project features.....	2-10
Figure 3.3.2-1. Swift Creek reservoir average daily water surface elevations, water years 1997–2001	3-11
Figure 3.3.2-2. Yale Lake average daily water surface elevations, water years 1997–2001	3-12
Figure 3.3.2-3. Lake Merwin average daily water surface elevations, water years 1997–2001	3-13
Figure 3.3.2-4. Daily flow exceedance curve for Lewis River at Ariel (below Merwin dam, USGS Gage 14220500; 1932 through 1998)	3-15
Figure 3.3.2-5. Recorded water temperatures (bold) in the Swift No. 2, Yale, and Merwin powerhouse tailraces and corresponding releases, July 15 through July 28, 1996	3-21
Figure 3.3.2-6. Monthly median temperatures at the Swift Creek reservoir inflow, Swift No. 1 tailrace, Swift No. 2 tailrace, Yale tailrace, and Merwin tailrace; May 1999 through April 2000	3-22
Figure 3.3.2-7. Nitrogen to phosphorus ratios for sites sampled monthly during May 1999 through April 2000	3-27
Figure 3.3.2-8. Observed Swift dam release temperature and modeled water temperature at downstream end of Lewis River bypassed reach for four release flows (in cfs) under average temperature conditions.....	3-34
Figure 3.3.3-1. Periodicity chart for life stages of fish species (with known life history information) in the Lewis River Basin	3-45
Figure 3.3.3-2. Adult spring Chinook and fall Chinook returns to the North Fork Lewis River (1980–2001)	3-47
Figure 3.3.3-3. Adult coho returns to the North Fork Lewis River.....	3-48
Figure 3.3.3-4. The number of winter and summer steelhead harvested in the Lewis River Basin recreation fishery (1980 through 1998)	3-50
Figure 3.3.3-5. Annual peak counts of bull trout spawners observed in Cougar Creek 1979 through 2003	3-54
Figure 3.3.3-6. Spawning population estimate of bull trout in Swift Creek reservoir for the years 1994 through 2003	3-55
Figure 3.3.3-7. Peak counts of kokanee spawning in Cougar Creek (1978 to 2002).....	3-56
Figure 3.3.3-8. Daily flow exceedance curves for observed Lewis River flows at Ariel since 1995	3-76
Figure 3.3.6-1. Recreational resources in the Lewis River Basin.....	3-137

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACC	Aquatics Coordination Committee
ADA	Americans with Disabilities Act
Advisory Council	Advisory Council on Historic Preservation
AIR	additional information request
ALP	Alternative Licensing Process
APE	area of potential effects
BLM	U.S. Department of the Interior, Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DO	dissolved oxygen
DPS	Distinct Population Segment
EDT	Ecosystem Diagnosis and Treatment
EFH	essential fish habitat
EIS	environmental impact statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
FPA	Federal Power Act
FR	Forest Road
FTE	full-time equivalents
FWS	U.S. Department of the Interior, Fish and Wildlife Service
GPNF	Gifford Pinchot National Forest
GWh	gigawatt-hour
HEP	Habitat Evaluation Procedure
HPMP	Historic Properties Management Plan
I&E	interpretation and education
Interior	U.S. Department of the Interior
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hours
LWD	large woody debris
MDN	marine-derived nutrients
mg/L	milligrams per liter
msl	above mean sea level
MW	megawatt
MWh	megawatt-hours

MWHMA	Merwin Wildlife Habitat Management Area
National Register	National Register of Historic Places
NCEMS	North Country Emergency Medical Service
NEPA	National Environmental Policy Act
ng/L	nanograms per liter
NMFS	National Marine Fisheries Service
NTUs	nephelometric turbidity units
NWPP	Northwest Power Pool
O&M	operation and maintenance
PAH	polycyclic aromatic hydrocarbons
PDEA	preliminary draft environmental assessment
PUD	Public Utility District
PWC	personal watercraft
REA	ready for environmental analysis
READ	Resource Enhancement Alternatives Document
ROW	right-of-way
RM	river mile
RRMP	Recreation Resource Management Plan
RV	recreational vehicle
SA	settlement agreement
SHPO	State Historic Preservation Officer
TCC	Terrestrial Coordination Committee
TDG	total dissolved gases
TSI	Trophic State Index
USGS	United States Geological Survey
VCPRD	Vancouver-Clark Parks and Recreation Division
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOE	Washington Department of Ecology
WECC	Western Electricity Coordinating Council
WHMP	Wildlife Habitat Management Plan
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation