



**Federal Energy
Regulatory
Commission**

**Office of
Energy
Projects**

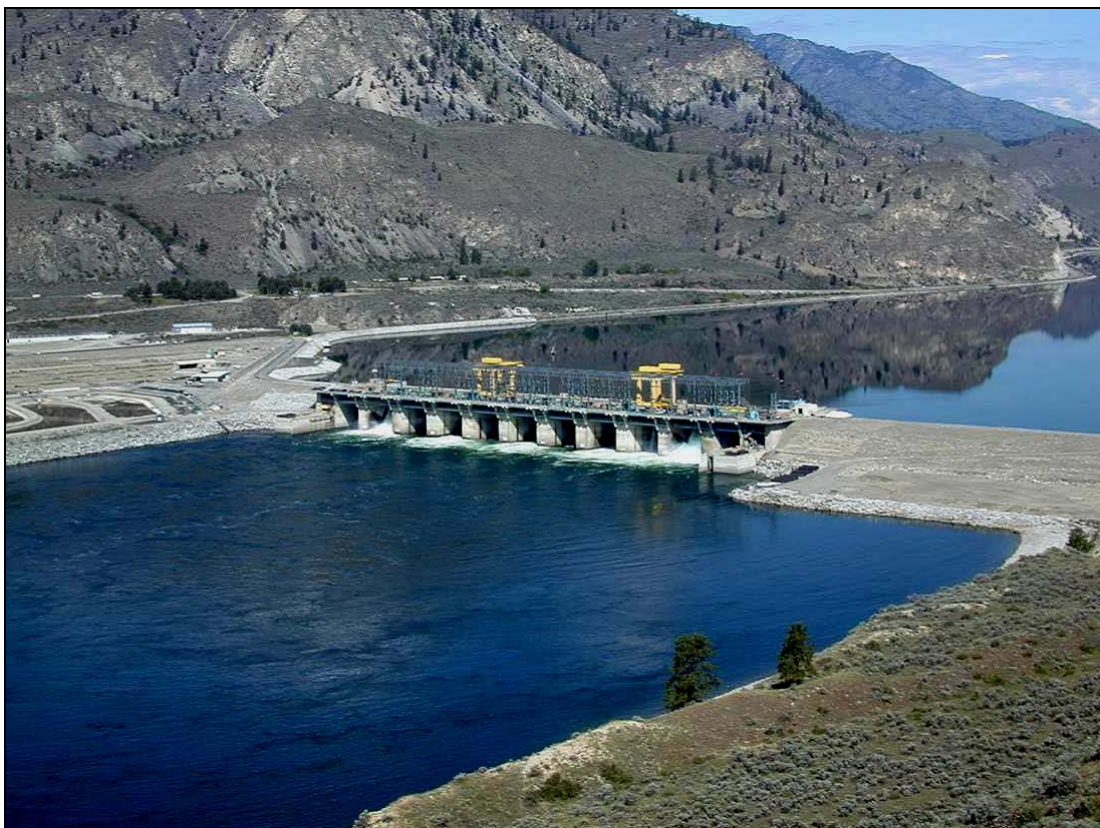
October 2011

FERC/FEIS-F-0240

**FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR HYDROPOWER LICENSE**

Wells Hydroelectric Project—FERC Project No. 2149-152

Washington



Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, D.C. 20426

FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

To the Agency or Individual Addressed:

Reference: Final Environmental Impact Statement

Attached is the final environmental impact statement (EIS) for the Wells Hydroelectric Project (No. 2149-152), located on the Columbia River near the towns of Pateros and Brewster in Okanogan County, Washington.

This final EIS document documents the view of governmental agencies, non-governmental organizations, affected Indian tribes, the public, the license applicant, and Federal Energy Regulatory Commission (Commission) staff. It contains staff evaluations of the applicant's proposal and the alternatives for relicensing the Wells Hydroelectric Project.

Before the Commission makes a licensing decision, it will take into account all concerns relevant to the public interest. The final EIS will be part of the record from which the Commission will make its decision. The final EIS was sent to the U.S. Environmental Protection Agency and made available to the public on or about October 31, 2011.

Copies of the final EIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, N.E., Washington D.C. 20426. The final EIS also may be viewed on the Internet at www.ferc.gov/docs-filing/elibrary.asp. Please call (202) 502-8222 for assistance.

Attachment: Final Environmental Impact Statement

This page intentionally left blank.

COVER SHEET

- a. Title: Relicensing the Wells Hydroelectric Project, FERC Project No. 2149-152.
- b. Subject: Final Environmental Impact Statement (final EIS)
- c. Lead Agency: Federal Energy Regulatory Commission
- d. Abstract: On May 27, 2010, Public Utility District No. 1 of Douglas County (Douglas PUD) filed an application to relicense the existing Wells Hydroelectric Project, located on the Columbia River near Pateros and Brewster in Douglas, Okanogan, and Chelan counties, Washington.
- The project has a current installed capacity of 774.3 megawatts and occupies about 2,664 acres of lands. Federal lands within the project boundary include 8.60 acres of the U.S. Department of the Interior's land and 6.55 acres of U.S. Army Corps of Engineers' land. Douglas PUD does not propose to change the project's capacity or add new generation facilities, but it does propose to construct several non-generating facilities.
- Douglas PUD proposes to relicense the project in accordance with an Aquatic Settlement Agreement and resource management plans filed with the relicense application.
- The staff's recommendation is to relicense the project as proposed with certain modifications and additional measures recommended by the agencies and staff.
- e. Contact: Kim A. Nguyen
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, N.E.
Washington, D.C. 20426
(202) 502-6105
- f. Transmittal: This final EIS to relicense the Wells Hydroelectric Project is being made available for public comment on or about October 31, 2011, as required by the National Environmental Policy Act of 1969¹ and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).
-

¹ National Environmental Policy Act of 1969, amended (Pub. L. 91-190. 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), September 13, 1982).

This page intentionally left blank.

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)² and the U.S. Department of Energy Organization Act³ is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric development subject to its jurisdiction, on the necessary conditions:

That the project...shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)...⁴

The Commission may require such other conditions not inconsistent with the FPA as may be found necessary to provide for the various public interests to be served by the project.⁵ Compliance with such conditions during the licensing period is required. The Commission's Rules of Practice and Procedure allow any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.⁶

² 16 U.S.C. § 791(a)-825r, as amended by the Electric Consumers Protection Act of 1986, Public Law 99-495 (1986) and the Energy Policy Act of 1992, Public Law 102-486 (1992).

³ Public Law 95-91, 91 Stat. 556 (1977).

⁴ 16 U.S.C. § 803(a).

⁵ 16 U.S.C. § 803(g).

⁶ 18 C.F.R. § 385.206 (2009).

This page intentionally left blank.

TABLE OF CONTENTS

COVER SHEET	iii
FOREWORD.....	v
LIST OF FIGURES	xi
LIST OF TABLES.....	xiii
ACRONYMS AND ABBREVIATIONS.....	xvii
EXECUTIVE SUMMARY	xxi
1.0 INTRODUCTION	1
1.1 APPLICATION.....	1
1.2 PURPOSE OF ACTION AND NEED FOR POWER.....	1
1.2.1 Purpose of Action.....	1
1.2.2 Need for Power.....	5
1.3 STATUTORY AND REGULATORY REQUIREMENTS	6
1.3.1 Federal Power Act.....	8
1.3.1.1 Section 18 Fishway Prescriptions	8
1.3.1.2 Section 4(e) Conditions	9
1.3.1.3 Section 10(j) Recommendations	9
1.3.2 Clean Water Act.....	9
1.3.3 Endangered Species Act.....	9
1.3.4 Coastal Zone Management Act.....	11
1.3.5 National Historic Preservation Act	11
1.3.6 Pacific Northwest Electric Power Planning and Conservation Act.....	12
1.3.7 Magnuson-Stevens Fishery Conservation and Management Act	13
1.4 PUBLIC REVIEW AND COMMENT	13
1.4.1 Scoping.....	13
1.4.2 Interventions.....	14
1.4.3 Comments on the Application.....	15
1.4.4 Aquatic Settlement Agreement	15
1.4.5 Comments on the Draft Environmental Impact Statement	16
2.0 PROPOSED ACTION AND ALTERNATIVES.....	17
2.1 NO-ACTION ALTERNATIVE	17
2.1.1 Existing Project Facilities.....	17
2.1.2 Project Safety	19

2.1.3	Existing Project Operation	19
2.1.3.1	Mid-Columbia Hourly Coordination Agreement.....	25
2.1.3.2	Vernita Bar Agreement and Hanford Reach Juvenile Fall Chinook Protection Program Agreement	26
2.1.3.3	Other Agreements.....	27
2.1.4	Existing Environmental Measures	28
2.2	APPLICANT’S PROPOSAL	32
2.2.1	Proposed Project Facilities	32
2.2.2	Proposed Project Operation.....	32
2.2.3	Proposed Environmental Measures	32
2.2.4	Modifications to Douglas PUD’s Proposal—Mandatory Conditions	37
2.3	STAFF ALTERNATIVE	37
2.4	STAFF ALTERNATIVE WITH MANDATORY CONDITIONS	41
2.5	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS	42
2.5.1	Issuing a Non-power License.....	42
2.5.2	Federal Government Takeover of the Project	42
2.5.3	Retiring the Project.....	43
3.0	ENVIRONMENTAL ANALYSIS.....	45
3.1	GENERAL DESCRIPTION OF THE RIVER BASIN	45
3.2	SCOPE OF CUMULATIVE EFFECTS ANALYSIS	46
3.2.1	Geographic Scope	47
3.2.2	Temporal Scope.....	47
3.3	PROPOSED ACTION AND ACTION ALTERNATIVES	47
3.3.1	Aquatic Resources.....	47
3.3.1.1	Affected Environment	47
3.3.1.2	Environmental Effects.....	85
3.3.1.3	Cumulative Effects	124
3.3.2	Terrestrial Resources.....	128
3.3.2.1	Affected Environment	128
3.3.2.2	Environmental Effects.....	141
3.3.3	Threatened and Endangered Species.....	161
3.3.3.1	Affected Environment	161
3.3.3.2	Environmental Effects.....	166
3.3.4	Cultural Resources	178
3.3.4.1	Affected Environment	178
3.3.4.2	Environmental Effects.....	193
3.3.5	Recreation and Land Use	195
3.3.5.1	Affected Environment	195
3.3.5.2	Environmental Effects.....	202

3.3.6	Aesthetic Resources	208
3.3.6.1	Affected Environment	208
3.3.6.2	Environmental Effects	209
3.3.7	Socioeconomics.....	210
3.3.7.1	Affected Environment	210
3.3.7.2	Environmental Effects	213
3.9	NO-ACTION ALTERNATIVE	214
4.0	DEVELOPMENTAL ANALYSIS	215
4.1	POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT	215
4.2	COMPARISON OF ALTERNATIVES.....	217
4.2.1	No-Action Alternative.....	217
4.2.2	Douglas PUD’s Proposal.....	218
4.2.3	Staff Alternative	218
4.2.4	Staff Alternative with Mandatory Conditions.....	218
4.3	COST OF ENVIRONMENTAL MEASURES.....	218
5.0	CONCLUSIONS AND RECOMMENDATIONS.....	223
5.1	COMPARISON OF ALTERNATIVES.....	223
5.2	COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE	230
5.3	UNAVOIDABLE ADVERSE EFFECTS.....	241
5.4	FISH AND WILDLIFE AGENCY RECOMMENDATIONS	241
5.5	CONSISTENCY WITH COMPREHENSIVE PLANS.....	260
6.0	LITERATURE CITED.....	263
7.0	LIST OF PREPARERS	281
8.0	LIST OF RECIPIENTS.....	283

APPENDIX A—Staff Responses to Comments on the Draft Environmental Impact Statement for the Wells Hydroelectric Project

APPENDIX B—Commission Staff-Recommended License Conditions

This page intentionally left blank.

LIST OF FIGURES

Figure 1.	Location of the Wells Hydroelectric Project within the Columbia River Basin.....	2
Figure 2.	Area map of the Wells Hydroelectric Project	3
Figure 3.	Wells Hydroelectric Project transmission line	4
Figure 4.	Mid-Columbia River profile and useable storage volumes.....	23
Figure 5.	Map of locations of Douglas PUD’s fish hatcheries and acclimation ponds	72
Figure 6.	Location of the Wells Wildlife Area units	129
Figure 7.	UCR spring-run Chinook abundance trends	164
Figure 8.	UCR steelhead abundance trends	165
Figure 9.	Location of Wells Hydroelectric Project recreation facilities.....	197

This page intentionally left blank.

LIST OF TABLES

Table 1.	Major statutory and regulatory requirements for the Wells Hydroelectric Project.....	6
Table 2.	Non-power programs related to Wells Hydroelectric Project and mid-Columbia River operations.....	21
Table 3.	Reservoir length and travel time for mid-Columbia Projects below Grand Coulee.....	24
Table 4.	Maximum turbine hydraulic capacity of mid-Columbia projects	24
Table 5.	Monthly discharge (cfs) statistics for daily data from USGS gage no. 12450700, Columbia River below Wells dam	48
Table 6.	Summary of reservoir fluctuation frequencies during 2001 to 2005 and 1990 to 2005	50
Table 7.	Summary of minimum reservoir level frequencies during 2001 to 2005 and 1990 to 2005	50
Table 8.	Summary of selected Washington DOE water quality criteria for the Wells Project area.....	52
Table 9.	Average, minimum, and maximum 12-hour high total dissolved gas levels (in percent saturation) measured in the Wells forebay, Wells tailrace, and Rocky Reach forebay during the monitoring season, 2003–2007	54
Table 10.	Annual summaries of days with hourly total dissolved gas values greater than 110, 115, and 120 percent at the Wells forebay, Wells tailwater, and the Rocky Reach forebay from 2003 to 2007 during the juvenile fish migration season (April–August)	55
Table 11.	Aquatic macrophyte species identified and the percentage of samples in which each was the dominant species (consisting of >60 percent of the total sample)	62
Table 12.	Mollusks collected from sampling stations on the Methow, Okanogan, and Columbia rivers during the 2005 Wells Project aquatic macroinvertebrate inventory	63
Table 13.	Annual anadromous fish counts from 2000–2009 and 10-year averages ...	67

Table 14.	Pacific lamprey counts at Columbia River mainstem dams, by dam and year, 1997–2007	74
Table 15.	Native and non-native resident fish species that have been documented in Wells reservoir from past resident fish assessments, monitoring efforts, and miscellaneous studies	77
Table 16.	Summary of bull trout passage up adult fish ladders at three mid-Columbia projects.....	79
Table 17.	Initial production objectives for the Wells HCP passage loss compensation program	102
Table 18.	Current production objectives	103
Table 19.	Projects funded through the Wells Tributary Conservation Plan through calendar year 2010.....	105
Table 20.	Acreage of cover types in the reservoir lands component of the Wells Project.....	130
Table 21.	Acreage of cover types in the transmission line component of the Wells Project.....	132
Table 22.	Noxious weeds documented in the Wells Project area	133
Table 23.	Special-status wildlife species detected at the Wells Project.....	139
Table 24.	Federally listed species potentially occurring in Douglas, Okanogan, and Chelan counties	162
Table 25.	Bull trout critical habitat primary constituent element analysis.....	173
Table 26.	Archaeological and historic resources within or directly adjacent to the Wells Project APE.....	182
Table 27.	Employment by industry in the project area from 2000 Census	211
Table 28.	Travel and tourism-related spending and revenue in project area	212
Table 29.	Parameters for the economic analysis of the Wells Project	216
Table 30.	Summary of the annual cost of alternative power and annual project cost for the alternatives for the Wells Hydroelectric Project.....	217

Table 31.	Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Wells Hydroelectric Project.....	220
Table 32.	Comparison of alternatives for the Wells Hydroelectric Project	224
Table 33.	Fish and wildlife agency recommendations for the Wells Project.....	243
Table 34.	FERC comprehensive plans considered for the Wells Hydroelectric Project.....	260

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

7-DADMax	7-day average of the daily maximum temperatures
7Q10	7-day, 10-year frequency flood
APE	area of potential effects
Aquatic Settlement	Aquatic Settlement Agreement
ATU	Accumulated Thermal Unit
BA	Biological Assessment
BIA	Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
°C	degrees Celsius
cfs	cubic feet per second
Chelan PUD	Public Utility District No. 1 of Chelan County
Colville Tribes	Confederated Tribes of the Colville Reservation
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CSR-SRI	Columbia and Snake River Spill Response Initiative
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
Douglas PUD	Public Utility District No. 1 of Douglas County
DPS	distinct population segment
EFH	essential fish habitat
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
GAP	Gas Abatement Plan
Grant PUD	Public Utility District No. 2 of Grant County

Hanford Agreement	Hanford Reach Juvenile Fall Chinook Protection Program Agreement
HCA	Agreement on the Hourly Coordination of Projects on the Mid-Columbia River
HCP	Habitat Conservation Plan
HGMP	Hatchery Genetic Management Plan
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
Interior	U.S. Department of the Interior
kcfs	thousand cubic feet per second
kg	kilogram
kV	kilovolt
L	liter
mg	milligrams per liter
msl	mean sea level
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NERC	North American Reliability Corporation
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity unit
O&M	operation and maintenance
PA	Programmatic Agreement
PCB	polychlorinated biphenyl
PCE	primary constituent element
Permit Species	Spring-run and summer/fall-run Chinook salmon, sockeye salmon, and steelhead
PIT	Passive Integrated Transponder
Plan Species	Spring-run and summer/fall-run Chinook salmon, sockeye salmon, coho salmon, and steelhead
project	Wells Hydroelectric Project
PUD	Public Utility District
QAPP	Quality Assurance Project Plan
RD	recreation day
REA	Ready for Environmental Analysis
RM	river mile
RTE	rare, threatened, and endangered

RV	recreational vehicle
RWG	Resource Work Group
SCORP	State Comprehensive Outdoor Recreation Plan
SD	standard deviation
SD1	Scoping Document 1
SD2	Scoping Document 2
SPCC	Spill Prevention, Control, and Countermeasure
spp.	species
ssp.	subspecies
SWG	Settlement Work Group
TCP	traditional cultural property
TDG	total dissolved gas
THPO	Tribal Historic Preservation Officer
TMDL	total maximum daily load
UCR	Upper Columbia River
Umatilla	Confederated Tribes of the Umatilla Indian Reservation
μg	microgram
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
Washington DAHP	Washington Department of Archaeology and Historic Preservation
Washington DFW	Washington Department of Fish and Wildlife
Washington DOE	Washington Department of Ecology
Washington IAC	Washington Interagency Committee for Outdoor Recreation
Washington NHP	Washington Natural Heritage Program
Washington SHPO	Washington State Historic Preservation Officer
WECC	Western Electricity Coordinating Council
Wells HCP	Wells Anadromous Fish Agreement and Habitat Conservation Plan
WQAP	Water Quality Attainment Plan
WQC	water quality certification
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation

This page intentionally left blank.

EXECUTIVE SUMMARY

Proposed Action

On May 27, 2010, the Public Utility District No. 1 of Douglas County (Douglas PUD) filed an application for a new license to operate and maintain the 774.3-megawatt (MW) Wells Hydroelectric Project (Wells Project or project). The project is located on the Columbia River near Pateros and Brewster in Douglas, Okanogan, and Chelan counties, Washington. The project occupies about 2,664 acres of land (15.15 acres are federal lands administered by the U.S. Bureau of Land Management and the U.S. Army Corps of Engineers). Lands of the Confederated Tribes of the Colville Reservation (Colville Tribes) border the project along the north and east side of the Columbia River upstream of the confluence of the Okanogan River, and along the eastern edge of the Okanogan River.

Project Description

The existing project consists of: (1) a 4,495-foot-long dam that includes: (a) a 2,300-foot-long and 40-foot-high earth and rock-filled west embankment; (b) a 1,165-foot-long and 168-foot-wide concrete central integrated structure with 10 generating units, 11 spillways (5 of which are modified to accommodate the juvenile fish bypass system), switchyard, and two fish ladders each with its own trap and sorting facility; and (c) a 1,030-foot-long and 160-foot-high earth and rock-filled east embankment; (2) two 41-mile-long, 230-kilovolt single-circuit transmission lines running parallel to each other; (3) a fish hatchery; (4) recreational facilities; and (5) appurtenant facilities.

The Wells Project is operated in coordination with five other regional hydroelectric projects on the mid-Columbia River.

Proposed Facilities

Douglas PUD does not propose to construct new generation facilities; however, it does propose to: construct new visitor interpretive displays; redesign, construct, and/or rehabilitate new/aging facilities at the Wells Hatchery and the non-project Methow Hatchery; construct a formal tent camping facility; expand the facilities at Marina Park; and extend the launch ramp at the Chicken Creek boat launch.

Proposed Environmental Measures

Douglas PUD proposes the following environmental measures:

- Continue to implement the Wells Anadromous Fish Agreement and Habitat Conservation Plan (Wells HCP), which consists of a Passage Survival Plan, a Juvenile Passage Survival Plan, an Adult Passage Plan, a Tributary Conservation Plan, a Hatchery Compensation Plan, and a Predator Control Program.

- Implement the Aquatic Settlement Agreement, which includes the following six aquatic resource management plans:
 - Water Quality Management Plan.
 - Bull Trout Management Plan.
 - Pacific Lamprey Management Plan.
 - White Sturgeon Management Plan.
 - Resident Fish Management Plan.
 - Aquatic Nuisance Species Management Plan.
- Implement the Wildlife and Botanical Management Plan.
- Implement the Avian Protection Plan.
- Implement the Historic Properties Management Plan (HPMP).
- Implement the Recreation Management Plan, which includes a Recreation Facility Improvement Program and a Recreation Facility Operation, Maintenance, and Monitoring Program, and continue to implement the Land Use Policy.

Alternatives Considered

This final environmental impact statement (EIS) considers the following alternatives: (1) no-action — continuing to operate the project as required under the current license; (2) Douglas PUD’s proposal — as outlined above; (3) a staff alternative — Douglas PUD’s proposal with staff’s additions and modifications; and (4) a staff alternative including all mandatory conditions.

The staff alternative includes Douglas PUD’s proposal without the following measures: (1) implementing as-yet unspecified measures or studies included in the Water Quality Management Plan, Bull Trout Management Plan, Pacific Lamprey Management Plan, White Sturgeon Management Plan, Resident Fish Management Plan, and Aquatic Nuisance Species Management Plan (implementation of any as-yet unspecified measures would require Federal Energy Regulatory Commission [Commission or FERC] approval after the filing of an application to amend any license issued); (2) requiring Douglas PUD to attend and participate in forums that address regional water quality issues, regional bull trout conservation efforts, regional Pacific lamprey conservation efforts, and regional monitoring efforts for aquatic nuisance species; (3) requiring that the Wells HCP Project Fish Bypass/Spill Operations Plan be subject to Aquatic Settlement Work Group approval; (4) monitoring and studying bull trout passage performance at off-project hatcheries and broodstock collection facilities; (5) collecting, and funding the genetic analysis of, bull trout tissue samples; (6) conducting a study of Pacific lamprey habitat and relative abundance in the project area; (7) conducting literature reviews of potential upstream and downstream passage measures for Pacific lamprey; (8) developing a mid-

Columbia hatchery facility to accommodate various phases of white sturgeon supplementation for the Wells Project; (9) identifying white sturgeon plan measures and activities to educate and to provide outreach to local public entities; (10) requiring Douglas PUD to compile information on other white sturgeon supplementation and recovery programs in the Columbia River Basin; (11) conducting periodic assessments of resident fish populations in the reservoir; (12) conducting an assessment of unspecified future changes in operations on resident fish and the proliferation of aquatic nuisance species; and (13) modifying or upgrading facilities at the non-project Methow Hatchery.

In addition, the staff alternative would include some modifications and additions to Douglas PUD's proposal, as follows: (1) filing total dissolved gas (TDG) and spill annual reports with the Commission; (2) filing the Gas Abatement Plan (GAP) and Quality Assurance Project Plans (and any subsequent changes to the plans) with the Commission for approval prior to implementation; (3) notifying the Commission within 48 hours of any temporary modifications to approved project operations or facilities that are necessary to protect water quality and aquatic resources in emergency situations; (4) obtaining prior Commission approval through the filing of an application to amend the license if any long-term (non-emergency) measures are proposed to address non-compliance with water quality criteria other than TDG (which would be addressed in the GAP); (5) including information about the project and project-specific measures for bull trout in informational and educational displays at the Wells Dam Visitor Center; (6) developing a detailed study plan to evaluate bull trout stranding and incidental take of bull trout during implementation of other aquatic resources measures and operation of the Wells Hatchery; (7) filing plans and schedules to implement four specific fishway improvement measures under the Pacific Lamprey Management Plan with the Commission for approval, if any are selected for implementation; (8) filing a white sturgeon broodstock collection and breeding plan with the Commission for approval; (9) identifying specific best management practices that would be implemented to contain aquatic nuisance species during implementation of recreation enhancements; (10) identifying specific measures that would be implemented if additional aquatic nuisance species are detected in the project area; and (11) filing progress reports for the Wildlife and Botanical Management Plan developed in consultation with the Terrestrial Resources Work Group, reviewing changes to the Washington rare plant list, and updating the sensitive species list.

The staff alternative with mandatory conditions includes staff-recommended measures along with the mandatory section 18 fishway prescriptions that we did not include in the staff alternative specifically: (1) implement as-yet unidentified plans, measures, or modifications to project facilities or operations to address bull trout passage criteria exceedances or allowable bull trout incidental take exceedances; (2) monitor and study bull trout incidental take and bull trout passage performance at off-project broodstock collection facilities; (3) continue to evaluate and exhibit steady progress toward achievement of adult Pacific lamprey passage standards (i.e., performance that is at least as high as other mid-Columbia River hydroelectric dams or performance that

complies with any future as-yet unidentified lamprey passage standard developed by the U.S. Fish and Wildlife Service [FWS]); (4) use the best technology that is commercially available to count lamprey at the project; (5) develop and implement an alternative lamprey passage route to serve as a counting facility for adult lamprey; (6) conduct an upstream Pacific lamprey passage literature review; (7) develop and implement an operations study plan to identify operational measures to improve upstream lamprey passage; (8) design, evaluate, and implement additional measures until the project achieves compliance with the upstream lamprey passage standard; and (9) develop and implement a downstream juvenile lamprey passage study if FWS determines that juvenile lamprey are being adversely affected by Wells dam, and if study results indicate that Wells dam has a substantive negative effect on juvenile lamprey, the licensee shall implement operational or structural modifications to improve downstream passage survival.

Public Involvement and Areas of Concern

Before filing its relicense application, Douglas PUD conducted pre-filing consultation under the Commission's Integrated Licensing Process (ILP). The intent of the ILP is to initiate public involvement early in the project planning process and encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission.

During pre-filing, Commission staff conducted scoping to determine what issues and alternatives should be addressed. On January 29, 2007, we distributed a scoping document (SD1) to interested parties, soliciting comments, recommendations, and information on the project. An environmental site review of the project was held on February 27, 2007. Two scoping meetings were held on February 27 and 28, 2007, to receive oral comments on the project. Based on discussions during the environmental site review and scoping meetings and written comments filed with the Commission, we issued a revised scoping document (SD2) on May 15, 2007. An addendum to SD2 was issued on May 16, 2007. On August 10, 2010, we issued a notice that the application was ready for environmental analysis and requested conditions and recommendations. We issued our draft EIS for the proposed relicensing of the Wells Project on April 6, 2011, and requested that comments on the draft EIS be filed by May 31, 2011. We received comments from Douglas PUD; the cities of Pateros, Bridgeport, and Brewster; U.S. Environmental Protection Agency; Washington Department of Ecology; the Colville Tribes; Washington Department of Fish and Wildlife; U.S. Department of the Interior; Port of Chelan County; National Marine Fisheries Service; FWS; and Congressman Doc Hastings. In appendix A of this final EIS, we summarize the written comments received; provide responses to those comments; and indicate, where appropriate, how we have modified the text for the final EIS.

The primary issues associated with relicensing the project are protecting anadromous fish habitat, ensuring that spill operations minimize project contributions to

elevated TDG levels in the Columbia River, maintaining safe passage for bull trout and improving passage for Pacific lamprey, minimizing take of bull trout, enhancing white sturgeon populations, maintaining existing wildlife management areas, meeting project-related recreation needs over the term of any new license, and protecting cultural resources.

Staff Alternative

Aquatic Resources

Implementing Douglas PUD's Water Quality Management Plan would help minimize the project's contribution to high TDG levels during juvenile fish bypass and spill operations, minimize the potential for hazardous material spills, ensure that procedures are in place to minimize the extent and adverse effects of any hazardous materials spills that do occur, and identify occurrences of excessive water temperatures in the project fish ladders or other project effects that contribute to the violation of water quality standards, which would allow appropriate corrective measures to be identified. Continuing to implement the existing Wells HCP would mitigate mortality that is caused to anadromous fish migrating through the project by ensuring that the no net impact goal for spring-run and summer/fall-run Chinook salmon, sockeye salmon, coho salmon, and steelhead (Plan Species) is met through a combination of passage and tributary habitat improvements and hatchery production. Implementing Douglas PUD's measures for bull trout, Pacific lamprey, and white sturgeon, with staff's modifications and additions, would address any project-related effects and contribute to the protection and recovery of these regionally-important fish species. Continuing to implement Douglas PUD's Land Use Policy and predator control program (filed as part of Douglas PUD's Resident Fish Management Plan) would help ensure protection and enhancement of aquatic habitat, and resident and anadromous fish species within the Wells reservoir.

Terrestrial Resources

Implementing the Wildlife and Botanical Management Plan would protect, maintain, and enhance sensitive plant species, wildlife, and wildlife habitat on project lands. Staff's recommended annual reporting in consultation with the resource agencies would help ensure that mitigation measures implemented through this plan are effective. Implementing Douglas PUD's Avian Protection Plan would reduce the risk of avian collision with the transmission line and minimize disturbance of nesting birds.

Threatened and Endangered Species

Implementing staff-recommended provisions of the Water Quality Management Plan, Bull Trout Management Plan, and Aquatic Nuisance Species Management Plan, as well as continuing to implement the Wells HCP (as previously approved by the Commission), Douglas PUD's Land Use Policy, and predator control program, would

help minimize project-related take and contribute to the recovery of threatened and endangered species.

Recreation

Implementing Douglas PUD's Recreation Management Plan would enhance existing public access sites within the project boundary, provide management for implementation of the proposed site improvements that would enhance the aesthetic quality and the physical condition of project-related recreational facilities, provide greater recreational opportunities within the project boundary through the expansion of existing recreation facilities and the construction of new ones, ensure that project-related recreational needs are met, reduce recreation-related adverse effects on environmental resources, define maintenance responsibilities, and provide recreation monitoring of use and needs through the term of the license. The proposed installation of interpretive displays and the distribution of printed or web-based materials would facilitate public use of project recreation facilities.

Land Use and Aesthetics

Continuing to implement Douglas PUD's Land Use Policy would provide for the management and approval of land uses within the project boundary, ensure that project lands remain available for recreation, ensure that private uses could continue on project lands, and ensure that any proposed private or commercial uses of project lands are in compliance with the FERC license. Douglas PUD's proposed aesthetic resource measures would preserve the aesthetic quality of the area by ensuring that facilities do not fall into disrepair or become outdated, and maintain or improve the aesthetic condition of recreation sites.

Cultural Resources

Implementing Douglas PUD's HPMP would protect cultural resources and historic properties from project-related effects for the term of the new license. Continuing to implement Douglas County's Land Use Policy would ensure that any land management decisions and activities associated with project lands are in compliance with the HPMP.

No-Action Alternative

Under the no-action alternative, Douglas PUD would continue to operate the project as it currently does under the terms of its current license, including continued implementation of the Wells HCP. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

Conclusions

Based on our analysis, we recommend licensing the project as proposed by Douglas PUD with some staff modifications and additional measures.

In section 4.2 of the EIS, we estimate the likely cost of alternative power for each of the alternatives identified above. Our analysis shows that during the first year of operation, under the no-action alternative, the project would produce power at a cost that is \$364,016,310, or about \$89.28/megawatt-hour (MWh), less than the cost of alternative power. Under the applicant's proposal, the project would produce power at a cost that is \$362,063,710, or about \$88.80/MWh, less than the cost of alternative power. Under the staff-recommended alternative, the project would produce power at a cost that is \$362,373,900, or about \$88.87/MWh, less than the cost of alternative power. Under the staff-recommended alternative with mandatory conditions, the project would produce power at a cost that is \$362,226,850, or about \$88.84/MWh, less than the cost of alternative power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (4,077,400 MWh annually); (2) the 774.3 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental resources proposed by Douglas PUD, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of proposed and recommended environmental measures.

This page intentionally left blank.

FINAL ENVIRONMENTAL IMPACT STATEMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.

Wells Hydroelectric Project FERC Project No. 2149-152—Washington

1.0 INTRODUCTION

1.1 APPLICATION

On May 27, 2010, Public Utility District No. 1 of Douglas County (Douglas PUD) filed an application for a new major license for the existing Wells Hydroelectric Project (Wells Project or project). The 774.3-megawatt (MW) project is located on the Columbia River at river mile (RM) 515.6 near Pateros and Brewster in Douglas, Okanogan, and Chelan counties, Washington (figures 1 through 3). The project occupies about 2,664 acres of land. Federal lands within the project boundary include 8.60 acres of U.S. Bureau of Land Management (BLM) land and 6.55 acres of U.S. Army Corps of Engineers (Corps) land. The project generates an average of about 4,077,400 megawatt-hours (MWh) of energy annually. Douglas PUD does not propose to change the project's capacity or add new generation facilities, but it does propose to construct several non-generating facilities.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of relicensing the Wells Project is to continue to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Federal Energy Commission (Commission or FERC) must decide whether to issue a license to Douglas PUD for the Wells Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

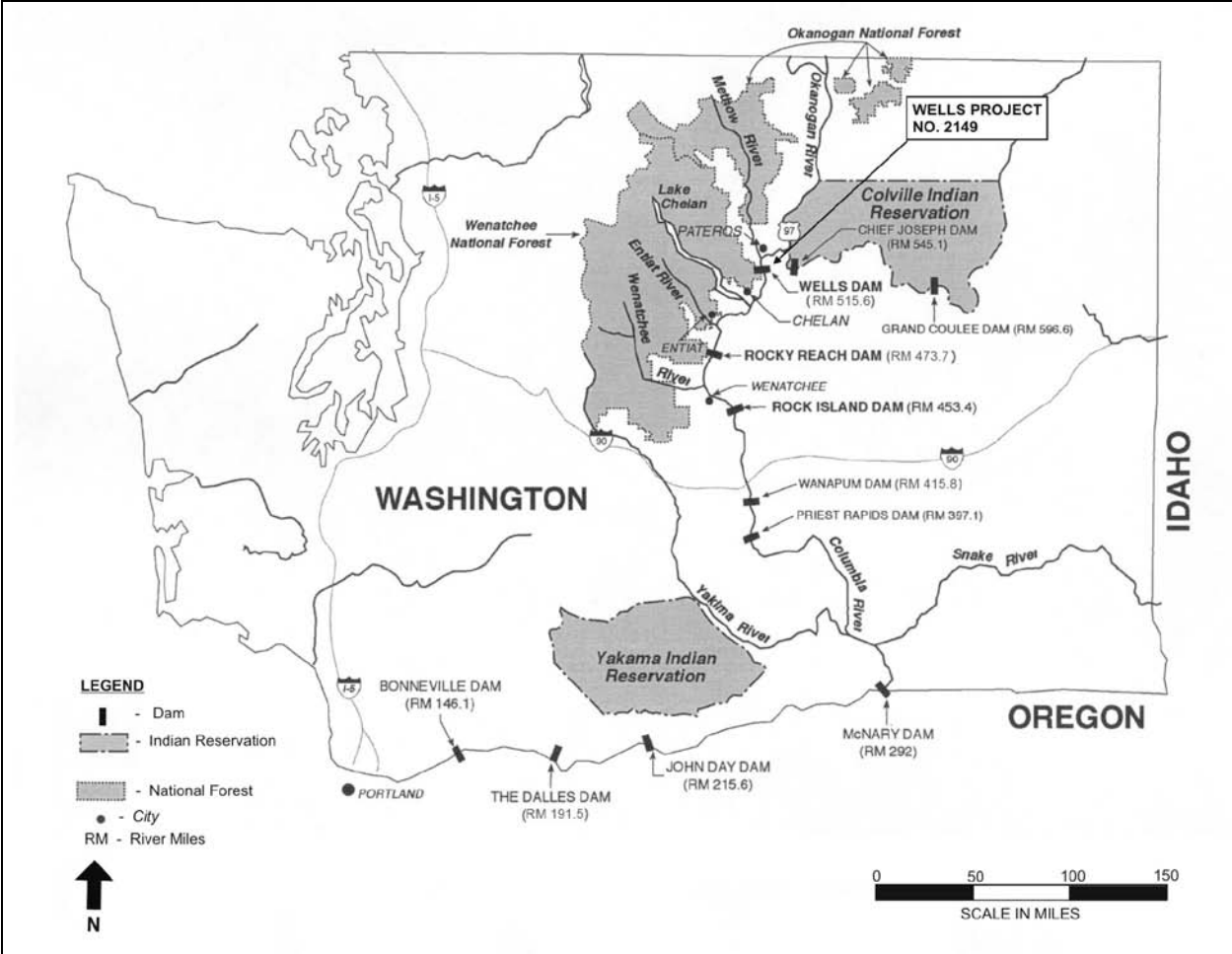


Figure 1. Location of the Wells Hydroelectric Project within the Columbia River Basin (Source: NMFS, 2002, as modified by staff).

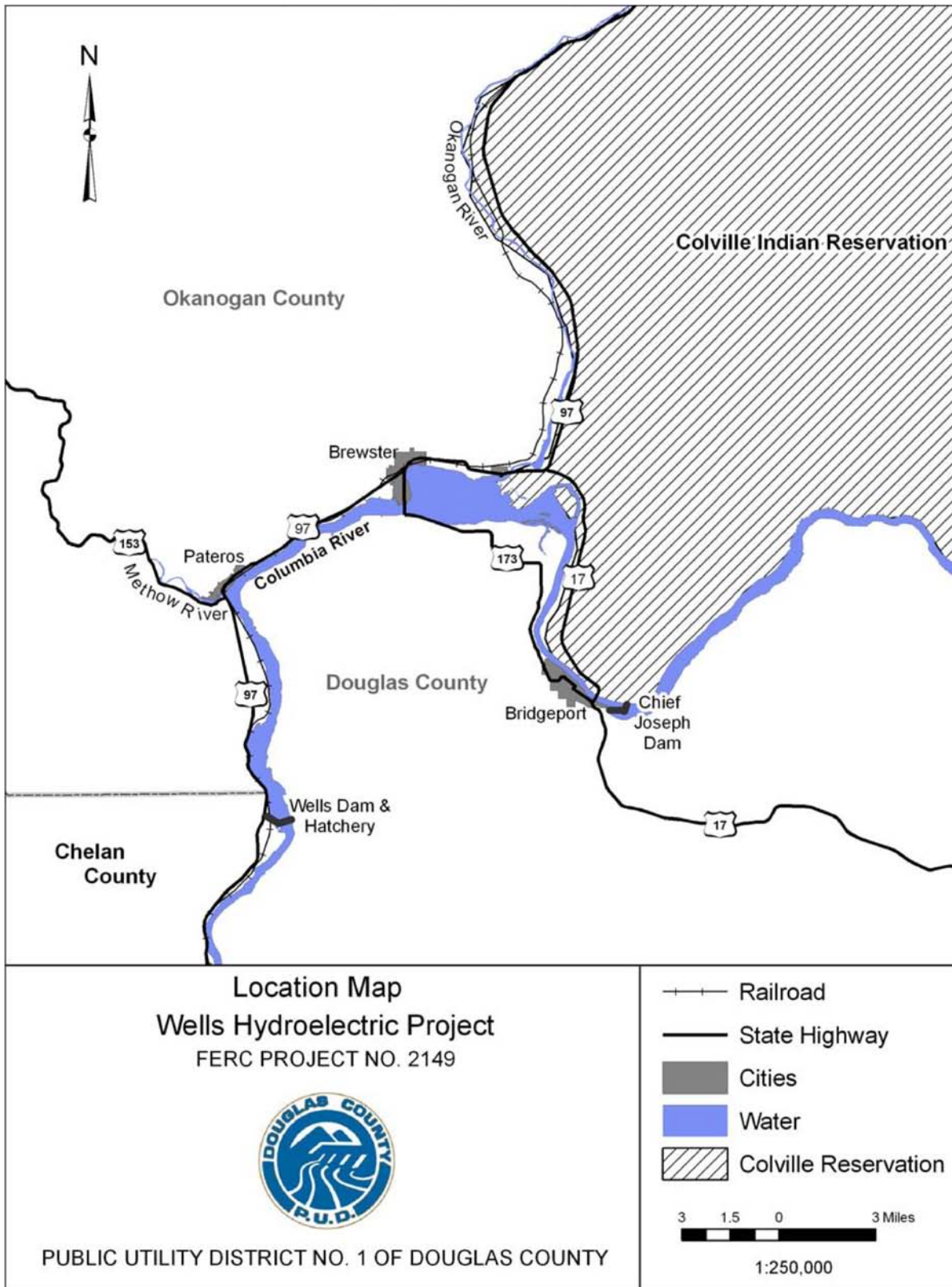


Figure 2. Area map of the Wells Hydroelectric Project (Source: Jacobs Engineering, 2008, as modified by staff).

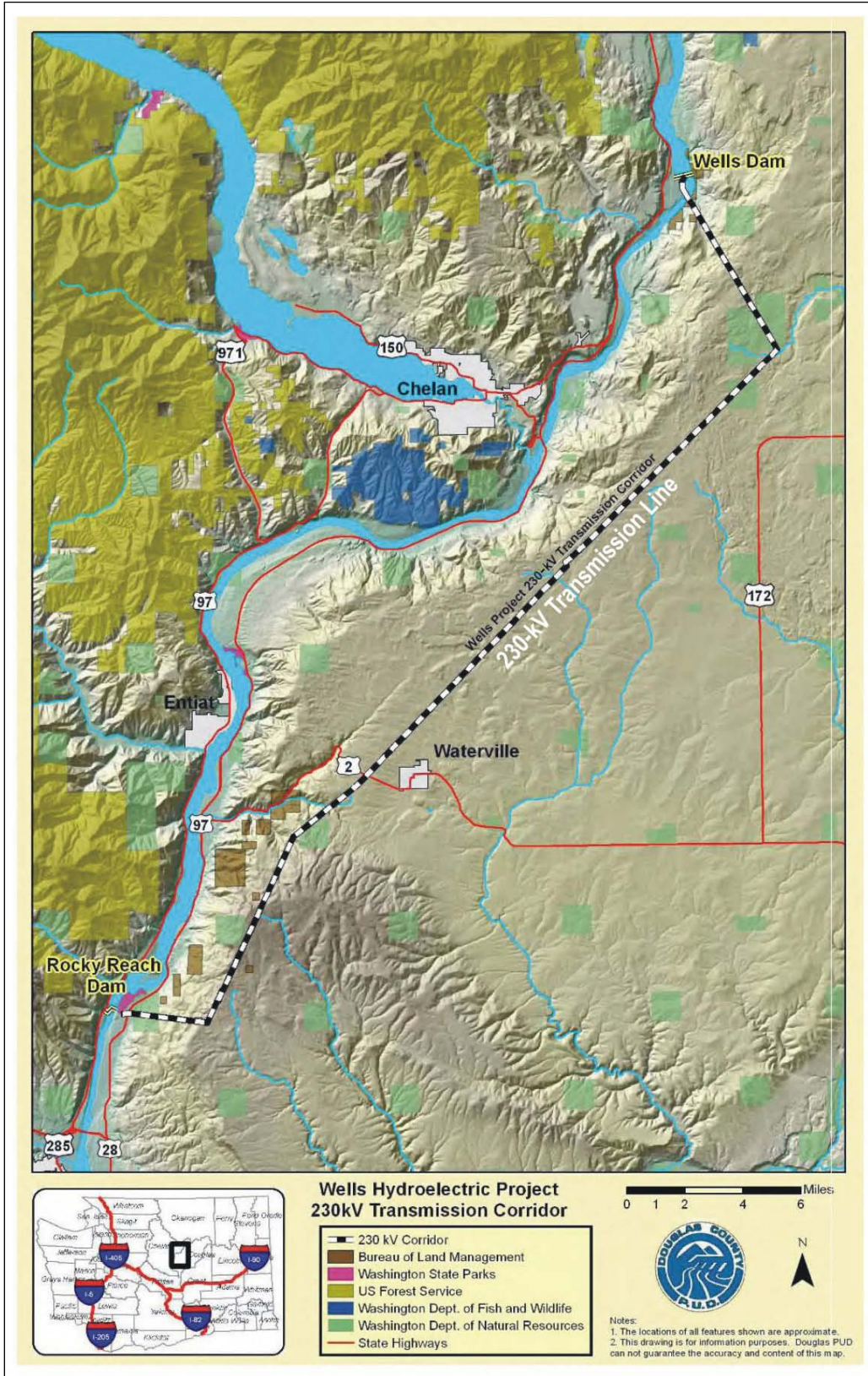


Figure 3. Wells Hydroelectric Project transmission line (Source: Parametrix, 2009a).

Issuing a new license for the Wells Project would allow Douglas PUD to continue generating electricity for the term of the new license, making electrical power from a renewable resource available to its customers.

This final environmental impact statement (EIS) assesses the effects associated with operation of the project, evaluates alternatives to the proposed project, and makes recommendations to the Commission on whether to issue a new license, and if so, recommends terms and conditions to become a part of any license issued.

In this final EIS, we assess the environmental and economic effects of: (1) Douglas PUD's proposal — as outlined above; (3) a staff alternative — Douglas PUD's proposal with staff's additions and modifications; and (4) a staff alternative including all mandatory conditions. We also consider the effects of the no-action alternative. Important issues that are addressed include minimizing effects of the project on total dissolved gas (TDG) concentrations; measures for the protection and enhancement of salmon and steelhead; improving conditions for other fish species, including bull trout, white sturgeon, Pacific lamprey, and resident fish; protecting and enhancing wildlife habitat; enhancing local recreational opportunities; and protecting cultural resources.

1.2.2 Need for Power

The Wells Project provides hydroelectric generation to meet part of Douglas PUD's power requirements, resource diversity, and capacity needs. The project has an installed capacity of 774.3 MW, generates about 4,077,400 MWh annually, and is Douglas PUD's primary generating asset used to meet the electrical power needs of more than 18,000 retail customers. Project power is also sold under long-term contracts to four wholesale power purchasers, helping to meet the electrical power needs of consumers throughout the Pacific Northwest region.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Wells Project is located within the Northwest subregion of the Western Electricity Coordinating Council (WECC) region of the NERC. According to NERC's 2010 forecast, winter peak demand and annual demand requirements for the Northwest subregion are projected to grow at a rate of 1.1 percent and 1.2 percent, respectively, from 2010 through 2019 (NERC, 2010). NERC projects resource capacity margins (generating capacity in excess of demand) will remain above the target reserve margins of 18.6 percent for summer and 20.0 percent for winter throughout the 2010–2019 period. Over the next 10 years, WECC estimates that about 6,285 MW of additional capacity will be brought on line.

We conclude that power from the Wells Project would help meet a need for power in the Northwest subregion in both the short and long term. The project provides low-cost power that displaces generation from non-renewable sources. Displacing the

operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A license for the Wells Project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are summarized in table 1 and described below.

Table 1. Major statutory and regulatory requirements for the Wells Hydroelectric Project (Source: staff).

Requirement	Agency	Status
Section 18 of the FPA (fishway prescriptions)	Interior, NMFS	Interior and NMFS filed preliminary fishway prescriptions and reservations of authority to modify their prescriptions on October 6 and October 8, 2010, respectively. On July 21 and August 1, 2011, NMFS and Interior, respectively, filed letters confirming that their preliminary prescriptions are final prescriptions.
Section 4(e) of the FPA (land management conditions)	Interior, Corps	No section 4(e) conditions have been filed by either agency.
Section 10(j) of the FPA	Washington DFW, NMFS, FWS	Washington DFW and NMFS filed section 10(j) recommendations on October 8, 2010. FWS filed section 10(j) recommendations on October 6, 2010, and amended its recommendations on November 19, 2010.

Requirement	Agency	Status
Clean Water Act—water quality certification	Washington DOE	Application for certification was received on September 30, 2010. On September 12, 2011, Douglas PUD filed notification that it withdrew and resubmitted its application for certification with Washington DOE, which was received on September 13, 2011; action on the application is due by September 13, 2012.
Coastal Zone Management Act	Washington DOE	Washington DOE concurred that the project is not subject to Washington coastal zone program review.
Endangered Species Act Consultation	NMFS, FWS	We initiated formal consultation with NMFS on May 12, 2011. A biological opinion was due by September 24, 2011. We initiated formal consultation with FWS on September 14, 2011. A biological opinion is due by January 28, 2012.
Pacific Northwest Electric Power Planning and Conservation Act	NMFS, FWS	We conclude that our recommendations in the final EIS are consistent with the applicable provisions of the program.
Magnuson-Stevens Fishery Conservation and Management Act	NMFS	We conclude that the proposed project would not adversely affect EFH for Chinook and coho salmon. We provided NMFS with our EFH assessment.

Requirement	Agency	Status
National Historic Preservation Act	Colville Tribes' THPO, Washington DAHP/SHPO	Douglas PUD consulted with the THPO of the Colville Tribes, the Washington DAHP/SHPO, BIA, and other interested parties during development of its proposed HPMP.

Notes: BIA – Bureau of Indian Affairs
Colville Tribes – Confederated Tribes of the Colville Reservation
Corps – U.S. Army Corps of Engineers
Douglas PUD – Douglas County Public Utility District No. 1
DPS – distinct population segment
EFH – essential fish habitat
FPA – Federal Power Act
FWS – U.S. Fish and Wildlife Service
HPMP – Historic Properties Management Plan
Interior – U.S. Department of the Interior
NMFS – National Marine Fisheries Service
THPO – Tribal Historic Preservation Officer
Washington DAHP/SHPO – Washington Department of Archaeology and Historic Preservation/State Historic Preservation Officer
Washington DFW – Washington Department of Fish and Wildlife
Washington DOE – Washington Department of Ecology

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the Department of Commerce or Interior. The U.S. Department of the Interior (Interior)⁷ and the National Marine Fisheries Service (NMFS) filed preliminary fishway prescriptions for the project on October 6 and October 8, 2010, respectively. On July 21 and August 1, 2011, NMFS and Interior, respectively, filed final prescriptions that do not modify their preliminary prescriptions.

Both Interior and NMFS requested reservations of authority to modify their section 18 fishway prescriptions included in any license issued for the project. These

⁷ Interior's preliminary fishway prescription includes measures for upstream and downstream passage of spring and summer/fall Chinook salmon, sockeye salmon, coho salmon, steelhead, bull trout, and Pacific lamprey.

conditions are described under section 2.2.4, *Modifications to Applicant's Proposal—Mandatory Conditions*.

1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. No section 4(e) conditions were filed in response to the Commission's notice requesting conditions and recommendations, issued on August 10, 2010.

1.3.1.3 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Washington Department of Fish and Wildlife (Washington DFW) and NMFS filed timely section 10(j) recommendations on October 8, 2010. The U.S. Fish and Wildlife Service (FWS) filed timely section 10(j) recommendations on October 6, 2010, and amended its recommendations on November 19, 2010. We summarize these measures in table 32, in section 5.4, *Recommendations of Fish and Wildlife Agencies*. In section 5.4, we also discuss how we address the agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On September 30, 2010, Douglas PUD applied to the Washington Department of Ecology (Washington DOE) for section 401 water quality certification (WQC) for the Wells Project. Douglas PUD withdrew its application and reapplied on September 12, 2011. Washington DOE has not yet acted on the request. The WQC is due by September 12, 2012.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or

threatened species or result in the destruction or adverse modification of the critical habitat of such species.

Through consultation with FWS and NMFS during preparation of its draft Biological Assessment (BA),⁸ Douglas PUD identified four federally listed threatened or endangered species that have the potential to occur in the project vicinity, including three species of fish and one plant species: endangered Upper Columbia River (UCR) spring-run Chinook salmon evolutionarily significant unit (ESU), threatened UCR steelhead trout distinct population segment (DPS), threatened Columbia River bull trout DPS, and threatened Ute ladies'-tresses. Designated critical habitat occurs within the project vicinity for all three of the federally listed fish species. Critical habitat for the Ute ladies'-tresses has not been designated. Our analyses of project effects on threatened and endangered species are presented in section 3.3.3.2, *Threatened and Endangered Species*, and our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

We conclude that relicensing the Wells Project with staff-recommended measures and mandatory conditions would have no effect on Ute ladies'-tresses because no populations of this species have been found in the Wells Project area, ongoing project maintenance activities and proposed construction of recreation facilities would have no effect on Ute ladies'-tresses, and Douglas PUD proposes no changes in operation that would increase or decrease the likelihood of their occurrence in the Wells Project area.

We conclude that implementation of the staff alternative with mandatory conditions is not likely to adversely affect the UCR spring-run Chinook salmon ESU, UCR steelhead trout DPS, or Columbia River bull trout DPS.⁹ We also conclude that implementation of the staff alternative with mandatory conditions is not likely to

⁸ Douglas PUD filed its draft BA with its final license application on May 27, 2010, and a supplemental draft BA on August 29, 2011.

⁹ The proposed action and determinations of effect for UCR spring-run Chinook salmon ESU, UCR steelhead trout DPS, and Columbia River bull trout DPS do not include the actions authorized by the Wells HCP. These actions were already considered in NMFS' September 25, 2003, *Biological Opinion, Unlisted Species Analysis and Magnuson-Stevens Fishery Conservation and Management Act Consultation for Proposed Issuance of a Section 10 Incidental Take Permit to Public Utility District No. 1 of Douglas County for the Wells Hydroelectric Project (FERC No. 2149) Anadromous Fish Agreement and Habitat Conservation Plan*, and FWS' May 13, 2004, *Biological Opinion and Conference Opinion for the License Amendments to incorporate the Rocky Reach, Rock Island, and Wells Anadromous Fish Agreements and Habitat Conservation Plans*.

adversely affect designated critical habitat for Columbia River bull trout, UCR spring-run Chinook salmon, or UCR steelhead trout.

By letters filed on May 9, 2011, and August 8, 2011, FWS stated it could not concur with our determination for bull trout. FWS also stated that Douglas PUD's draft BA and FERC's draft EIS do not include an analysis of bull trout critical habitat, and that analysis of the project's effects on the primary constituent elements (PCEs) of bull trout critical habitat should be included in a final BA. On August 29, 2011, Douglas PUD filed an updated draft BA that includes FWS' requested analysis of project effects on bull trout critical habitat PCEs. On September 14, 2011, we requested formal consultation with FWS for the Columbia River bull trout DPS and its designated critical habitat. A biological opinion is due by January 28, 2012.

On May 12, 2011, NMFS indicated that it does not concur with our findings for UCR spring-run Chinook salmon, UCR steelhead trout, or either species designated critical habitat, and that it would issue a biological opinion within 135 days. A biological opinion is due by September 24, 2011.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The Wells Project is not located within the state-designated Coastal Management Zone (letter from P. Irle, Hydropower Project Manager, Washington DOE, Yakima, WA, to B. Patterson, Douglas PUD, East Wenatchee, WA, filed February 9, 2011). Therefore, the project is not subject to Washington coastal zone program review, and no consistency certification is needed for the action. By letter filed on February 9, 2010, Washington DOE concurred.¹⁰

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties (TCPs), and objects significant in American history, architecture, engineering,

¹⁰ Washington DOE's letter to Douglas PUD filed with the Commission on February 9, 2010, states it "...will not require any further action under CZMA."

and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) for the protection of historic properties from the effects of the operation of the project. The terms of the PA would ensure that Douglas PUD addresses and treats all historic properties identified within the project's area of potential effects (APE) through the finalization of the existing draft Historic Properties Management Plan (HPMP).

1.3.6 Pacific Northwest Electric Power Planning and Conservation Act

Under section 4(h) of the Pacific Northwest Electric Power Planning and Conservation Act, the Northwest Power and Conservation Council developed the Columbia River Basin Fish and Wildlife Program to protect, mitigate, and enhance the fish and wildlife resources associated with development and the operation of the hydroelectric projects within the Columbia River Basin. Section 4(h) states that responsible federal and state agencies should provide equitable treatment for fish and wildlife resources, in addition to other purposes for which hydropower is developed, and that these agencies shall take into account, to the fullest extent practicable, the program adopted under the act.

The program directs agencies to consult with federal and state fish and wildlife agencies, appropriate Indian tribes, and the Council during the study, design, construction, and operation of any hydroelectric development in the basin. At the time the license application was filed, our regulations required the applicant to consult with the appropriate federal and state fish and wildlife agencies and tribes before filing and after filing, to provide these groups with opportunities to review and comment on the application. Douglas PUD has followed this consultation process, and the relevant federal and state fish and wildlife agencies and tribes have reviewed and commented on the application.

To mitigate harm to fish and wildlife resources, the Council has adopted specific provisions to be considered in the licensing or relicensing of non-federal hydropower projects (appendix B of the Program). The specific provisions that apply to the proposed project call for: (1) consulting with fish and wildlife managers during study design, construction and operation of the project; (2) using the best available means for aiding downstream and upstream passage of anadromous and resident fish; (3) compensating for unavoidable fish losses or fish habitat losses through habitat restoration or replacement, appropriate propagation, or similar measures; (4) collecting data needed to monitor and evaluate the results of fish protection efforts; and (5) ensuring that the project will not degrade water quality beyond the point necessary to sustain sensitive fish species.

Our recommendations in this final EIS (section 5.2) are consistent with the applicable provisions of the program, listed above. Further, a condition of any license issued would reserve to the Commission the authority to require future alterations in

project structures and operations to take into account, to the fullest extent practicable, the applicable provisions of the program.

As part of the program, the Council has designated more than 40,000 miles of river in the Pacific Northwest region as not being suitable for hydroelectric development (“protected area”). The project is not located within a protected area.

1.3.7 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on all actions that may adversely affect essential fish habitat (EFH). EFH for Chinook and coho salmon in the project area includes the mainstem Columbia River within the Wells Project boundary and the portions of the Okanogan and Methow rivers that are inundated by Wells reservoir. Our analysis of project effects on aquatic habitat is presented in sections 3.3.1, *Aquatic Resources*, and 3.3.3, *Threatened and Endangered Species*, and our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

We conclude that relicensing the Wells Project as proposed with staff-recommended measures and mandatory conditions would not adversely affect EFH for Chinook and coho salmon. We are providing NMFS with our EFH assessment and requesting that NMFS provide any EFH recommendations along with its biological opinion.

1.4 PUBLIC REVIEW AND COMMENT

The Commission’s regulations (18 CFR, section 5.1-5.16) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission’s regulations.

1.4.1 Scoping

Before preparing this final EIS, we conducted scoping to determine what issues and alternatives should be addressed. Scoping Document 1 (SD1) was distributed to interested agencies and others on January 29, 2007. It was noticed in the Federal Register on February 7, 2007. Two scoping meetings were held on February 28, 2007, in East Wenatchee and Brewster, Washington, to request oral comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission’s public record for the project. In addition to comments provided at the scoping meetings, the following entities provided written comments:

<u>Commenting Entity</u>	<u>Date Filed</u>
Betty Wagoner	March 19, 2007
Friends of Fort Okanogan	March 29, 2007

<u>Commenting Entity</u>	<u>Date Filed</u>
City of Brewster	March 30, 2007
Douglas PUD	March 30, 2007
Washington DFW	March 30, 2007
City of Pateros	March 31, 2007
Bureau of Indian Affairs (BIA)	April 2, 2007
Washington DOE	April 6, 2007
FWS	April 9, 2007

A revised scoping document (SD2), addressing these comments, was issued on May 15, 2007, and an addendum to SD2 was issued on May 16, 2007.

1.4.2 Interventions

On August 10, 2010, the Commission issued a notice that Douglas PUD had filed an application to relicense the Wells Project. This notice set October 12, 2010, as the deadline for filing protests and motions to intervene. In response to the notice, the following entities filed motions to intervene, none in opposition:

<u>Intervenor</u>	<u>Date Filed</u>
Puget Sound Energy, Inc.	June 11, 2010
Portland General Electric Company	June 17, 2010
PacifiCorp	June 25, 2010
Bonneville Power Administration (BPA)	July 29, 2010
the Corps, Seattle District	August 18, 2010
Washington DFW	August 23, 2010
Public Utility District No. 1 of Chelan County (Chelan PUD)	August 25, 2010
Washington DOE	September 3, 2010
Interior	October 1, 2010
NMFS	October 8, 2010
Confederated Tribes of the Umatilla Indian Reservation (Umatilla)	October 8, 2010

On October 18, 2010, Pat Kelleher filed comments and a motion to intervene, but did not file a petition for late intervention.

1.4.3 Comments on the Application

A notice requesting conditions and recommendations was issued on August 10, 2010, and an errata to the notice was issued on August 19, 2010. The following entities commented:

<u>Commenting Agency and Other Entity</u>	<u>Date Filed</u>
Interior	October 6, 2010, and November 19, 2010
BPA and the Corps, Seattle District	October 7, 2010
Washington DFW	October 8, 2010
NMFS	October 8, 2010
Umatilla	October 8, 2010
Washington DOE	October 13, 2010

Douglas PUD filed reply comments on November 23, 2010.

1.4.4 Aquatic Settlement Agreement

On May 27, 2010, Douglas PUD and the parties to the agreement filed an Aquatic Settlement Agreement (Aquatic Settlement), signed by FWS, BLM, Washington DFW, Washington DOE, the Confederated Tribes of the Colville Reservation (Colville Tribes), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD. The measures in the Aquatic Settlement are intended to satisfy the anticipated relicensing requirements and resolve all remaining aquatic resource issues¹¹ associated with the project. The Aquatic Settlement includes six resource management plans: Water Quality Management Plan, Bull Trout Management Plan, Pacific Lamprey Management Plan, White Sturgeon Management Plan, Resident Fish Management Plan, and Aquatic Nuisance Species Management Plan.¹² The Commission issued notice of the Aquatic Settlement on July 7, 2010, and set a comment deadline of July 27, 2010, and a reply comment deadline of August 6, 2010. Interior filed a letter on July 27, 2010, stating that it had no comments. Douglas PUD filed a reply on August 6, 2010, acknowledging that no entities filed comments.

¹¹ Project effects on anadromous salmonids were addressed by the Wells Anadromous Fish Agreement and Habitat Conservation Plan (Wells HCP).

¹² The Aquatic Settlement also provides for the establishment of a working group—the Aquatic Settlement Work Group (SWG)—to coordinate, consult, and oversee implementation of the aquatic resource management plans along with an adaptive management process and a dispute resolution provision.

1.4.5 Comments on the Draft Environmental Impact Statement

On April 6, 2011, we issued a draft EIS for the Wells Project. Comments on the draft EIS were due by May 31, 2011. Written comments on the draft EIS were filed by the following entities:

<u>Commenting Entity</u>	<u>Date Filed</u>
Douglas PUD	May 16, 2011
City of Pateros	May 25, 2011
U.S. Environmental Protection Agency (EPA)	May 27, 2011
Washington DOE	May 27, 2011
Colville Tribes	May 31, 2011
Washington DFW	May 31, 2011
Interior	May 31, 2011
Port of Chelan County	June 7, 2011
NMFS	June 8, 2011
City of Bridgeport	June 10, 2011
FWS	June 29, 2011
Colville Tribes	July 7, 2011
Congressman Doc Hastings	July 14, 2011
City of Brewster	July 20, 2011

Appendix A summarizes the comments that were filed, includes our responses to those comments, and indicates where we made modifications to the draft EIS.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

The no-action alternative is the baseline from which to compare the proposed action and all action alternatives that are assessed in the environmental document. Under the no-action alternative, for relicensing, the project would continue to operate under the terms and conditions of the current license. The current license requires implementation of the Wells HCP. Thus, the no-action alternative would include the existing facilities, current project operation, and current environmental measures.

2.1.1 Existing Project Facilities

The existing Wells Project includes a dam, reservoir, tailrace area, switchyard, transmission line, upstream and downstream fish passage facilities, fish hatchery, and recreational facilities. The dam includes an east abutment, a central hydrocombine section, and a west abutment. The east abutment is 1,030 feet long and 160 feet high and consists of an impervious core to bedrock with a filter zone and gravel shell on each side. The west abutment is 2,300 feet long and 40 feet high and consists of an impervious core to the riverbed materials with a filter zone and gravel and rockfill shell on each side. At elevation 781 feet mean sea level (msl), the reservoir has a surface area of 9,740 acres, a gross storage capacity of 331,200 acre-feet, and a useable storage of 97,985 acre-feet.

The hydrocombine is a 1,165-foot-long, 160-foot-high structure that includes 11 spillway bays, 10 generating units, upstream and downstream fish passage facilities, and a switchyard. The spillway bays are located on top of the generating units. The 10 generating units are identical vertical-axis Kaplan turbines with a total installed capacity of 774.3 MW. Each spillway bay is 46 feet wide and spill is controlled by a 66-foot-high gate that is divided into a top and bottom section. Spill flows are passed between the two sections of each gate, and the combined spillways are capable of passing a combined flow of 940,000 cubic feet per second (cfs) at a normal full pool elevation of 781 feet msl and 1,180,000 cfs at a maximum water surface elevation of 791 feet msl.

The switchyard, located on top of the hydrocombine section, is connected to two single-circuit, 230-kilovolt (kV) transmission lines that extend about 41 miles to the Douglas switchyard operated by Douglas PUD, where it interconnects with the electric grid.

The project's fish passage facilities are all located within the hydrocombine and include two upstream fish ladders and a downstream juvenile bypass system. One fish ladder is located at each end of the hydrocombine, and each ladder includes a pump system for providing attraction flows to the ladder entrance, a counting station, a fish trap

and sorting facility, and Passive Integrated Transponder (PIT) tag¹³ detection equipment. The downstream juvenile bypass system consists of fabricated steel barriers that are seasonally¹⁴ inserted into spillway bay nos. 2, 4, 6, 8, and 10 to modify the intake velocities into the spillways. The steel barriers are 72 feet high and block all but a 72-foot-high by 16-foot-wide vertical slot through each of the five spillway entrances, thereby consolidating spill flows and increasing water velocities through each of the five open spillways. Since most juvenile salmon and steelhead migrate near the water surface, most of the fish are passed through the surface spill route and avoid the deep turbine intakes, which originate below the depth of the spillway entrances. Because all 11 spillways may be needed during periods of extreme flows, the juvenile fish bypass barriers are designed to collapse when the spillway gates are opened more than 6 feet. The existing project also includes the Wells Hatchery, located on the downstream side of the west abutment of Wells dam. The Wells Hatchery consists of a 6,100-foot-long channel that is modified to hold adult and juvenile fish, numerous above-ground and in-ground raceways, four large earthen rearing ponds, a centralized incubation and early rearing area, a cold storage facility, an administration building, a vehicle storage building, a steelhead spawning building, and several residences for hatchery personnel.

The existing project includes 17 formal recreation facilities along Wells reservoir and tailrace in Pateros, Brewster, and Bridgeport, Washington, and along the lower reaches of the Methow and Okanogan rivers, tributaries to Well reservoir: (1) Wells dam overlook; (2) Starr boat launch; (3) Chicken Creek boat launch; (4) Monse Bridge boat launch; (5) Cassimer Bar fishing access; (6) Okanogan River informal boat launch and fishing site 1; (7) Okanogan River informal boat launch and fishing site 2; (8) Pateros winter boat launch; (9) Riverside Drive recreation access; (10) Peninsula Park; (11) Memorial Park; (12) Methow boat launch; (13) Columbia Cove Park; (14) Brewster waterfront trail; (15) Marina Park; (16) Carpenter Island boat launch; and (17) Methow fishing access.

The current project boundary includes about 2,664 acres of land. The project boundary generally follows the 781-foot-msl elevation contour line. The project boundary expands to include lands around the project dam, powerhouse, tailrace area, transmission lines, fish passage facilities, Wells Hatchery, wildlife management areas, and recreational facilities. Douglas PUD owns about 2,649 acres within the project boundary. Of the remaining lands, 8.6 acres are administered by BLM and 6.55 acres are administered by the Corps. Lands of the Colville Tribes border the Wells Project along

¹³ PIT tags are small tags implanted in fish that transmit a unique code when they are energized by passing near a receiver antenna. Because they do not require a battery, they have a long lifespan.

¹⁴ The downstream juvenile bypass system is typically operated from mid-April through late August.

the eastern edge of the Okanogan River and along the north and east side of the Columbia River upstream of the confluence of the Okanogan River.

Several of the mitigation facilities developed to fulfill conditions in the existing license are located partly or entirely outside of the current project boundary. Facilities located entirely outside of the project boundary include: the Methow Hatchery and associated facilities (Twisp acclimation pond, Chewuch acclimation pond, and Twisp adult collection weir), and three upland units of the Wells Wildlife Area (West Foster Creek, Central Ferry, and Indian Dan Canyon). Facilities that are partially included within the Wells Project boundary include several of the recreation facilities (Peninsula Park, Memorial Park, Methow boat launch, Riverside Drive access area, Columbia Cove Park, Brewster waterfront trail, Marina Park, and Carpenter Island boat launch) and three upland units of the Wells Wildlife Area (Bridgeport Bar, Okanogan, and Washburn Island).

2.1.2 Project Safety

The project has been operating for more than 40 years under the existing license, and during this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant who has submitted safety reports for Commission review. As part of the relicensing process, the Commission staff would evaluate the continued adequacy of the proposed project facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to ensure continued adherence to Commission-approved plans and specifications, special license articles relating to construction, operation and maintenance (O&M), and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The 773.4-MW Wells Project has a water right for 220,000 cfs for power production with an impoundment right of 331,200 acre-feet, of which 97,985 acre-feet is usable storage. The project is authorized to maintain its reservoir level between elevation 781 and 771 feet for power and non-power purposes. For the period from 2003 to 2007, the reservoir elevation was maintained at or above 774 feet 99.7 percent of the time, and the average annual generation was 4,077,400 MWh. The powerhouse discharge ranges from 13,000 cfs (one unit, minimum load) to 220,000 cfs (full hydraulic capacity).

The project is an integral part of the seven-dam mid-Columbia River Hydroelectric System, which is the single largest coordinated hydroelectric system in the country with a total combined capacity of just under 13,600 MW. The area referred to as the mid-Columbia River extends from Grand Coulee dam, which at 6,809 MW is the

largest hydro generating facility in the United States, to the Hanford Reach, nearly 210 miles downstream (see figure 1).

Grand Coulee dam (located at RM 596.6), federally owned and operated by the Bureau of Reclamation, is a significant point-of-control for regulating flows and project operations throughout the entire downstream mid-Columbia River Hydroelectric System. Coordinated water releases from Grand Coulee dam arrive first at Chief Joseph dam (RM 545.1), a federally owned project operated by the Corps.

From Chief Joseph dam, the next five downstream dams are owned and operated by Public Utility Districts (PUDs). At RM 515.6, the Wells dam (part of the Wells Project) is owned and operated by Douglas PUD. Rocky Reach and Rock Island dams (part of the Rocky Reach and Rock Island projects), located at RM 473.7 and RM 453.4, respectively, are owned and operated by Chelan PUD. Wanapum and Priest Rapids dams (part of the Priest Rapids Project), located at RM 415.8 and 397.1, respectively, are owned and operated by Public Utility District No. 2 of Grant County (Grant PUD).

Downstream of the Priest Rapids Project, the Columbia River joins with the Snake River before flowing west through the four lower Columbia River projects to the Pacific Ocean. These Corps-owned and operated projects are McNary (RM 292), John Day (RM 215.6), The Dalles (RM 191.5), and Bonneville (RM 146.1) dams.

Each of the seven mid-Columbia dams is operated in accordance with the terms of the Agreement on the Hourly Coordination of Projects on the Mid-Columbia River (HCA),¹⁵ which seeks to maximize electricity generation to satisfy regional customer needs within the constraints of operating criteria designed for non-power, environmental protection purposes. Table 2 summarizes the major non-power operating agreements that currently govern the operation of the Wells Project, as well as the other mid-Columbia projects.

The benefit of coordinated operation is better management of water resources and hydroelectric facilities of the mid-Columbia River to achieve a diverse set of goals for the region, including flood control, protection and enhancement of fishery resources, power generation at the time of highest electricity demand, load-following, and ensuring the reliability of the transmission system. To better understand the importance of

¹⁵ In 1966, Congress authorized the expansion of power generation facilities at the federally owned, Grand Coulee and Chief Joseph dams. Because of concern about the potential effects of having a much greater turbine discharge capacity at Grand Coulee than at the five non-federal, mid-Columbia PUD projects on the river just downstream, the parties jointly agreed to develop a method for coordinating the operation of all seven of the mid-Columbia River projects. This eventually led to the signing in 1972 of the Agreement on the Hourly Coordination of Projects on the Mid-Columbia River (or HCA), which has recently been extended through November 1, 2017.

Table 2. Non-power programs related to Wells Hydroelectric Project and mid-Columbia River operations (Source: FERC, 2006).

Development Affected	Non-Power Requirement	Constraint	Approximate Period	Comments ^a
Priest Rapids Wanapum Rocky Reach Wells Chief Joseph Grand Coulee	1988 Vernita Bar Agreement	50–70 kcfs protection level flow from end of spawning to end of emergence	Late November to May	Protection level flows are met from Grand Coulee, Chief Joseph, and tributary flows. If this is not sufficient, Priest Rapids drafts 3 feet, then Wanapum drafts 2 feet, then Rocky Reach drafts 1 foot, and Wells drafts 1 foot, then Priest Rapids drafts an additional 0.7 foot. If flows are still not sufficient, operators meet protection level flow through the HCA.
14 developments on the Columbia River	2004 Federal Columbia River Power System Biological Opinion	Modified spill and transportation schedules based on new research for ESA-listed salmon and steelhead	Through 2014	
Rock Island Rocky Reach Wells	2004 Wells and Rocky Reach HCPs	Combination of fish passage measures, hatchery programs, and funds for habitat improvement of salmon and steelhead	50 years	
Priest Rapids Wanapum Rock Island Rocky Reach Wells Chief Joseph Grand Coulee	Hanford Reach Juvenile Fall Chinook Protection Program	<p>1. When outflow from Priest Rapids is between 36- and 80-kcfs, limit Priest Rapids daily delta to no more than 20 kcfs.</p> <p>2. When Priest Rapids outflow is between 80- and 110-kcfs, limit Priest Rapids daily delta to no more than 30 kcfs.</p> <p>3. When Priest Rapids outflow is between 110- and 140-kcfs limit Priest Rapids</p>	From late March (start of emergence) to early June (400 ATUs after end of emergence).	Implemented by using Priest Rapids and Wanapum to re-shape incoming flow fluctuations according to fluctuation limits. On-peak generation shortfall is made up by upstream projects using HCA.

Development Affected	Non-Power Requirement	Constraint	Approximate Period	Comments ^a
		daily delta to no more than 40 kcfs.		
		4. When Priest Rapids outflow is between 140- and 170-kcfs limit Priest Rapids daily delta to no more than 60 kcfs.		
		5. When Priest Rapids outflow is greater than 170 kcfs, maintain Priest Rapids minimum outflow of 150 kcfs.		

Notes: ATU – Accumulated Thermal Unit is a unit of measurement that describes the cumulative effect of temperature over time. It is used to predict the amount of time based on the temperature of water that it will take for salmon eggs or fry to develop.

HCA – Agreement on the Hourly Coordination of Projects on the Mid-Columbia River

HCP – Habitat Conservation Plan

kcfs – thousand cubic feet per second

coordinated operation in achieving these goals, it is important to consider the physical attributes of the mid-Columbia dams, their relationship to each other, and their unique position in the Columbia River.

Figure 4 is a profile of the mid-Columbia River showing the relationship of the seven dams and the reservoirs created by each. At normal operating water surface elevations, backwater conditions extend from each dam to the tailwaters of the next upstream dam. Because of this, a change of flow at one dam very quickly produces a change of water surface elevation in the forebay of the next downstream dam unless a corresponding (coordinated) change is made in the flow at the downstream dam. By coordinating the operations, the relatively small amount of storage available at each of the PUD projects can be used to make minor (hourly) changes to the shape of the outflows.

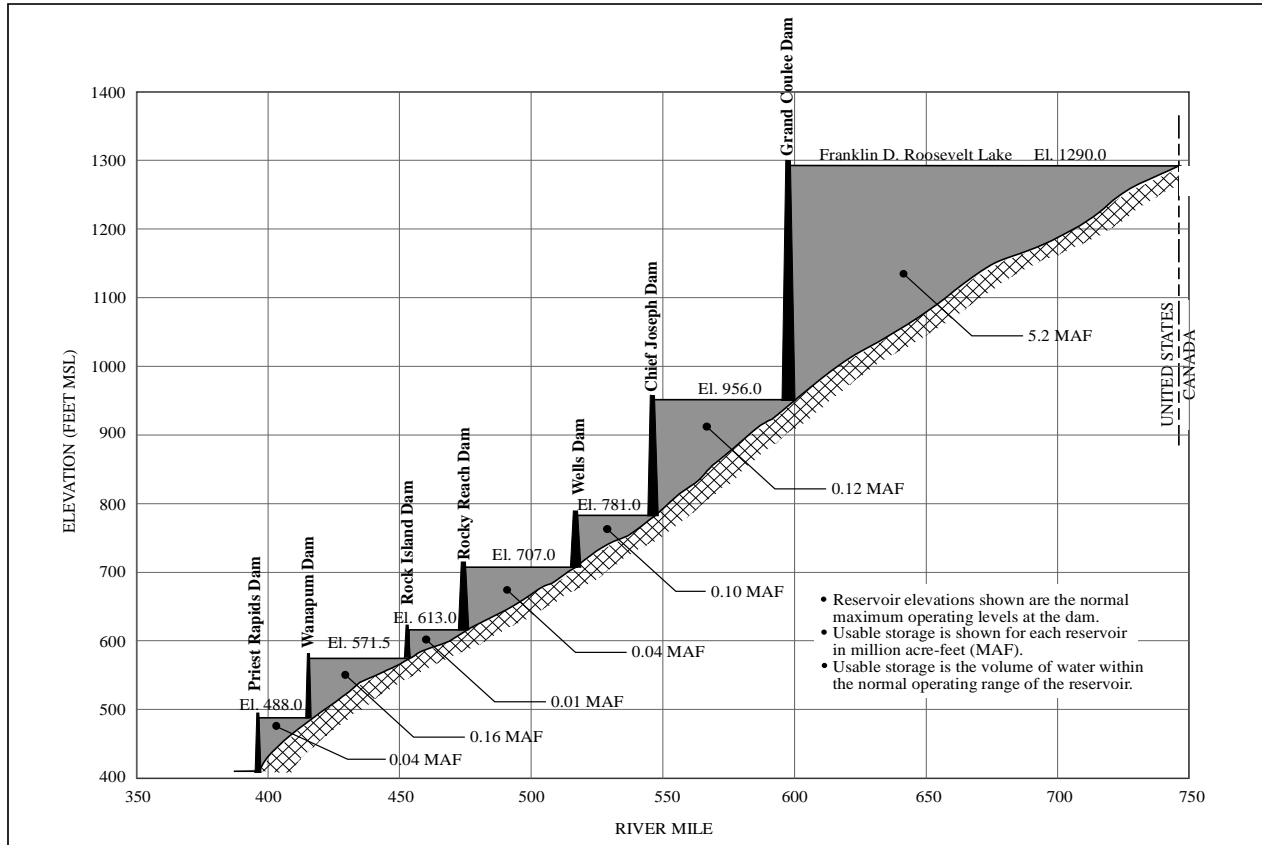


Figure 4. Mid-Columbia River profile and useable storage volumes (Source: FERC, 2006).

Table 3 shows the travel time (defined as the time required for changes in the water surface elevation at the forebay of a downstream dam in response to a flow change at the next upstream dam) through each of the reservoirs downstream from Grand Coulee. The travel times range from 45 minutes for the smaller reservoirs to 2 hours and 45 minutes for the larger reservoirs. The travel time is 1 hour and 15 minutes for the Wells Project. The total time required for a flow change at Grand Coulee to begin to affect reservoir elevation at Wells dam would be about 4 hours with no flow shaping by the intervening projects. Normal operating practice, however, includes some reshaping at each of the reservoirs in accordance with the requirements of their respective power demands and non-power operating requirements.

Table 3. Reservoir length and travel time for mid-Columbia Projects below Grand Coulee (Source: FERC, 2006).

Project	Reservoir Length	Travel Time
Chief Joseph	52 miles	2 hours, 45 minutes
Wells	29 miles	1 hour, 15 minutes
Rocky Reach	38 miles	2 hour, 45 minutes
Rock Island	21 miles	45 minutes
Wanapum	38 miles	1 hour, 30 minutes
Priest Rapids	18 miles	45 minutes

Another physical attribute of the mid-Columbia projects that necessitates a coordinated approach to their operation is the hydraulic capacity of the respective project turbines to handle the maximum generating output capability of Grand Coulee. Grand Coulee and Chief Joseph are primarily used to satisfy on-peak demand. With the addition in 1975 of a third powerhouse at Grand Coulee dam, the turbine hydraulic capacity at Grand Coulee exceeds that of the downstream PUD projects (table 4). Without a coordinated approach to operation, this imbalance, together with the short response (travel) times, would result in a significant amount of unplanned spill (wasted energy) at the downstream projects.

Table 4. Maximum turbine hydraulic capacity of mid-Columbia projects (Source: FERC, 2006).

Project/Development	Maximum Hydraulic Capacity (cfs)
Grand Coulee	280,000
Chief Joseph	213,000
Wells	220,000
Rocky Reach	220,000
Rock Island	220,000
Wanapum	180,000
Priest Rapids	175,000

The HCA provides a framework for coordinating the operation of the mid-Columbia projects to make efficient use of water resources for power, while protecting non-power resource benefits by incorporating project specific environmental operating constraints. This EIS considers recommendations by agencies, tribes and other parties to the licensing proceeding for changes to the current non-power operating requirements at

the Wells Project. Because any such changes would likely be implemented through the HCA, the following section describes the HCA in greater detail and the current non-power operating requirements and agreements.

2.1.3.1 Mid-Columbia Hourly Coordination Agreement

The HCA was originally signed for a 1-year experimental period from July 1, 1972, to June 30, 1973. Twelve parties representing the federal government, the three mid-Columbia PUDs, and all of the power purchasers at that time signed the original agreement. Several 1-year agreements were signed covering subsequent periods until a 10-year contract was signed on July 1, 1977. At the end of that term, another 10-year contract was signed, extending the arrangement through June 30, 1997. A new 20-year renewal agreement has been signed extending the term to November 1, 2017.

In general, the parties to the HCA have agreed to coordinate the operation of the projects to achieve the following objectives:

1. Coordinate the hydraulic operation of the projects for the purpose of optimizing the amount of energy from the available water consistent with the need to: (a) adjust the total actual generation to match the total requested generation and (b) operate within all power and non-power requirements;
2. Provide flexibility and ease of scheduling project generation through centralized, coordinated scheduling and the use of composite scheduling and accounting procedures;
3. Minimize unnecessary changes in project generation to avoid frequent unit starts and stops; and
4. Reduce the amount of fluctuation in river flow that could otherwise occur without such coordination.

Grant PUD has been designated to coordinate the scheduling activities and dispatching at its headquarters (Central) in Ephrata, Washington. Communications were established between Central and the dispatching centers controlling the seven dams.

Each day the non-federal HCA participants provide an estimated schedule of desired generation from the lower five projects. The federal project operators provide an estimate of water expected to be discharged from Grand Coulee and Chief Joseph. Central then determines an estimated operation schedule for the following day based on anticipated flows from the federal projects, reservoir levels, and load. Central sends the schedule to each of the five lower projects. Each project then pre-schedules its operation, including hourly generation, for the following day based on Central's estimated operation schedule.

During real-time operation, each non-federal project sends Central an uncoordinated load request signal every 4 seconds. Based on the sum of these load requests, Central's computer system determines the actual allocation of generation

required to meet load demand and non-power constraints for the system. Central operators use power generation characteristics and reservoir target elevations to set desired generation and discharges at each of the developments.

After Central establishes the coordinated generation by sending a coordinated request signal back to each of the non-federal projects, the coordinated generation signal is also sent to the federal projects in the form of a “bias,” which is defined as the difference between coordinated and uncoordinated generation. A significant change in load requests, which might, for example, be driven by power market prices, can result in significant bias. Therefore, the federal projects have established limits on the amount of bias they would accept. Under certain conditions, the federal projects can elect to have zero bias, during which time Central has no ability to control generation at the federal projects. During these periods, the federal projects are considered to be “off” coordinated operation, and they operate for maximum power that typically results in larger flow fluctuations. This occurs about 10 percent of the time and can also result in spill at the lower five projects.

Recently, the Grand Coulee and Chief Joseph projects together have been providing much of the load-following requirements for the entire federal system in the Pacific Northwest. The imposition of requirements to maintain turbine operations within the 1 percent of best efficiency range at all lower Columbia and Snake River dams and a 1-foot reservoir level fluctuation limitation for the federal projects on the lower Snake River, as required by the 2008 Biological Opinion related to the operation of the Federal Columbia River Power System (NMFS, 2008), has limited the load-following capability of much of the federal power system. These requirements have resulted in a shift of load-following to the Grand Coulee and Chief Joseph projects, which tends to increase flow fluctuations and decrease flow predictability in the mid-Columbia River.

2.1.3.2 Vernita Bar Agreement and Hanford Reach Juvenile Fall Chinook Protection Program Agreement

The 1988 Vernita Bar Agreement was filed with FERC on July 16, 1988, and approved on December 9, 1988 (45 FERC 61,401). The agreement ensures that the operation of the mid-Columbia River Hydroelectric System provides adequate flow for salmon eggs and fry in the Vernita Bar area located approximately 4 miles below the Priest Rapids development. Parties to the agreement include three mid-Columbia PUDs (Grant, Chelan, and Douglas), BPA, NMFS, Washington Department of Fisheries (now known as the Washington Department of Fish and Wildlife), Oregon Department of Fish and Wildlife, as well as the Confederated Tribes of the Umatilla Indian Reservation, the Colville Tribes, and the Yakama Nation. The Hanford Reach Juvenile Fall Chinook Protection Program Agreement (Hanford Agreement), to which Douglas PUD is a party, was developed to provide protection for wild fall Chinook salmon populations downstream of the Priest Rapids Project and to replace and supersede the Vernita Bar Agreement, while continuing the provisions of the original Vernita Bar Agreement. When the new license for the Priest Rapids Project was issued on April 17, 2008, the

Hanford Agreement was made part of the new license and would be effective through the term of the new license.

To maintain the protection level flow below Priest Rapids dam, the Hanford Agreement describes operating obligations for Grant PUD, Chelan PUD, Douglas PUD, and BPA. Under the Hanford Agreement, BPA is required to provide flow from Chief Joseph dam (less side inflow) that is not less than the protection level flow. When necessary to make up for the difference between the combined flows from Chief Joseph outflow and tributary inflows, and protection level flows, Grant, Chelan, and Douglas PUDs are obligated to make up the deficiency by drafting according to the following schedule as necessary to maintain the protection level flow:

1. Grant PUD drafts up to 3 feet from Priest Rapids reservoir;
2. Grant PUD drafts up to 2 feet from Wanapum reservoir;
3. Chelan PUD drafts up to 1 foot from Rocky Reach reservoir;
4. Douglas PUD drafts up to 1 foot from Wells reservoir; and
5. Grant PUD drafts up to 0.7 foot from Priest Rapids reservoir.

The Hanford Agreement allows Grant, Chelan, and Douglas PUDs to draft their reservoirs in an alternative manner as long as the alternative provides an equivalent volume and also a mechanism to provide additional water through use of the HCA. Drafts are limited to levels within the applicable reservoir operating elevations. Whenever a reservoir is within 1 foot of the minimum elevation, reservoir refill is to be accomplished in reverse order of draft or an alternative manner by agreement of Grant, Chelan, and Douglas PUDs.

2.1.3.3 Other Agreements

The Wells Project is operated in a coordinated manner with other regional hydroelectric projects. The management and regulation of upstream reservoirs in the United States and Canada greatly affect the amount and timing of flows in the mid-Columbia River. A number of agreements govern the regulation of the upstream reservoirs in the United States and Canada, including the 1997 Pacific Northwest Coordination Agreement and the Columbia River Treaty between the United States and Canada.

On April 7, 1997, Douglas PUD entered into the 1997 Pacific Northwest Coordination Agreement among numerous federal agencies and northwest utilities. Operations under this agreement began on August 1, 2003, and its term extends until September 15, 2024. The agreement helps manage reservoir systems by maintaining the independence of each hydroelectric facility while achieving maximum beneficial use of the river. The various projects work cooperatively toward meeting overall load requirements by mutually supporting each other's operations.

The Columbia River Treaty, signed in 1964, established a coordinated development plan that would address Columbia River flooding and meet the region’s increasing demands for energy. The treaty led to the development of four dams in the higher reaches of the basin—three in Canada and one in the United States.

The construction of the Wells Project increased the tailwater levels at the Chief Joseph Project, reducing the hydraulic head available for generation. Douglas PUD entered into an agreement in 1968 with the Corps to compensate the federal system for power loss due to Wells Project encroachment (Encroachment Agreement 1968), consistent with Article 32 of the Wells Project license. The Encroachment Agreement was supplemented in 1982 when the Commission approved raising the elevation of Wells reservoir from elevation 779 to elevation 781 (Supplement Agreement 1982). On September 3, 1982, the Commission issued an order amending the license to raise the elevation of the reservoir and added 10 license articles (Articles 49 through 58) as part of its order. These articles included measures to protect cultural resources and recreation facilities, improve wildlife management facilities, compensate the Corps for lost generation of Chief Joseph dam, and undertake various project safety reviews.

2.1.4 Existing Environmental Measures

Douglas PUD currently provides environmental measures and implements plans and agreements at the Wells Project.

Continued Implementation of the Wells Habitat Conservation Plan

In 1993, Douglas PUD began working with federal, state, and tribal entities to develop the Wells HCP for the Wells Project. The Wells HCP was signed in 2002 by NMFS, FWS, the Colville Tribes, Washington DFW, Douglas PUD, and the Wells Project power purchasers (Puget Sound Energy, Portland General Electric, PacifiCorp, and Avista Corporation). In 2005, the Wells HCP was also signed by the Yakama Nation. The Wells HCP was approved by the Commission and incorporated into the existing Wells Project license on June 21, 2004.

The Wells HCP commits Douglas PUD to a 50-year program to ensure that the Wells Project has “no net impact” on five Columbia River salmon and steelhead populations. These populations include listed UCR spring-run Chinook salmon and UCR steelhead trout as well as non-listed UCR summer/fall-run Chinook salmon, sockeye salmon, and coho salmon (collectively, the “Plan Species”). The goal of the Wells HCP is to result in no net impact on the Plan Species by using a combination of mitigation tools to improve fish passage survival rates and achieve a virtual 100 percent survival rate of fish passing the project. The no net impact goal has been accomplished at the Wells Project since 2007 through a combination of successful operation of the Wells dam juvenile bypass system, fish ladders, hatchery compensation and evaluations, and funding habitat restoration work in tributaries upstream of the project. The Wells HCP also provides Douglas PUD with incidental take permits under section 10 of the ESA for all Plan Species that are listed under the ESA. The incidental take permits would also apply

to non-listed Plan Species, if and when such species are listed. Coho salmon are not included in the incidental take permits because the native stock of coho salmon was extirpated early in the 1900s.

The specific measures implemented under the Wells HCP include:

- **Passage Survival Plan**—The Passage Survival Plan contained within section 4 of the Wells HCP provides specific detail regarding the implementation and measurement of unavoidable juvenile and adult losses for each of the Plan Species passing Wells dam. Due to an agreed-upon inability of the parties to differentiate between sources of adult mortality, initial compliance with the combined adult and juvenile survival standard is based on measurement of juvenile survival (93 percent juvenile project survival and 95 percent juvenile dam passage survival). The plan lays out the methodologies for measuring survival rates and the decision process to be followed depending on whether the applicable survival standards are achieved or not. This section of the plan also details the specific survival standards that must be achieved within defined time frames in order for the licensee to be considered in compliance with the terms of the Wells HCP.
- **Juvenile Passage Survival Plan**—In addition to the specific details describing how survival studies are to be implemented and evaluated relative to achievement of no net impact, the Wells HCP also contains specific criteria for the operation of the Wells juvenile fish bypass system.¹⁶ This section of the Wells HCP outlines specific bypass operational criteria, operational timing and evaluation protocols to ensure that at least 95 percent of the juvenile Plan Species passing Wells dam are provided a safe, non-turbine passage route past the dam. The operational dates for the bypass are set annually by unanimous agreement of the parties to the Wells HCP.
- **Adult Passage Plan**—The Adult Passage Plan, as contained within section 4.4 and appendix A of the Wells HCP, is intended to ensure safe and rapid passage for adult fish of Plan Species as they pass through the fish ladders at Wells dam. The plan contains specific operating and maintenance criteria for

¹⁶ As described in section 2.1.1, the downstream juvenile bypass system consists of fabricated steel barriers that are seasonally inserted into spillway bay nos. 2, 4, 6, 8, and 10. The steel barriers are 72 feet high and block all but a 16-foot-wide gap through each of the five spillway entrances, thereby consolidating spill flows and increasing water velocities through each of the five open spillways.

the two adult fish ladders¹⁷ and the two adult fish ladder traps, and provides details regarding the implementation of passage studies on adult Plan Species, including studies related to passage success, timing, and rates of fallback.

- **Tributary Conservation Plan**—The Tributary Conservation Plan within section 7 of the Wells HCP guides the funding for and allocation of dollars from the Plan Species Account. The Plan Species Account provides funding for tributary habitat protection and restoration projects within the Wells Project boundary and within the portions of the Methow and Okanogan rivers that are accessible to Plan Species to compensate for up to 2 percent of unavoidable adult and/or juvenile mortality for Plan Species passing Wells dam. The Tributary Committee selects projects according to guidelines established in Supporting Document D, with a high priority given to the acquisition of land or interests in land, such as conservation easements or water rights.
- **Hatchery Compensation Plan**—The Hatchery Compensation Plan, as described in section 8 of the Wells HCP, was established to provide hatchery compensation for up to 7 percent unavoidable juvenile passage losses of Plan Species passing Wells dam. The goal of the program is to use hatchery-produced fish to replace unavoidable losses in such a manner that the hatchery-produced fish contribute to the rebuilding and recovery of naturally reproducing populations of Plan Species, in their native habitats, while maintaining the genetic and ecological integrity of each stock of Plan Species. Supporting harvest, where appropriate, is also a goal of the Hatchery Compensation Plan. The Hatchery Compensation Plan guides the operation of the Wells Hatchery, located at Wells dam, and at the non-project Methow Hatchery, located at RM 51 on the Methow River, and associated acclimation ponds and adult collection facilities.
- **Predator Control Program**—Section 4.3.3 of the Wells HCP requires Douglas PUD to implement a northern pikeminnow, piscivorous bird, and piscivorous mammal harassment and control program to reduce the level of predation on anadromous salmonids migrating past Wells dam. The northern pikeminnow removal program may include a northern pikeminnow bounty program, fishing derbies, and tournaments, and the use of longline fishing and trapping. The other component of the predator control program is the implementation of control measures for piscivorous birds and mammals. The focus of these programs is not removal but hazing and access deterrents. Hazing includes

¹⁷ As described in section 2.1.1, one fish ladder is located at each end of the hydrocombine and each ladder includes a pump system for providing attraction flows to the ladder entrance, a counting station, a fish trap and sorting facility, and PIT-tag detection equipment.

propane cannons, pyrotechnics, and the physical presence of hazing staff. Access deterrents include steel wires across the hatchery ponds and tailrace, fencing and covers for hatchery ponds, and electric fencing.

Other Aquatic Resources Measures

- The Spill Prevention, Control, and Countermeasure (SPCC) Plan outlines procedures to minimize the potential for spill of hazardous materials and measures that would be implemented in the event of a spill of hazardous materials.

Terrestrial Measures

- Operation and maintenance of the 137-acre Cassimer Bar Wildlife Management Area located on the eastern shore of the Okanogan River on the Colville Indian Reservation.
- The Piscivorous Wildlife Control Plan, which is a part of the Predator Control Program of the Wells HPC, at the Wells and Methow hatcheries to reduce predation by piscivorous birds and mammals in an effort to further the no net impact survival goals of the Wells HCP. Douglas PUD currently employs active and passive non-lethal control measures to deter predation at the hatcheries.
- An off-license settlement agreement with Washington DFW for wildlife and resident fish enhancement within and outside the project boundary. The off-license settlement agreement complements the goals and objectives of the aquatics and terrestrial management plans. Terrestrial components include providing Washington DFW with annual funding of \$200,000 for maintenance and operations of the Wells Wildlife Area; providing up to \$50,000 over the term of the agreement for habitat restoration after wildland fires on the Wells Wildlife Area; providing for the replacement of certain capital equipment used to meet the program goals; protecting rare, threatened, and endangered (RTE) wildlife and botanical resources, managing noxious weeds, and protecting wetland habitat on all six units of the Wells Wildlife Area. Aquatic components include providing 20,000 pounds of rainbow trout to be stocked annually in Okanogan and Douglas counties to enhance recreational fishing harvest opportunities. The fish for this program would be raised at the Wells Fish Hatchery, if sufficient hatchery capacity exists after Wells HCP hatchery needs are met, unless otherwise agreed.

Recreation and Land Use Measures

- The Wells Recreation Plan (Douglas PUD, 1967), the Wells Recreation Plan Supplement (Douglas PUD, 1974), the Public Use Plan (Douglas PUD, 1982), and the implementation of various Recreation Actions Plans listed in exhibit E

of the license application governing the O&M of the 17 recreational facilities within the project boundary.

- The current Douglas PUD Land Use Policy designed to: (1) ensure the compatibility of public and commercial use of project lands (public land) with Wells Project operations and compliance with the license articles, and federal and state laws; (2) ensure that public access and recreation within the Wells Project take place in a safe and environmentally sound manner; and (3) provide guidance for resolving conflicts with adjacent land owners if the policy is violated.

Cultural Measures

- The current Cultural Resource Management Program implemented through a Memorandum of Agreement with the Washington Department of Archaeology and Historic Preservation (Washington DAHP) to address potential adverse effects of the project on historic and archaeological sites.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

Douglas PUD does not propose to construct any new generation facilities. However, proposed construction for non-generating facilities include new visitor interpretive displays (as part of the Recreation Management Plan), located within the project boundary but away from critical energy infrastructure, and the construction of a formal tent camping facility, expansion of the facilities at Marina Park, and extension of the launch ramp at the Chicken Creek boat launch (as part of the Recreation Management Plan). All proposed project modifications would take place within the current project boundary.

2.2.2 Proposed Project Operation

Douglas PUD does not propose any substantial change to the operations of the project.

2.2.3 Proposed Environmental Measures

Continued Implementation of the Wells HCP

Douglas PUD proposes to continue to implement the Wells HCP to achieve no net impact for five Columbia River salmon and steelhead populations. In accordance with the mitigation requirements established in the Wells HCP, Douglas PUD proposes modifications to the project's Wells Hatchery and non-project Methow Hatchery to comply with Hatchery Genetic Management Plans (HGMPs) for ESA-listed UCR steelhead and UCR spring-run Chinook salmon. NMFS has initiated new formal ESA consultations for both the steelhead and spring Chinook HGMPs.

Other Aquatic Resources Measures

Douglas PUD also proposes to implement the Aquatic Settlement, which includes the following six aquatic resource management plans.

- *Water Quality Management Plan*—monitoring TDG; transmitting TDG data to a web-accessible database; providing an annual report of all spill and predicted TDG levels occurring outside of the fish passage season; coordinating the annual Wells HCP Fish Bypass/Spill Operations Plan and the Gas Abatement Plan (GAP) in consultation with the Aquatic SWG, using best available information to minimize the production of TDG during periods of spill and requiring approval by the Aquatic SWG; developing and implementing an annual GAP; preparing a TDG annual report; monitoring water temperature and other water quality parameters to ensure compliance with state water quality criteria; making water quality data available to EPA to assist in development of the Columbia River temperature total maximum daily load (TMDL); notifying the Aquatic SWG of instances of non-compliance with state water quality criteria; implementing future as-yet unidentified measures as a result of the temperature TMDL; operating the project to minimize spill of hazardous substances; implementing the Spill Prevention Control and Countermeasures Plan; continuing to participate in the Columbia and Snake River Spill Response Initiative (CSR-SRI); continuing to participate in the Water Quality Team and Adaptive Management Team meetings; allowing Washington DOE staff access to the project; coordinating project operations with other mid-Columbia hydroelectric projects; preparing study plans including Quality Assurance Project Plans (QAPPs) to guide implementation of the water quality monitoring program; and preparing annual reports for the Aquatic SWG. The reports would summarize the previous year’s water quality activities and activities proposed for the coming year; any decisions, statements of agreement, evaluations, or changes made pursuant to the Water Quality Management Plan; monitoring results; and compliance with the numeric criteria.
- *Bull Trout Management Plan*—continuing to provide upstream and downstream passage for bull trout through existing fish passage facilities, and operating the facilities according to the criteria established in the Wells HCP; continuing to conduct video monitoring of the Wells dam fish ladders to monitor for bull trout; conducting periodic upstream and downstream passage evaluations for bull trout and developing a plan to address passage impacts or exceedances of incidental take; evaluating upstream and downstream passage and incidental take of bull trout at off-project broodstock collection facilities associated with the Wells HCP, and developing a plan to address passage impacts or exceedances of incidental take; implementing specific measures (e.g., PIT tagging, fish sampling) if significant number of juvenile bull trout

are observed passing Wells dam; implementing modifications to upstream and downstream fish passage facilities or project operations if passage problems for bull trout are identified; conducting bull trout stranding evaluations during periods of low reservoir elevation and implementing measures to address any exceedances of bull trout incidental take; monitoring activities associated with implementation of other aquatic resources measures and developing a plan to address incidental take exceedances; collecting tissue samples and funding genetic analysis of bull trout; participating in regional information exchanges for bull trout research and monitoring; developing an interpretive display at the Wells Dam Visitor Center to promote the conservation and recovery of bull trout in the upper Columbia River and tributaries; monitoring Wells Hatchery and non-project Methow Hatchery activities for incidental take of bull trout and developing a plan to address exceedances of incidental take; and preparing annual reports.

- *Pacific Lamprey Management Plan*—operating the project fish ladders and juvenile bypass facilities and conducting fish ladder salvage activities according to the criteria established in the Wells HCP; developing an operations study plan to evaluate potential operational modifications to improve upstream lamprey passage, and implementing modifications required by the Aquatic SWG; continuing to count adult Pacific lamprey 24-hours-per-day during the adult fish ladder monitoring season (May 1–November 15) using the “most-current” technology that is commercially available; potentially implementing alternative measures to improve lamprey counting; conducting a literature review of upstream passage improvements implemented at other Columbia and Snake River hydroelectric projects; conducting a fishway inspection and evaluating the need for implementing four specific fishway improvements (entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools); evaluating the effectiveness of lamprey fishway improvement measures and conducting periodic monitoring over the license term; improving adult lamprey passage until performance is at a level similar to other mid-Columbia hydroelectric projects, or until compliance with an as-yet unidentified standard is achieved; conducting literature reviews at 5-year intervals to evaluate juvenile lamprey passage at other Columbia and Snake River hydroelectric projects; conducting a juvenile lamprey downstream passage evaluation if appropriate technology is developed during the license term to conduct such a study; implementing as-yet unidentified measures, studies, or operational modifications if the results of a future, potential juvenile-lamprey downstream passage evaluation indicate that Wells Project operations are adversely affecting lamprey populations above Wells dam; implementing a study to examine the presence and relative abundance of juvenile lamprey in habitat affected by the project; participating in Pacific lamprey regional work groups; and preparing annual reports.

- *White Sturgeon Management Plan*—developing a broodstock collection and breeding plan; implementing a two-phase juvenile white sturgeon stocking program and monitoring and evaluation program; implementing a two-phase index monitoring program to assist in implementation of the stocking program; tracking a portion of the stocked fish using active-tags; determining natural production potential in Wells reservoir; compiling information on other white sturgeon supplementation and recovery programs in the Columbia River Basin; evaluating the biological benefits of providing adult sturgeon passage and potentially implementing adult sturgeon passage measures that are consistent with passage measures implemented at other mid-Columbia projects; identifying appropriate white sturgeon measures as opportunities for education to local public entities (e.g., schools, cities, and fishing and recreation groups); and preparing annual reports.
- *Resident Fish Management Plan*—continuing to implement the Wells HCP predator control program; continuing to implement the Douglas PUD Land Use Policy; conducting resident fish studies throughout the license term to determine the relative abundance of various resident fish species within Wells reservoir; implementing measures to address significant negative changes to native resident fish populations; conducting an assessment to identify the potential effects of future changes in project operations on native resident fish, and implementing measures to address potential effects; and preparing annual reports.
- *Aquatic Nuisance Species Management Plan*—implementing best management practices (BMPs) during implementation of recreation enhancement measures to contain aquatic nuisance species; monitoring for the presence of aquatic nuisance species in project waters; notifying agencies and implementing containment measures if aquatic nuisance species are detected; participating in information exchanges and regional efforts to coordinate monitoring activities; monitoring by-catch data from implementation of other aquatic resource measures for the presence of aquatic nuisance species; implementing public outreach measures for preventing the spread of aquatic nuisance species; assessing the effects of any future changes in project operation on the proliferation of aquatic nuisance species and implementing measures to address adverse effects; and preparing annual reports.

Terrestrial Resources

- Douglas PUD would implement the Wildlife and Botanical Management Plan, which is designed to protect and enhance RTE wildlife species' habitat and native habitat on Wells Project lands and includes protecting RTE botanical species from land-disturbing activities and herbicide sprays; conserving habitat for species protected by the federal ESA, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act; maintaining productive wildlife habitat on the Cassimer Bar Wildlife Management Area; and controlling noxious weeds on project lands.
- Douglas PUD would also implement the Avian Protection Plan, which includes a protocol for reporting avian mortalities found in the transmission line corridor to the appropriate parties; a nest management protocol to comply with federal and state bird protection laws; a tree removal protocol requiring that any tree removal as part of transmission corridor maintenance only occur between August 31 and January 31 to protect migratory birds; and a training protocol to train appropriate personnel to evaluate avian issues when performing maintenance on the transmission lines and corridor.

Cultural Resources

- Douglas PUD would implement the HPMP, which includes provisions for: coordination and consultation with the Washington State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), Commission staff, and other parties as appropriate; education and interpretation; inadvertent discoveries of cultural materials and/or human remains; emergency situations; management standards for monitoring and treatment of cultural resources; curation and data management; and periodic updates to accommodate for environmental and regulatory changes.

Recreation and Land Use

- Douglas PUD would implement the Recreation Management Plan, which includes a Recreation Facility Improvement Program and a Recreation Facility Operation, Maintenance and Monitoring Program. Douglas PUD has also entered into agreements with the cities of Pateros, Brewster, and Bridgeport, which cover O&M of recreation facilities. Douglas PUD would also continue to implement the Land Use Policy to address land use issues under the new license.

2.2.4 Modifications to Douglas PUD’s Proposal—Mandatory Conditions

The following mandatory conditions have been provided and are evaluated as part of Douglas PUD’s proposal.

Section 18 Prescriptions

NMFS’ final section 18 prescription specifies that Douglas PUD carry out its obligations, in their entirety, as set forth in the Wells HCP as approved by the Commission at 107 FERC ¶ 61,280 and 107 FERC ¶ 61,283 (2004).

Interior’s final section 18 prescriptions include measures for upstream and downstream passage of spring and summer/fall Chinook salmon, sockeye salmon, coho salmon, steelhead, bull trout, and Pacific lamprey. The prescriptions specify that Douglas PUD: (1) manage the Wells Project to provide effective upstream and downstream fish passage over the full range of river flows for which the project maintains operational control; (2) provide for the construction, operation, maintenance, and effectiveness monitoring of upstream and downstream fishways for Plan Species as set forth in the Wells HCP; (3) implement specific upstream passage and downstream passage measures identified in the Bull Trout Management Plan until Douglas PUD has demonstrated that the survival and passage rates for adult marked fish are greater than 95 and 90 percent, respectively; (4) implement specific upstream passage measures identified in the Pacific Lamprey Management Plan until Douglas PUD has demonstrated that lamprey passage is at levels at least as high as other mid-Columbia River projects until Pacific lamprey performance standards have been adopted by FWS; and (5) if FWS determines that downstream migrating juvenile lamprey may be negatively affected by the project, develop and implement a downstream juvenile lamprey passage study, and if results indicate that Wells dam has a substantive negative impact on downstream migrating juvenile lamprey, identify and implement measures to address such impacts.

Both Interior and NMFS requested reservations of authority to modify their section 18 fishway prescriptions included in any license issued for the project.

2.3 STAFF ALTERNATIVE

We recommend including the following environmental measures proposed by Douglas PUD¹⁸ in any license issued for the project:

¹⁸ Douglas PUD’s Aquatic Settlement and resource plans provide for the establishment of the Aquatic SWG to coordinate, consult, and oversee implementation of the aquatic resource management plans along with an adaptive management process and a dispute resolution provision. The Commission encourages parties to undertake means to facilitate consultation and resolve disputes. While we have no objection to the licensee and other entities establishing work groups, the Commission only has jurisdiction over its licensees and cannot enforce provisions against parties other than the licensee.

- Continue to implement the Wells HCP.
- Develop and implement a UCR steelhead HGMP for the project’s Wells Hatchery.
- Implement the Water Quality Management Plan (as modified below).
- Implement the Bull Trout Management Plan (as modified below).
- Implement the following measures from the Pacific Lamprey Management Plan: operate the project fish ladders and juvenile bypass facilities and conduct fish ladder salvage activities according to the criteria established in the Wells HCP; continue to count adult Pacific lamprey 24-hours-per-day during the adult fish ladder monitoring season (May 1–November 15); conduct a fishway inspection and implement up to four specific fish ladder improvement measures (entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools); evaluate the effectiveness of any of the four specific fishway improvement measures that are implemented; conduct periodic monitoring of passage effectiveness; and prepare an annual reports.
- Implement the White Sturgeon Management Plan (as modified below).
- Implement the Aquatic Nuisance Species Management Plan (as modified below).
- Implement the Wildlife and Botanical Management Plan (as modified below).
- Implement the Avian Protection Plan.
- Implement the HPMP.
- Implement the Recreation Resources Management Plan.
- Continue to implement the Douglas PUD Land Use Policy.

In addition to Douglas PUD’s proposed measures, we recommend the following modifications, additions, or deletions:

Water Quality Management Plan

We recommend modification of this plan to require the following additional measures: (1) filing of annual TDG and spill (outside the fish passage season) reports with the Commission; (2) filing the GAP and QAPPs (and any subsequent changes to the plans) with the Commission for approval, prior to implementation; (3) notifying the Commission within 48 hours of any temporary modifications to approved operations or facilities that are implemented to protect water quality and aquatic resources in emergency situations; and (4) obtaining prior Commission approval through the filing of an application to amend the license if any long-term (non-emergency) measures are proposed to address non-compliance with water quality criteria other than TDG (which would be addressed in the GAP).

We do not recommend the following water quality measures proposed by Douglas PUD: (1) obtaining Aquatic SWG approval of the operations identified in the annual Wells HCP Project Fish Bypass/Spill Operations Plan; (2) implementing future as-yet unidentified measures as a result of the temperature TMDL; and (3) participating in the CSR-SRI and Columbia River Temperature TMDL Water Quality Team and Adaptive Management Team meetings.

Bull Trout Management Plan

We recommend modification of this plan to require the following additional measures: (1) including information about the project and project-specific measures for promoting the conservation and recovery of bull trout in project waters in the informational and educational display at the Wells Dam Visitor Center; and (2) developing a detailed study plan to evaluate bull trout stranding and incidental take of bull trout during implementation of other aquatic resources measures and operation of the Wells Hatchery.

We do not recommend the following bull trout measures proposed by Douglas PUD: (1) implementing as-yet unidentified plans, measures, or modifications to project facilities or operations to address bull trout passage criteria exceedances or allowable bull trout incidental take exceedances; (2) monitoring and studying bull trout incidental take and bull trout passage performance at off-project hatcheries and broodstock collection facilities; (3) collecting tissue samples and funding genetic analysis of bull trout; and (4) participating in regional information exchanges for bull trout research and monitoring.

Pacific Lamprey Management Plan

We recommend modification of this plan to require that Douglas PUD prepare the plans and implementation schedules for any of the four specific fishway improvement measures, if chosen for implementation, and file them with the Commission for approval prior to implementation.

We do not recommend the following Pacific lamprey measures proposed by Douglas PUD: (1) developing an operations study plan, conducting a literature review, and implementing as-yet unidentified operational measures; (2) using the “most-current” technology available to count lamprey; (3) implementing as-yet unidentified alternative measures to improve lamprey counting; (4) improving adult lamprey passage until performance is at a level similar to other mid-Columbia hydroelectric projects or until compliance with an as-yet unidentified standard is achieved; (5) implementing a study to examine the presence and relative abundance of juvenile lamprey habitat affected by the project; (6) conducting a juvenile lamprey downstream passage evaluation if appropriate technology is developed during the license term to conduct such a study; (7) implementing as-yet unidentified measures, studies, or operational modifications if the results of a future potential juvenile-lamprey downstream passage evaluation indicate that Wells Project operations are adversely affecting lamprey populations above Wells

dam; (8) conducting literature reviews at 5-year intervals to evaluate juvenile lamprey passage at other Columbia and Snake River hydroelectric projects; and (9) participating in Pacific lamprey regional work groups.

White Sturgeon Management Plan

We recommend modification of this plan to require that the sturgeon broodstock collection and breeding plan be filed with the Commission for approval, prior to implementation.

We do not recommend the following white sturgeon measures proposed by Douglas PUD: (1) as part of the broodstock collection and breeding plan, developing a mid-Columbia hatchery facility jointly funded by Douglas, Chelan, and Grant PUDs to accommodate various phases of white sturgeon supplementation; (2) implementing alternative measures determined by the Aquatic SWG if juvenile sturgeon stocking deadlines cannot be achieved; (3) obtaining updated information, when available, on other white sturgeon supplementation and recovery programs (e.g., upper Columbia River, Kootenai River, mid-Columbia PUDs); (4) developing as-yet unidentified adult white sturgeon passage measures consistent with any future measures implemented at other mid-Columbia projects; and (5) identifying appropriate white sturgeon measures as opportunities for education to local public entities (e.g., schools, cities, and fishing and recreation groups).

Resident Fish Management Plan

We do not recommend implementation of the Resident Fish Management Plan, except for the continued implementation of the Wells HCP predator control program and the Douglas PUD Land Use Policy.

Aquatic Nuisance Species Management Plan

We recommend modifying this plan to require identification of: (1) the specific BMPs that would be implemented to contain aquatic nuisance species during the implementation of recreation enhancement measures, and (2) the specific measures that would be implemented if additional aquatic nuisance species are detected in the project area.

We do not recommend the following aquatic nuisance species measures proposed by Douglas PUD: (1) assessing the potential effects of any future changes in project operation on the proliferation of aquatic nuisance species and implementing measures to address potential adverse effects, and (2) participating in regional information exchanges.

Wildlife and Botanical Management Plan

We recommend modification of the Wildlife and Botanical Management Plan to include the following annual requirements: (1) filing progress reports, developed in consultation with the Terrestrial Resources Work Group (RWG), that describe measures

implemented in the past year and activities planned for the coming year; (2) reviewing changes to the Washington Natural Heritage Program (Washington NHP) rare plant list; and (3) updating the list of sensitive species.

2.4 STAFF ALTERNATIVE WITH MANDATORY CONDITIONS

We recognize that the Commission is required to include valid section 18 fishway prescriptions in any license issued for the project. The staff alternative with mandatory conditions includes staff-recommended measures along with the mandatory section 18 fishway prescriptions that we did not include in the staff alternative: (1) implement as-yet unidentified plans, measures, or modifications to project facilities or operations to address bull trout passage criteria exceedances or allowable bull trout incidental take exceedances; (2) monitor and study bull trout incidental take and bull trout passage performance at off-project broodstock collection facilities; (3) continue to evaluate and exhibit steady progress toward achievement of adult Pacific lamprey passage standards (i.e., performance that is at least as high as other mid-Columbia River hydroelectric dams or performance that complies with any future as-yet unidentified lamprey passage standard developed by FWS); (4) use the best technology that is commercially available to count lamprey at the project; (5) develop and implement an alternative lamprey passage route to serve as a counting facility for adult lamprey; (6) conduct an upstream Pacific lamprey passage literature review; (7) develop and implement an operations study plan to identify operational measures to improve upstream lamprey passage; (8) design, evaluate, and implement additional measures until the project achieves compliance with the upstream lamprey passage standard; and (9) develop and implement a downstream juvenile lamprey passage study if FWS determines that juvenile lamprey are being adversely affected by Wells dam, and if study results indicate that Wells dam has a substantive negative impact on juvenile lamprey, the licensee shall implement operational or structural modifications to improve downstream passage survival.

Incorporation of these mandatory conditions into a new license would not cause us to modify or eliminate any of the environmental measures that we include in the staff alternative.

Comments filed on October 7, 2010, by BPA and the Corps included recommendations for certain license articles from the current license to be included in any new license issued for the project.¹⁹

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

We considered several alternatives to Douglas PUD's proposal, but eliminated them from further analysis because they are not reasonable in the circumstances of this case. They are: (1) issuing a non-power license; (2) federal government takeover of the project; and (3) retiring the project.

2.5.1 Issuing a Non-power License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no agency has suggested a willingness or ability to do so. No party has sought a non-power license, and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing in this circumstance.

2.5.2 Federal Government Takeover of the Project

Federal takeover and operation of the project is not considered to be a reasonable alternative. Douglas PUD is a municipal entity, and the law bars the federal takeover of projects owned by municipal entities (16 U.S.C. § 828b [2006]). Moreover, no party has suggested that a federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

¹⁹ Articles 9, 15, 16, 17, 18, and 36 for the safeguarding of navigability of the Columbia River; Article 32 for compensation to the United States for lost power production at the Chief Joseph Project due to increased tailwater levels caused by construction of the project; Article 38 for compensation for the project's share of coordinated system benefits from improved streamflows provided from Canadian storage projects; Article 47 for compensation for headwater benefits derived from upstream storage improvements located in the United States; and Article 34 for the project to provide flood storage space requested by the Corps to compensate for lost valley storage. These articles, which would be addressed in the license order for any new license that is issued for the project, are not analyzed in this EIS.

2.5.3 Retiring the Project

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicensing application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. Along with providing a viable, safe, and clean renewable source of power to the region, the project's reservoir also provides for recreational resources in the area. Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate protection, mitigation, and enhancement measures.

The second project retirement alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we do not consider disablement or removal of the electric generating equipment to be a reasonable alternative.

This page intentionally left blank.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area (e.g., aquatic resources, terrestrial resources, recreation). Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.2, *Comprehensive Development and Recommended Alternative*.²⁰

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Wells Project is located at RM 515.6 on the Columbia River. The Columbia River has an average annual runoff at its mouth of 198 million acre-feet and drains an area of about 219,000 square miles of the United States, including Washington, Oregon, Idaho, northwestern portion of Montana; and small areas in Wyoming, Nevada, and Utah. An additional 39,500 square miles of the Columbia River Basin, or about 15 percent, is contained within Canada, principally draining the southern portion of British Columbia.

Most of the annual precipitation in the Columbia River Basin occurs during the winter months with the bulk of the precipitation falling as snow in the higher elevations of the Rocky and Cascade mountains. Snowfall is heaviest between November and February. Natural winter stream flows are generally low with high-sustained runoff flows occurring in the spring and early summer. Roughly 60 percent of the natural runoff of the Columbia River occurs during May, June, and July.

The Methow River enters the Columbia River within Wells reservoir at RM 523.9 near Pateros, Washington, about 8.3 miles upstream of Wells dam. The Methow River has a watershed of 1,791 square miles. Annual precipitation in the Methow River Basin ranges from 15 to 80 inches per year.

The Okanogan River enters the Columbia River within Wells reservoir at RM 533.3, about 17.7 miles upstream of Wells dam. The Okanogan River watershed covers an area of about 8,200 square miles, 2,342 square miles (29 percent) of which is located

²⁰ Unless otherwise indicated, our information is taken from the application for license for this project (Douglas PUD, 2010) and additional information filed by Douglas PUD on May 18, 2010. We provide citations for information obtained from other sources, including subsequent filings related to the project.

in the U.S. Annual precipitation in the Canadian portion of the Okanogan Basin ranges from 30 to 40 inches and from 10 to 15 inches in the U.S. portion of the basin.

The Wells Project lies in a north-south trending valley between two significantly different physiographic areas: the North Cascade Mountains to the west and the Columbia Plateau to the east. North and west of the river rugged mountainous highlands prevail; south and east is a vast plateau with small undulating hills and occasional shallow, steep-walled valleys. The mountainous areas north and west of the Columbia River are underlain primarily by a variety of structurally complex, pre-Tertiary crystalline rocks. The Columbia Plateau surface, on the other hand, is controlled by the wide-spread Miocene basalt flows. Glacial deposits, lake sediments, and river terraces cover the bedrock in much of the Wells Project area. There are no known major fault zones or other geologic hazards of significance in or near the Wells Project (Jacobs Engineering, 2009). Soil types in the Wells Project area are variable and reflect a diversity of parent materials and slope conditions that surround the Wells reservoir.

Uplands in the project area that have not been converted by human activities are dominated by shrub steppe habitat. Dominant land uses include irrigated and dry-land agriculture, residential, and small towns. The human environment is rural in character and agriculturally based. The combined populations of the three towns in the immediate project area total less than 5,000; much of the human population in the project vicinity live in rural, unincorporated areas. The nearest metropolitan center, Wenatchee, is 45 miles southwest of Wells dam.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing National Environmental Policy Act (40 CFR § 1508.7), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified aquatic resources as having the potential to be cumulatively affected by the project in combination with other past, present, and future activities. Aquatic resources were selected because hydroelectric developments and diversions along the river have affected the fishery and habitat by altering the flow regime, modifying water quality, blocking or delaying fish movement, and entraining fish.

3.2.1 Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

The seven dams on the mid-Columbia River have cumulatively affected aquatic resources on the Columbia River from the tailrace of the Chief Joseph Project to the upstream end of the McNary reservoir. The geographic scope of cumulative effects analysis for the Wells Project encompasses this reach and includes inundated portions of tributaries to Wells reservoir, such as the lower Methow and Okanogan rivers.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of past, present, and future actions and their effects on aquatic resources. Based on the term of the proposed license, we will look 30 to 50 years into the future, concentrating on the effect on aquatic resources from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effect of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific site-specific and cumulative environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EIS. Based on this, we have determined that water quality and quantity, aquatic, terrestrial, threatened and endangered species, recreation, cultural, aesthetic, and socioeconomic resources may be affected by the proposed action and action alternatives. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

3.3.1 Aquatic Resources

3.3.1.1 Affected Environment

Water Quantity

Columbia River and Wells Project Hydrology

The drainage area of the Columbia River Basin upstream of the project dam is about 86,100 square miles, and the average flow through the reservoir for the period from 1968 to 2007 was 111,000 cfs. The maximum and minimum daily average flows

for this period were 402,000 cfs (June 15, 1972) and 23,700 cfs (November 11, 1973), respectively, as recorded at U.S. Geological Survey (USGS) gage no. 12450700, Columbia River below Wells dam. Table 5 provides monthly flow statistics for the gage below Wells dam.

Table 5. Monthly discharge (cfs) statistics for daily data from USGS gage no. 12450700, Columbia River below Wells dam (Source: USGS, 2010a).

Month	Mean	Median	Maximum	Minimum	10% Exceedance	90% Exceedance
October	77,721	77,350	159,000	35,100	101,000	54,890
November	87,818	88,250	153,000	23,700	113,000	61,500
December	101,782	100,000	189,000	31,500	140,000	69,800
January	109,575	108,000	203,000	34,300	151,000	70,390
February	109,902	108,000	260,000	29,000	154,000	70,290
March	108,511	103,000	222,000	28,500	164,000	64,670
April	114,614	112,000	257,000	25,200	173,000	60,870
May	146,316	142,000	293,000	29,500	212,000	88,790
June	161,354	151,000	402,000	29,300	255,100	86,180
July	130,202	122,000	347,000	26,400	194,000	71,000
August	105,976	102,000	226,000	34,700	151,000	67,570
September	77,953	76,450	222,000	31,100	104,000	52,790

The Columbia River is primarily fed by snowmelt. Numerous dams and reservoirs developed for hydropower and flood control alter the natural flow in the basin, and water is withdrawn from the Columbia River and its tributaries at various locations for agricultural, domestic, municipal, and industrial supply. Flow releases from upstream storage projects, which are regulated by the Federal Columbia River Power System, primarily control the annual flow regime. In general, the Columbia River Power System is operated to fill upstream storage reservoirs by the end of June; provide augmented summer flows for fish passage, navigation, and power production through the summer; draft storage reservoirs to meet power demand and salmon spawning requirements through the fall and winter, and depending on snow accumulations and runoff forecasts, draft for flood control and fill to meet June refill targets through the spring.

Flows in the Methow River, which enters Wells reservoir at RM 523.9, are measured at USGS gaging station no. 12449950. The gage measures flows from about 99 percent of the 1,791 square mile watershed. For water years 1959 to 2007, the

average flow was 1,539 cfs with average monthly flows ranging from 422 cfs in February to 5,738 cfs in June. A maximum recorded flow of 27,200 cfs occurred on May 31, 1972. The minimum flow recorded at this gage—150 cfs—was recorded on January 10, 1974.

Flows in the Okanogan River, which enters Wells reservoir at RM 533.3, are measured at USGS gaging station no. 12447200. The gage measures flows from about 98 percent of the 8,200 square mile watershed. For water years 1966 to 2007, the average flow was 3,010 cfs with average monthly flows ranging from 1,125 cfs in September to 9,764 cfs in June. A daily maximum recorded flow of 45,300 cfs occurred on June 3, 1972. The daily minimum flow recorded at this gage—288 cfs—was recorded on September 4, 1970.

Although the current FERC license allows reservoir elevations to fluctuate between elevations 771 and 781 feet msl, typical fluctuations are between 1 to 2 feet. Drawdowns greater than 4 feet are sometimes required for flood control purposes²¹ and have also occurred to assist with flushing sediment from the lower Methow River, increase downstream flows to benefit Chinook salmon in the Hanford Reach, and facilitate construction of islands for waterfowl habitat. Hourly water level monitoring data indicate that drawdowns of more than 4 feet occurred only 1.1 percent of the time from 2001 to 2005 (table 6) and slightly less than 1 percent of the time from 1990 to 2005. Between 1990 and 2005, the reservoir level was maintained above elevation 777 feet for 95.1 percent of the time (table 7), and from 2001 to 2005, the reservoir level was maintained above that elevation for 96.2 percent of the time (Douglas PUD, 2006).

Project Water Rights

Washington DOE has jurisdiction over water use in the mid-Columbia River. Douglas PUD currently holds water rights of 220,000 cfs for power generation and a total of 331,200 acre-feet of water for impoundment. Douglas PUD also holds several other surface water rights and groundwater withdrawal permits for fish propagation, irrigation, domestic water supply, and commercial and industrial uses.

²¹ Article 34 of the current license requires Douglas PUD to provide up to 125,000 acre-feet of storage space in the Wells Project reservoir upon request by the Corps. The amount of storage space to be provided by the licensee may vary from zero acre-feet for a forecasted peak flow of 500,000 second-feet at The Dalles, Oregon, to approximately 125,000 acre-feet for a forecasted peak flow of 1,100,000 second-feet at The Dalles.

Table 6. Summary of reservoir fluctuation frequencies during 2001 to 2005 and 1990 to 2005 (Source: DTA, 2006a).

Elevation Change (ft)	2001–2005		1990–2005	
	Days	Frequency	Days	Frequency
0 to 2	1,260	69.0%	4,715	81.9%
2 to 3	443	24.3%	807	14.0%
3 to 4	102	5.6%	182	3.2%
4 to 6	17	0.9%	43	0.7%
6 to 10	4	0.2%	7	0.1%

Table 7. Summary of minimum reservoir level frequencies during 2001 to 2005 and 1990 to 2005 (Source: DTA, 2006a).

Minimum Water Elevation (ft)	2001–2005		1990–2005	
	Days	Frequency	Days	Frequency
781 to 779	929	50.9%	3,464	60.2%
779 to 777	827	45.3%	2,008	34.9%
777 to 775	50	2.7%	117	3.1%
775 to 773	19	1.0%	81	1.4%
773 to 771	1	0.1%	24	0.4%

Consumptive Uses—Irrigation

The primary consumptive use of water withdrawn from Wells reservoir is orchard irrigation. Orchards with apple, cherry, pear, peach, apricot, and other fruit trees represent the primary agricultural activity in the Columbia River Valley and the surrounding tributary valleys throughout North Central Washington. The irrigation season begins in late March or April and continues through October. Peak irrigation use occurs in June, July, and August when temperatures in the region are highest. Within the project area, irrigation withdrawals constitute the largest segment of consumptive water use. Annual irrigation water rights issued by Washington DOE provide for the withdrawal of up to 30,292 acre-feet per year from the project reservoir, and some additional water is diverted for irrigation under permits issued by the Coleville Tribes. Mixed use water rights, which may include irrigation, power, fish propagation, wildlife, domestic, industrial, and other uses, account for 22,906 acre-feet per year.

Consumptive Uses—Domestic

Domestic water supply withdrawals from Wells reservoir are very limited. Some withdrawals are for use in irrigating yards and gardens. Water withdrawals for drinking water are primarily from groundwater sources and are concentrated in Brewster, Bridgeport, and Pateros.

Consumptive Uses—Commercial and Industrial

Commercial and industrial uses are limited and account for about 5,713 acre-feet per year of surface water withdrawals in Wells reservoir. Similar to domestic water withdrawals, commercial and industrial uses are concentrated in the cities of Brewster, Bridgeport, and Pateros, adjoining Wells reservoir. Stock watering use is limited to about 1,157 acre-feet per year.

Water Quality

In general, water quality in the project area is characterized by low- to moderately low levels of nutrients, slightly basic pH (range 7.5 to 8.5), well-oxygenated water, and low turbidity with moderately low algae growth. The reach of the Columbia River within the Wells Project area and parts of the Okanogan and Methow rivers upstream of the Wells Project boundary are listed for temperature impairment under section 303(d) of the CWA. The Okanogan River was listed for toxin impairment in 1998, but it was delisted after EPA approved a TMDL for polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT) in 2004.

Applicable Water Quality Standards

Under the 2006 Washington State water quality standards, the Columbia River at the project, the Methow River up to RM 1.5, and the Okanogan River up to RM 15.5 are subject to salmonid spawning, rearing, and migration criteria. Designated uses include: spawning/rearing (aquatic life), primary contact recreation, and all types of water supply and miscellaneous uses. Table 8 summarizes pH, dissolved oxygen (DO), TDG, turbidity, and toxins numeric criteria for the project area.

Table 8. Summary of selected Washington DOE water quality criteria for the Wells Project area (Source: Douglas PUD, 2010).

Parameter	Salmonid Spawning, Rearing, and Migration Criteria
pH	Within 6.5 to 8.5 units ^a
Dissolved oxygen	Must exceed 8.0 mg/L ^b
Total dissolved gas	Not to exceed 110% ^{c,d}
Turbidity	Not to exceed 5 NTUs over background, or 10% over background of 50 NTUs or more
Toxins	DDT: not to exceed 1.1 µg/L as an instantaneous value (acute condition) and 0.001 µg/L as a 24-hour average (chronic condition) PCBs: not to exceed 2.0 µg/L as a 24-hour average (acute condition) and 0.01 µg/L as a 24-hour average (chronic condition)

Notes: mg/L – milligrams per liter

NTU – nephelometric turbidity unit

PCB – polychlorinated biphenyl

µg/L – microgram per liter

- ^a Human-caused variation within the range above must be within 0.5 unit.
- ^b When a water body’s DO is lower than 8.0 mg/L, and that condition is due to natural conditions, then human actions considered cumulatively may not cause the DO of that water body to decrease more than 0.2 mg/L.
- ^c This criterion does not apply when flow exceeds the 7-day, 10-year frequency flood (7Q10) of 246,000 cfs at Wells dam.
- ^d When approved, Douglas PUD’s annual GAP will allow for TDG levels above 110 percent for spill for fish passage (tailrace average of 12 highest hours ≤120 percent, no single hour >125 percent) and not exceed 115 percent at the Rocky Reach dam forebay).

Water Temperature

Washington DOE’s water temperature criteria applicable to waters within the Wells Project boundary are as shown below.

For the tributary reaches within the Wells Project boundary (Okanogan River from RM 0 to RM 15.5 and the Methow River from RM 0 to RM 1.5):

- Water temperature shall not exceed 17.5 degrees Celsius (°C) (63.5 degrees Fahrenheit [°F]), where water temperature is measured by the 7-day average of the 7-day average of the daily maximum temperatures (7-DADMax).
- When a water body's temperature is warmer than 17.5°C (or within 0.3°C (0.54°F) of 17.5°C) and that condition is due to natural conditions, then

human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

- When the natural condition of the water is cooler than 17.5°C, the incremental temperature increases resulting from the combined effect of all non-point source activities in the water body must not, at any time, exceed 2.8°C (5.04°F).
- The Methow River within the project boundary (RM 0 to RM 1.5) has been identified by Washington DOE as requiring special protection for salmon and trout spawning and incubation. From October 1 to June 15, water temperature shall not exceed 13.0°C, as measured by the 7-DADMax.

For the mainstem Columbia River within the Wells Project boundary:

- Water temperature shall not exceed 17.5°C (64.4°F), where water temperature is measured by the 7-DADMax.
- When a water body's temperature is warmer than 17.5°C (or within 0.3°C (0.54°F) of 17.5°C) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).
- When the natural condition of the water is cooler than 17.5°C, the incremental temperature increases resulting from the combined effect of all nonpoint source activities in the water body must not, at any time, exceed 2.8°C (5.04°F).

Total Dissolved Gas

Spilling water at hydroelectric projects can entrain atmospheric gas in the tailwater, forcing this gas into solution, potentially leading to supersaturation of TDG (Weitkamp and Katz, 1980). High TDG levels can be detrimental to a wide array of aquatic animals and may cause a potentially lethal condition known as gas bubble trauma in fish. Gas bubble trauma develops when dissolved gas in the bloodstream of animals rapidly comes out of solution and forms bubbles in the internal and external tissues, resulting in injury or death.

Although Washington DOE's numeric water quality standard is 110 percent for TDG supersaturation in the Columbia River, this standard does not apply when flows exceed the 7-day, 10-year frequency flood (7Q10) of 246,000 cfs at Wells dam. In addition, the TDG criteria may be adjusted to accommodate spill to facilitate fish passage at hydroelectric dams when consistent with a Washington DOE-approved GAP. Annually since 2002, Douglas PUD has prepared a GAP and received a TDG exemption from Washington DOE. The exemption allows the project to spill water for fish passage provided that TDG level in the tailrace does not exceed 120 percent (daily average of highest 12 consecutive hours) and no single hourly TDG measurement exceeds 125 percent. In addition, the spill must be controlled so that the TDG level in

the forebay of the next dam downstream (i.e., Rocky Reach Project) does not exceed 115 percent.

Douglas PUD monitors TDG in the center of the project forebay and in the tailrace about 3 miles downstream of Wells dam, and Chelan PUD monitors TDG in the forebay of Rocky Reach dam (table 9). In the Wells forebay, the average TDG values for the years 2003 through 2007 ranged from 107 to 110 percent. In the Wells tailrace, average values typically are within the criteria established by the TDG exemption, with only one exceedance in the last 5 years (2003). The 2006 exceedance was a result of a TDG study that required Douglas PUD to intentionally spill water in various spillway configurations. In the Rocky Reach forebay, the average TDG values ranged from 108 to 110 percent with maximum values sometimes exceeding the 115 percent standard. The total number of days in which TDG values exceeded 110, 115, and 120 percent in the forebay and tailwater of the Wells Project and in the forebay of the Rocky Reach Project from 2003 to 2007 are summarized in table 10.

Table 9. Average, minimum, and maximum 12-hour high total dissolved gas levels (in percent saturation) measured in the Wells forebay, Wells tailrace, and Rocky Reach forebay during the monitoring season, 2003–2007 (Source: Douglas PUD, 2010).

Location	TDG	2003	2004	2005	2006	2007
Wells forebay	Average	108.1	108.2	107.4	109.9	108.3
	Minimum	101.3	102.0	110.8	102.5	100.9
	Maximum	114.5	113.5	100.9	116.1	113.2
Wells tailrace	Average	109.8	109.6	109.1	114.0	110.9
	Minimum	101.9	101.6	102.8	103.2	103.5
	Maximum	126.0	113.7	116.8	131.3	122.0
Rocky Reach forebay	Average	110.1	109.1	109.6	114.4	110.4
	Minimum	103.8	104.7	103.3	102.7	104.5
	Maximum	120.8	114.3	120.4	130.0	118.0

Notes: The 12-hour high is defined as the average of the 12 highest hourly readings within a 24-hour period. Monitoring season is typically April 1 to September 15, the juvenile fish migration season.

Table 10. Annual summaries of days with hourly total dissolved gas values greater than 110, 115, and 120 percent at the Wells forebay, Wells tailwater, and the Rocky Reach forebay from 2003 to 2007 during the juvenile fish migration season (April–August) (Source: Lê, 2008).

TDG Value	Wells Forebay	Wells Tailwater	Rocky Reach Forebay	Sampled
2003				
>110%	55 days	76 days	62 days	168 days
>115%	0 days	8 days	2 days	168 days
>120%	0 days	1 day	0 days	168 days
2004				
>110%	38 days	69 days	67 days	168 days
>115%	0 days	0 days	0 days	168 days
>120%	0 days	0 days	0 days	168 days
2005				
>110%	20 days	69 days	66 days	168 days
>115%	0 days	1 day	2 days	168 days
>120%	0 days	0 days	0 days	168 days
2006				
>110%	70 days	108 days	96 days	168 days
>115%	22 days	59 days	42 days	168 days
>120%	0 days	29 days	19 days	168 days
2007				
>110%	48 days	116 days	66 days	168 days
>115%	0 days	11 days	1 day	168 days
>120%	0 days	2 days	0 days	168 days

Water Temperature

Water temperatures in Wells reservoir are primarily governed by the temperature of inflowing water from Chief Joseph dam, with little warming occurring as water passes through the reservoir. Studies conducted by Douglas PUD (EES Consulting, 2006) showed a lack of temperature and DO stratification in the reservoir.

Beginning in 2001, Douglas PUD initiated an extensive water temperature monitoring effort to better understand the temperature dynamics in Wells reservoir (EES Consulting, 2006). Temperature data were collected at four locations in the Columbia River (RM 544.5, RM 535.3, RM 530.0, and RM 515.6) and at one site each on the inundated portions of the Okanogan (RM 10.5) and Methow (RM 1.4) rivers affected by the project. Monitoring results indicated that water temperatures in the Columbia River within the project area generally exceed the 17.5°C water quality standard from mid-July through early October. Water temperatures at the Methow River site exceeded the 17.5°C standard from mid-July through August, and water temperatures at the Okanogan River site exceeded the 17.5°C standard from early June to late September. When water temperatures are in excess of the 17.5°C standard due to natural conditions, an additional standard applies that requires the project to not cause a 0.3°C increase over background temperatures. State water quality standards also include supplemental temperature requirements for the Methow River. Water temperatures are not to exceed 13°C from October 1 to June 15 in the lower Methow River including the portion within the Wells Project Boundary (up to RM 1.5).

Maximum water temperatures typically occur in August, with temperatures below Chief Joseph dam and at the Methow River and Okanogan River sites reaching 20.0°C, 22.5°C, and 27.0°C, respectively. In 2006, Douglas PUD expanded the temperature monitoring season to cover the entire year and added additional monitoring stations at the mouths of the Okanogan (RM 0.5) and Methow (RM 0.1) rivers. Water temperature data collected from these stations have been used to model temperature and allocate the effects of project operations on water temperatures at Wells dam and within Wells reservoir as they relate to compliance with the numeric temperature standard.

To assess compliance with the temperature standard, Douglas PUD developed CE-QUAL-W2 water temperature models for the Wells Project area (West Consultants Inc., 2008). Results indicate that water temperatures within the project area generally exceed the 17.5 °C water quality standard from mid-July through early October, but the Wells Project does not cause water temperatures to increase by more than the 0.3°C that is allowed under state water quality standards.

Daily high temperatures within the inundated portions of the Okanogan River were often lowered relative to the daily high temperatures in the non-inundated portions of the Okanogan River upstream of the project during the hottest summer months. This study showed that the intrusion of Columbia River water into the lower 1 to 2 miles of the Okanogan River reduces summer high temperatures by 2 to 6°C. In the lowest 1.5 miles of the Methow River, summer high temperatures are reduced by about 1°C and winter temperatures are increased by 2 to 3°C, when compared to the non-inundated portions of the Methow River upstream of the project.

In the fall, water temperatures drop more quickly in the Okanogan and Methow rivers than they do in the Columbia River. In both rivers, the warmer water of the Columbia River intrudes into the lower reaches of both river sections, especially when

the tributary inflows are small. During the winter, the warmer Columbia River water limits the amount of freezing in the lower reaches of the Okanogan and Methow rivers within the project area.

Douglas PUD reports that NMFS requires all entities that use the fish trapping facilities at Wells dam to discontinue trapping operations when fish ladder water temperatures exceed 68.0°F (20.6°C).²² In 2001 and 2003, Douglas PUD added supplemental temperature recording equipment near the broodstock collection facilities in the east fishway at Wells dam to monitor compliance with requirements in the Biological Opinion. In 2001, hourly data indicate that water temperatures at this location in the east fish ladder did not exceed 68.0°F (20.6°C) at any time during the monitoring period from late July to early December. In 2003, data were recorded every 2 hours and exceedances of greater than 68.0°F (20.6°C) were observed on 3 hourly occasions.

Dissolved Oxygen, pH, and Turbidity

In 2005, Douglas PUD added sensors to its existing forebay TDG monitoring equipment to collect preliminary project information about pH and DO and monitor these parameters during the late summer when probabilities of exceedance are highest. Additional DO, pH, and turbidity data were collected during 2008 and 2009 from Wells dam forebay and the lower Okanogan River, both above and within the Wells Project boundary (Douglas PUD and CBE, 2009). The monitoring data indicate that values for these parameters are generally in compliance with state numeric standards (Parametrix, 2009b).

Measured pH values were consistently within the range of 6.5 to 8.5 specified by the numeric standard. On only one occasion did pH within the project area exceed background measurements, and by only 0.06 unit on the Okanogan River at the Malott Bridge monitoring station, slightly upstream of the project boundary. This exceedance of background measurements was well within the water quality allowance for human-caused conditions.

During August and September, there were periodic occurrences of DO concentrations below the 8.0 milligrams per liter (mg/L) standard, but these normally occurred only in the Okanogan River.

The highest turbidity levels in the project are typically observed in the Okanogan River arm of Wells reservoir. Increased river flows coincide with snowmelt and precipitation events, which also cause higher turbidity levels. To evaluate turbidity,

²² However, we note that the NMFS's Incidental Take Permits for operation of Douglas PUD's hatchery facilities (Incidental Take Permit Nos. 1196, 1347, and 1395) specify that trapping operations at adult trapping sites be discontinued when water temperatures exceed 69.8°F (21°C).

Secchi disk readings were taken daily on the west side of Wells dam near the exit to the west fishway during the adult fish passage monitoring period (May 1 to November 15). General trends of Secchi disk data suggest relatively low periods of visibility (0.6 to 1.2 meters) during the spring and early summer. These relatively low periods of visibility are correlated with high flows during the spring runoff period. As the high flow period subsides, Secchi disk values increased to between 3.4 and 4.6 meters for the remainder of the monitoring period.

Toxins

In 1998, Washington DOE listed the portion of the Okanogan River within project boundary on the 303(d) list because dichlorodiphenyldichloroethylene (DDE),²³ DDT, and PCB concentrations found in edible carp tissue were above standards. In 2004, Washington DOE completed the lower Okanogan River DDT and PCB TMDL, which was approved by EPA. The TMDL determined that the concentrations of DDT and PCBs were below thresholds for acute toxicity, and this river section was removed from the 303(d) list. The TMDL technical assessment (Serdar, 2003, as cited in Douglas PUD, 2010) identified re-suspended Osoyoos Lake sediments as the origin for nearly all of the DDT loads in the Okanogan River.

In 2008, Douglas PUD conducted a toxins study in the Okanogan River (Parametrix, 2008). The objective of the study was to determine the concentration of the persistent bioaccumulative pollutants DDT and PCBs in recreational fish species and in swimming area sediments of the lower Okanogan River (up to RM 15.5) within the Wells Project boundary. This study augmented previous information collected by Washington DOE during the development of the lower Okanogan River Basin DDT and PCBs TMDL report. The Douglas PUD study assisted in further documenting DDT and PCB concentrations in the sediment and fish tissues in the lower Okanogan River.

Fish species targeted for analyses were common carp, mountain whitefish, and smallmouth bass. Sediment sampling locations were selected during a site reconnaissance targeting accessible recreation sites along the lower Okanogan River within the Wells Project boundary (RM 15.5 to RM 0.0).

PCBs were undetected in all sediment samples at the 3.9 to 4.0 micrograms per kilogram ($\mu\text{g}/\text{kg}$) reporting limits. These results were more than one order of magnitude below the 60 $\mu\text{g}/\text{kg}$ sediment quality standard value proposed by Michelsen (2003, as cited in Douglas PUD, 2010). DDT analogs²⁴ were not detected in two sampling sites. Total DDT results were similar to the range of 8.3 to 23 $\mu\text{g}/\text{kg}$ detected in the upper 32 centimeters of a 2001 sediment core collected for the TMDL study, where total

²³ DDE is a common breakdown product of DDT.

²⁴ A chemical analog is a compound having a structure very similar to that of another one.

concentrations were 8.8 $\mu\text{g}/\text{kg}$ in the upper 2 centimeters and increased to 23 $\mu\text{g}/\text{kg}$ in sediments from 30 to 32 centimeters deep. Sample concentrations from both studies were below the lowest apparent effects thresholds for aquatic life (DDD [dichlorodiphenyltrichloroethane] – 96 $\mu\text{g}/\text{kg}$, DDE – 21 $\mu\text{g}/\text{kg}$, and DDT – 19 $\mu\text{g}/\text{kg}$).

Carp sampled in the Douglas PUD study were larger and presumably older than the carp sampled during the TMDL technical assessment, which may account for higher DDT levels measures in some of the carp sampled by Douglas PUD. Total DDT ranged from 120 to 25,726 $\mu\text{g}/\text{kg}$ in carp from the Douglas PUD study compared to 236 to 434 $\mu\text{g}/\text{kg}$ in carp from the TMDL study. Higher PCBs concentrations were also associated with larger, older-aged carp with higher lipids content. Total PCBs concentrations ranged from 8.8 to 246 $\mu\text{g}/\text{kg}$ in carp and <4 to 79 $\mu\text{g}/\text{kg}$ in smallmouth bass.

Douglas PUD indicates that these concentrations were lower than fish tissue concentrations in mountain whitefish from the Wenatchee River and in carp from the Walla Walla River that have led to fish consumption advisories.

Fisheries Resources

General Description of the Fish Community and Habitats

Fisheries resources within the project area consist of six anadromous species, including four species of Pacific salmon, steelhead, and Pacific lamprey and 27 species of resident fish, 16 of which are native to the region. Three federally listed fish species occur in the project area: the UCR spring-run Chinook salmon, UCR steelhead, and bull trout. The UCR spring-run Chinook salmon is listed as endangered, and the UCR steelhead and bull trout are listed as threatened under the ESA. A description of aquatic habitats within the project area and the biology of anadromous and resident fish species are presented below. Additional information about the listing history and critical habitat of the federally listed species and on EFH for anadromous salmonid species is provided in section 3.3.3, *Threatened and Endangered Species*.

Aquatic Habitat

Wells Reservoir

Wells reservoir is about 30 miles long, extending from Wells dam at RM 515.5 to Chief Joseph dam at RM 545.1 on the Columbia River. The reservoir inundates 1.5 miles of the lower Methow River and 15.5 miles of the lower Okanogan River. At full pool, the reservoir surface area is 9,740 acres, the total storage capacity is 331,200 acre-feet, and the usable storage capacity is 97,985 acre-feet. The reservoir level is maintained between elevation 781 and 771 feet msl. The maximum depth of the reservoir under average conditions is more than 100 feet, and the mean depth is 34 feet. The flushing rate varies seasonally with average flushing rates of 0.48 day in June and 2.98 days in January.

The uppermost 5-mile section of Wells reservoir immediately downstream from the Chief Joseph dam tailrace is relatively narrow and fast-flowing with a steep shoreline. Dominant substrate in this section is characterized by large cobble substrate. The middle 10-mile section is a shallow, relatively broad area containing the confluence of the Okanogan River. Water velocities in this middle section are slower, more of the substrate is composed of fine sediment, and the bathymetry is more gradual than the upper portion of the reservoir. This section has the highest density of aquatic plant communities and has the largest area of littoral fish habitat. The lowermost 15-mile section is relatively narrow and fast flowing but slows and deepens as it nears Wells dam. This section includes the confluence of the Methow River. Shoreline slopes are steep with a relatively high frequency of rip-rap. Substrates in this section tend to be coarse, except in the area near the confluence of the Methow River.

Lower Methow River

The lower Methow River is contained in a moderately confined alluvial valley and has an average gradient of 0.37 percent. Shoreline areas within the 1.5-mile section backwatered by Wells reservoir are highly developed, with the southern shoreline dominated by private residences with boat docks and lawns, and the northern shoreline dominated by rip-rap and the city of Pateros. The Methow Watershed supports populations of anadromous summer/fall-run Chinook salmon and ESA-listed UCR spring-run Chinook salmon, UCR steelhead, and bull trout. These species use the aquatic habitat in the lower section of the Methow River as an adult migratory corridor to access spawning areas in the upper reaches, and juvenile anadromous salmonids use it for rearing and as a migration corridor.

Lower Okanogan River

The entire Okanogan River drainage is a broad valley comprising deep glacial deposits that are highly erodible. Substrate in the project area is primarily gravel and increases in size to primarily cobble substrate heading upstream. The lower portion of the Okanogan River, including the 15.5-mile-long section backwatered by Wells reservoir, exceeds state water temperature standards during the summer months.

Despite water temperatures in exceedance of state standards, the Okanogan River watershed currently supports harvestable runs of summer/fall-run Chinook salmon, and the Columbia River Basin's largest run of sockeye salmon. The Okanogan River Basin also supports UCR steelhead. Anecdotal reports from the Colville Tribes also suggest bull trout are present seasonally in the Okanogan River and have been detected in the upper reaches at Zosel dam (RM 79) in Oroville, Washington. However, 8 years of telemetry monitoring by Douglas PUD indicate that bull trout stray only briefly into the lower Okanogan River from the Methow River. The lower section of the Okanogan River that is inundated by Wells reservoir is used by anadromous salmonids primarily as a migratory corridor.

Tailrace

Downstream of Wells dam, the immediate left and right banks of the tailrace are lined with rock rip-rap to prevent erosion from currents produced during larger spill events. An excavated rock trap, about 13 feet deep and 30 feet wide, runs the length of the hydrocombine, immediately downstream of the draft tube exit sill. The trap is cleaned out when accumulated debris approaches a height in the trap that would create a potential for debris to fall back into the draft tube exits. The rock trap has been excavated twice since 1967, most recently in August 2006. Water levels in the Wells tailwater are influenced by the Rocky Reach Project reservoir, which is located 42 miles downstream.

Aquatic Plants

In August and September 2005, Douglas PUD conducted a comprehensive aquatic plant (macrophyte) survey in Wells reservoir (Lê and Kreiter, 2006). The study relied on high resolution orthophotography, detailed bathymetric data, and extensive in-water sampling to determine the presence or absence of macrophyte beds. Species composition in documented macrophyte beds was then verified during more intensive field surveys (61 transects, totaling 369 sample points).

Nine aquatic plant species were documented during the survey (table 11). Seven of these species are native to the mid-Columbia River Basin, and two are non-native (Eurasian watermilfoil and curly leaf pondweed). The two most common dominant species collected in the samples were common waterweed (24.7 percent) and leafy pondweed (16.7 percent). Both of these species are native to the Columbia River Basin. Native aquatic plants were the dominant species in more than 89 percent of the macrophytes beds sampled. Eurasian watermilfoil, considered to be an aquatic nuisance species was dominant in only 6.3 percent of samples. All of these samples were taken at depths between 4 and 15 feet. Samples in which no plants were observed occurred 41.7 percent of the time, indicating that macrophyte communities maintain a patchy distribution within the Wells Project (Lê and Kreiter, 2006).

In general, aquatic macrophyte communities were not found at depths of less than 4 feet. Depths between 5 and 15 feet were characterized by a native dominant species composition. If Eurasian watermilfoil were present at these depths, it was generally sub-dominant or at low densities (<10 percent of sample). At depths ranging from 15 to 24 feet, species composition consisted of exclusively native species. From 24 feet to 30 feet, macrophyte communities were absent, presumably due to the limited light (Lê and Kreiter, 2006). Field observations have found aquatic macrophytes to be non-existent in the Wells dam tailrace. The absence of macrophytes in this area is likely due to the incompatible habitat conditions, which consist of relatively deep water, high flows, and predominantly large substrate (Lê and Kreiter, 2006).

Table 11. Aquatic macrophyte species identified and the percentage of samples in which each was the dominant species (consisting of >60 percent of the total sample) (Source: Douglas PUD, 2010).

Scientific Name	Common Name	Percentage of Samples in which the Species was Dominant
<i>Chara</i> spp.	Muskgrass	0.3 (1/396)
<i>Elodea canadensis</i>	Common waterweed	24.7 (98/396)
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	6.3 (25/396)
<i>Potamogeton crispus</i>	Curly leaf pondweed	4.3 (17/396)
<i>Potamogeton foliosus</i>	Leafy pondweed	16.7 (66/396)
<i>Potamogeton nodosus</i>	American pondweed	1.3 (5/396)
<i>Potamogeton pectinatus</i>	Sago pondweed	0.8 (3/396)
<i>Potamogeton zosteriformis</i>	Flat-stemmed or eelgrass pondweed	2.3 (9/396)
Absent		41.7 (165/396)

Note: spp. – species

Overall, native species assemblages dominate the aquatic macrophyte communities in the Wells Project area. Non-native Eurasian watermilfoil, although present in the reservoir, was not observed at levels found in studies conducted in downstream mid-Columbia River reservoirs. In the Rocky Reach reservoir, Eurasian watermilfoil was found to be the most abundant species (Duke, 2000, as cited in Douglas PUD, 2010). In the Priest Rapids and Wanapum reservoirs, Eurasian watermilfoil comprised the highest percent composition across all samples—41.7 percent of samples (Normandeau, 2000). At the Wells Project, only 6.3 percent of samples collected were dominated by Eurasian watermilfoil (Lê and Kreiter, 2006).

Aquatic Macroinvertebrates

Aquatic macroinvertebrates are visible without magnification and include aquatic insects, worms, mollusks, crustaceans, and other animals without backbones. They inhabit a diverse array of habitats including streams, wetlands, springs, lakes, and reservoirs. The abundance and diversity of aquatic macroinvertebrates have been used as indicators of ecosystem health and local biodiversity (Plotnikoff and Ehinger, 1997).

In the fall of 2005, Douglas PUD conducted an aquatic macroinvertebrate inventory and assessment designed to detect the presence of RTE aquatic macroinvertebrates within the Wells Project area. The study area included Wells reservoir from Wells dam to the tailrace of Chief Joseph dam. The primary objective of the study was to document the

distribution, habitat associations, and relative abundance of the current aquatic invertebrate assemblage in the project area (BioAnalysts, 2006). Additionally, an RTE species survey was conducted to document the possible presence of several species of mollusks that have been listed as species of concern in Washington State.

Benthic macroinvertebrate fauna were sampled in the study area with colonization baskets, petite ponar grabs, and a suction device. Overall, the abundance and richness of the aquatic macroinvertebrate fauna varied according to habitat type. Eighty-eight different taxa were observed with the most abundant and diverse taxa observed in shoreline areas of fast and slow water habitats (BioAnalysts, 2006). In shoreline areas, chironomids (midges) were consistently one of the most dominant taxa but other important taxa included gastropods (snails and limpets), annelids (segmented worms), crustaceans (crayfish, isopods), and trichoptera (caddis flies). Fast water habitat had greater abundance but similar taxa richness compared to slow water habitat. Abundance at deepwater sites was generally lower than shoreline sites; dominant taxa included chironomids, bivalves (clams and mussels), annelids, and trichoptera. Similar taxa were observed in the Methow River and Okanogan River sampling sites.

Seventeen mollusk species were identified in the Wells Project area during the survey (table 12). Nine were gastropods and eight were bivalves. The gastropods included eight native species and one non-native snail (*Radix auricularia*). The bivalves included seven native species and one non-native clam (Asian clam, *Corbicula fluminea*). The Asian clam was the dominant bivalve noted at most of the stations.

Table 12. Mollusks collected from sampling stations on the Methow, Okanogan, and Columbia rivers during the 2005 Wells Project aquatic macroinvertebrate inventory (Source: Douglas PUD, 2010).

Location	Common Name	Taxon
Methow River	Western pearlshell	<i>Margaritopsis falcata</i>
	Striate fingernail clam	<i>Sphaerium striatinum</i>
	Ridgebeak peaclam	<i>Pisidium compressum</i>
	Western lake fingernail clam	<i>Musculium raymondi</i>
	Giant Columbia River limpet ^a	<i>Fisherola nuttalli</i>
	Ashy pebblesnail ^a	<i>Fluminicola fuscus</i>
	Western floater	<i>Anodonta kennealyi</i>
	Ubiquitous peaclam	<i>Pisidium casertanum</i>
	Big-ear radix ^b	<i>Radix auricularia</i>
	Golden fossaria	<i>Fossaria obrussa</i>

Location	Common Name	Taxon
	Prairie fossaria	<i>Fossaria (Bakerilymnaea) bulimoides</i>
	Ash gyro	<i>Gyraulus parvus</i> <i>Corbicula</i> sp.
Okanogan River	Western ridgemussel	<i>Gonidea angulata</i>
	Striate fingernail clam	<i>Sphaerium striatinum</i>
	Ridgebeak peaclam	<i>Pisidium compressum</i>
	Ubiquitous peaclam	<i>Pisidium casertanum</i>
	Asian clam ^b	<i>Corbicula fluminea</i>
	Ashy pebblesnail ^a	<i>Fluminicola fuscus</i>
	Fragile ancyloid	<i>Ferrissia californica</i>
	Ash gyro	<i>Gyraulus parvus</i>
	Western lake fingernail clam	<i>Musculium raymondi</i> <i>Physella</i> sp. <i>Anodonta</i> sp.
Columbia River	Western floater	<i>Anodonta kennnerlyi</i>
	Asian clam ^b	<i>Corbicula fluminea</i>
	Ridgebeak peaclam	<i>Pisidium compressum</i>
	Three ridge valvata	<i>Valvata tricarinata</i>
	Rocky Mountain physa	<i>Physella propinqua propinqua</i>
	Ash gyro	<i>Gyraulus parvus</i>
	Golden fossaria	<i>Fossaria (F.) obrussa</i>
	Prairie fossaria	<i>Fossaria (Bakerilymnaea) bulimoides</i>
	Big-ear radix ^b	<i>Radix auricularia</i>

^a State species of concern.

^b Introduced (non-native) taxon.

Two Washington State candidate species, the ashy pebblesnail and giant Columbia River limpet, were found in the Methow River in relatively clean and complex substrate. The ashy pebblesnail was also found in the Okanogan River in areas that appeared to be transitional riffle habitat. These mollusks were not abundant at either site, and in most instances, were identified from shell fragments. No ESA-listed or federal candidate species of macroinvertebrates or mollusks were found in the Wells Project area during the study (BioAnalysts, 2006).

Aquatic Nuisance Species

An aquatic nuisance species is a nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such waters. Because few natural controls exist in their new habitat, aquatic nuisance species may spread rapidly, damaging recreational opportunities, lowering property values, clogging waterways, impacting irrigation and power generation, destroying native plant and animal habitat, and sometimes destroying or endangering native species (Aquatic Nuisance Species Committee, 2001). Aquatic nuisance species populations that are currently present in the Wells Project area include Eurasian watermilfoil, carp, and tench. Zebra and quagga mussels—two other aquatic nuisance species of particular concern—are not currently found in the Wells Project area.

Eurasian watermilfoil is classified as a class B noxious weed by the Washington State Noxious Weed Control Board (Washington Administrative Code [WAC] 16–752).²⁵ Class B noxious weeds are nonnative plants whose distribution is limited within Washington State. Additionally, Eurasian watermilfoil is identified as a nuisance species in the Washington State Aquatic Nuisance Species Management Plan (Aquatic Nuisance Species Committee, 2001).

Eurasian watermilfoil is extremely adaptable and has the ability to thrive in a variety of environmental conditions. Although Eurasian watermilfoil can potentially spread by both sexual and vegetative means, vegetative spread is considered the primary mode of dispersal. During the growing season, the plant undergoes auto-fragmentation. The plant fragments often develop roots at the nodes before separation from the parent plants. Fragments are also produced by wind and wave action and boating activities, with each plant fragment having the potential to develop into a new plant. Monospecific stands of Eurasian watermilfoil adversely affect aquatic habitat and water quality, and can interfere with power generation, irrigation, and recreational activities.

Zebra and quagga mussels are freshwater, bivalve mollusks that are native to Eurasia. They are designated as deleterious exotic wildlife by Washington DFW

²⁵ Eurasian watermilfoil is native to Europe, Asia, northern Africa, and Greenland and was first documented in Washington State in 1965.

(WAC 232-12-01701). These species are not known to occur within the state, and their importation is strictly prohibited. A volunteer monitoring program is in place along the Columbia and Snake rivers and in several lakes throughout Washington and Oregon (Aquatic Nuisance Species Committee, 2001).

Zebra and quagga mussels were introduced into the Great Lakes as a result of ballast water discharge from transoceanic ships that were carrying mussels (USGS, 2010b). Zebra mussels first invaded North America in the mid-1980s and quagga mussels invaded a few years later in 1989 (FWS, 2010). These two species are closely related. The North American distribution of these species has been concentrated in the Great Lakes region of the U.S. with the zebra mussel distribution also spanning farther into the southern and western United States.

Zebra and quagga mussel size varies from microscopic to 2 inches long. Typical lifespan is up to 5 years. Both species are prolific reproducers. Fecundity is high with a few individuals having the capability of producing millions of eggs and sperm (FWS, 2010). Both species can tolerate a wide range of water temperatures (1 to 30°C), low velocities (<2 meters/second), and prefer hard surfaces for attachment although quagga mussels can live in soft sediments (FWS, 2010). Zebra mussels are typically found just below the surface to about 12 meters deep and quagga mussels are typically found at any depth where oxygen is available (FWS, 2010).

Zebra mussels have caused major ecological and economic problems since their arrival in North America, and quagga mussels pose many of the same threats. Both species are prolific filter feeders, removing substantial amounts of phytoplankton and suspended particulates from the host water body adversely affecting aquatic ecosystems by altering food webs (USGS, 2010b). The ability of zebra mussels and quagga mussels to rapidly colonize hard surfaces causes serious economic problems. These major bio-fouling organisms can clog water intake structures such as pipes and screens, reducing capabilities for power generation and water treatment. Recreation-based industries and activities have also been heavily affected because of colonization on docks, breakwalls, buoys, boats, and beaches (USGS, 2010b).

The economic impact of zebra and quagga mussels to the hydropower system on the Columbia and Snake rivers is of particular concern. If introduced into the Columbia River Basin, the mussels could affect all submerged components and conduits of this system, including fish passage facilities, navigation locks, raw water distribution systems for turbine cooling, fire suppression and irrigation, trash racks, diffuser gratings, and drains. These species could also adversely affect the native macroinvertebrate populations.

Anadromous Salmonids

Five stocks of anadromous salmonids are found in project area. These include the UCR spring-run Chinook salmon, UCR summer/fall-run Chinook salmon, Okanogan River sockeye salmon, UCR steelhead, and hatchery origin coho salmon.

With the exception of summer/fall-run Chinook salmon, anadromous salmonids use Wells reservoir primarily as a migratory corridor. Summer/fall-run Chinook salmon are known to extensively use Wells reservoir for rearing as well as migration. The Wells reservoir does not provide suitable spawning habitat for any anadromous fish species.

Annual fish counts at the Wells Project of all anadromous salmonids for the period of 2000 through 2009 are provided in table 13.

Table 13. Annual anadromous fish counts from 2000–2009 and 10-year averages (Source: Fish Passage Center, 2010).

Year	Spring-Run Chinook Salmon	Summer/Fall-Run Chinook Salmon	Coho Salmon	Sockeye Salmon	Steelhead
2009	8,174	35,852	3,014	134,937	34,370
2008	3,134	29,192	1,196	165,334	13,611
2007	2,793	19,487	2,432	22,273	10,910
2006	4,376	34,172	409	22,075	9,247
2005	4,996	35,122	348	55,559	9,963
2004	4,793	38,624	291	78,053	14,917
2003	4,702	54,644	168	28,977	15,915
2002	7,626	69,479	132	10,586	15,027
2001	10,881	47,726	616	74,490	26,864
2000	2,587	13,573	0	59,944	8,067
Average	5,406	37,787	861	65,223	15,889

Upper Columbia River Spring-run Chinook Salmon

The UCR spring-run Chinook salmon ESU is listed as endangered and includes all naturally reproducing populations in all river reaches accessible to Chinook salmon in the mid-Columbia River tributaries upstream of Rock Island dam and downstream of Chief Joseph dam. NMFS has identified three important spawning populations within this ESU: the Wenatchee, Entiat, and Methow River populations (NMFS, 2002).

Methow River Basin (Chewuch, Methow, and Twisp rivers) spring-run Chinook salmon exhibit classic stream-type life history strategies, emigrating from freshwater as yearling smolts and undertaking extensive offshore ocean migrations. The majority of these fish mature at 4 years of age and return to the Columbia River from March through mid-May. In the mid-Columbia River Basin, Chinook salmon passing Wells dam before June 28 are considered spring-run Chinook salmon. Between the years of 2000 and 2009, the number of spring-run Chinook salmon migrating upstream past

Wells dam annually has averaged 5,406 adults and ranged from 2,587 adults in 2000 to 10,881 adults in 2001 (table 13).

After entering the Methow River, adult spring-run Chinook salmon hold in deep pools and under cover until the onset of spawning. They may spawn near their holding areas or move upstream into smaller tributaries. Spawning generally occurs from late July through September and typically peaks in late August, although the peak varies among tributaries. Spring-run Chinook salmon eggs hatch in late winter and the fry emerge from the gravel in April and May. Most juveniles rear in tributary headwater streams for 1 year before migrating to the ocean, typically during the months of April, May, and June. Spring-run Chinook salmon use the mainstem Columbia River primarily as a migration corridor, and as a result, they spend little time rearing in Wells reservoir.

The primary spawning areas for Methow spring-run Chinook salmon are the mainstem Methow River upstream of the Chewuch River confluence, the Twisp, Chewuch and Lost rivers, and Thirtymile and Lake creeks. Spawning is observed occasionally in the non-project Methow Hatchery outfall, but it is likely that the fish spawning here are of hatchery origin. A limited amount of spawning has also been reported in Early Winters, Wolf, and Gold creeks. Documented spawning sites for spring-run Chinook salmon in the Methow drainage are located more than 40 miles upstream from Wells reservoir. Although spring-run Chinook salmon have been extirpated from the Okanogan River, the Colville Tribes are working to reintroduce them to the subbasin (NMFS, 2007).

Upper Columbia River Steelhead

NMFS considers all summer-run steelhead returning to tributary streams upstream of the confluence of the Yakima River and the Columbia River at RM 333 as belonging to the UCR steelhead DPS. UCR steelhead are listed as threatened under the ESA.

Steelhead are an anadromous form of rainbow trout that spawn in tributaries and migrate downstream as juveniles through the Columbia River to the Pacific Ocean. Adult steelhead rear for 1 to 2 years in the ocean before returning to the Columbia River from March through October. Returning adults typically pass Wells dam from June through October. Between 2000 and 2009, the number of adult steelhead migrating upstream past Wells dam annually has averaged 15,889 adults and ranged from 8,067 adults in 2000 to 34,370 adults in 2009 (table 13). Spawning does not occur until the following spring. Unlike other anadromous salmonids, some steelhead adults (kelts) return to the ocean after spawning and may spawn more than once during their lifetime; however, repeat spawners in the mid-Columbia River region represent only 2.1 percent of the population (Brown, 1995, as cited in Douglas PUD, 2010).

Steelhead eggs incubate from late March through June, and fry emerge from the gravel from late spring to August. Generally, juveniles rear in tributaries for 2 to

3 years (range from 1 to 7 years) before migrating downstream as smolts. Fry and smolts disperse downstream past Wells dam in late April through June. Although steelhead typically feed during their seaward migration, mid-Columbia reservoirs, such as Wells, serve primarily as migration corridors rather than as rearing habitat (Chapman et al., 1994a, as cited in Douglas PUD, 2010). Some steelhead are thought to residualize and live their entire lives in freshwater.

The majority of naturally and hatchery-produced steelhead in the Wells Project area spawn in the Methow River watershed, with a small population spawning and rearing in the Okanogan River watershed. Steelhead use spawning habitat in the mainstem Methow River and 11 of its tributaries located in the mid and upper reaches of the drainage (NMFS, 2002).

Upper Columbia River Summer/Fall-Run Chinook Salmon

The UCR summer/fall-run Chinook salmon ESU includes all naturally-spawned summer and fall Chinook salmon populations found in the Columbia River and its tributaries from the confluence of the Snake and Columbia rivers at RM 325 upstream to Chief Joseph dam. On March 9, 1998, NMFS determined that UCR summer/fall-run Chinook salmon did not warrant listing under the ESA.

UCR summer/fall-run Chinook salmon spawn in the Okanogan River downstream of Osoyoos Lake and in the Similkameen, Methow, Wenatchee, and Entiat rivers during late September through November, with peak activity in October (NMFS, 2002). Hatcheries that raise and release summer/fall-run Chinook salmon include the Wells, Eastbank, Turtle Rock, and Priest Rapids hatcheries. These programs release fish into the Okanogan, Similkameen, Methow, Wenatchee, and mainstem Columbia rivers. The Colville Tribes have received approval for a new hatchery near Chief Joseph dam (Chief Joseph Hatchery) that will produce summer/fall-run Chinook salmon intended to enhance populations in the Okanogan and Columbia rivers (NWPPC, 2009).

Most adult summer/fall-run Chinook salmon enter the Columbia River from late May to early September and pass the mid-Columbia River dams from late June through October, after spending 3 or 4 years in the ocean (Chapman et al., 1994b, as cited in Douglas PUD, 2010). Summer/fall-run Chinook salmon pass Wells dam between June 29 and mid-November. Between the years of 2000 and 2009 the number of adult summer/fall-run Chinook salmon migrating past Wells dam annually averaged 37,787 individuals and ranged from 13,573 adults in 2000 to 69,479 adults in 2002 (table 13).

Naturally produced juvenile summer/fall-run Chinook salmon emerge from the gravel in April and May and move downstream within a few days to a few weeks (Chapman et al., 1994b, as cited in Douglas PUD, 2010). Summer/fall-run Chinook salmon generally exhibit an ocean-type life history, emigrating to the marine environment as age-0 subyearlings in late summer and early fall months, passing mid-Columbia River dams between June and August (Chapman et al., 1994b, as cited in Douglas PUD, 2010). Summer/fall-run Chinook salmon leave the Methow and

Okanogan rivers in summer (Snow et al., 2008, as cited in Douglas PUD, 2010). These fish may rear in the mainstem Columbia River for extended periods (Chapman et al. 1994b, as cited in Douglas PUD, 2010).

Coho Salmon

Historically, coho salmon were distributed throughout the Columbia and Snake River basins. By the early 1900s, populations of mid-Columbia River coho salmon were extirpated. Prior to 1910, irrigation, livestock grazing, and mining were major contributors to the decline of coho salmon; later, timber harvest, fire management, and irrigation impacts were the major causes of coho salmon stock decline. Within the Wells Project area, the Methow River drainage once supported a large population of coho salmon, but indigenous coho salmon were extirpated upstream from Rock Island dam by the mid-1940s.

Because coho salmon stocks were locally extirpated early in the 1900s, most mid-Columbia River coho salmon life history information is derived from affidavits from older residents. These accounts indicate that coho salmon likely returned to mid-Columbia River tributaries in September, October, and November, consistent with the timing of hatchery coho salmon that have been reintroduced to the mid-Columbia Basin in recent years. In the lower Columbia River tributaries, the majority of coho salmon spawn from October to mid-December. Juveniles typically spend 1 year in freshwater before outmigrating as yearling smolts in April and May (Snow et al., 2008, as cited in Douglas PUD, 2010). Coho salmon typically spend about 18 months at sea before returning to spawn.

Efforts are currently underway to reintroduce coho salmon to the Methow River Basin. Between 2000 and 2009, the number of coho salmon adults migrating past Wells dam annually has averaged 861, ranging from zero in 2000 to 3,014 in 2009 (table 13).

Okanogan River Sockeye Salmon

The Okanogan River Sockeye Salmon ESU includes all naturally-reproducing sockeye salmon that spawn in, upstream, or downstream of Osoyoos Lake, or in the Similkameen River (a tributary of the Okanogan River). Spawning and primary rearing habitat of this ESU is located in British Columbia, while the migration corridor for both juveniles and adults includes Wells reservoir. This population is genetically distinct from Lake Wenatchee sockeye salmon populations as determined by both spatial distribution and genetic differences. On March 10, 1998, NMFS determined that Okanogan River sockeye salmon did not warranted listing under the ESA.

Adult sockeye salmon begin entering the Columbia River in May and pass the mid-Columbia River dams between late May and mid-August with the majority of the fish passing Wells dam during July. Between 2000 and 2009, the number of adult sockeye salmon migrating past Wells dam annually has averaged 65,223, ranging from 10,586 in 2002 to 165,334 in 2008 (table 13).

The timing of the adult sockeye salmon migration to Osoyoos Lake is affected by temperatures in the Okanogan River. Once these fish reach Osoyoos Lake, the adults hold in the north basin of the lake until spawning, which generally occurs from late September to early November. Sockeye fry emerge in March and April and move into Osoyoos Lake to rear for 1 to 3 years before migrating downstream to the ocean. Sockeye smolts typically pass Wells dam between mid-April and late May during their outmigration (Chapman et al., 1995, as cited in Douglas PUD, 2010).

Anadromous Fish Hatcheries

Douglas PUD owns and funds the operation of two hatchery facilities operated by Washington DFW. Construction of the project's Wells Hatchery was completed in 1967 and the non-project Methow Hatchery was completed in 1992. Both hatcheries are currently operated under the terms of the Wells HCP.

The hatcheries are operated to provide compensation for both inundation and for passage losses according to the terms of the Wells HCP. Inundation compensation targets specified in the Wells HCP require the production of 300,000 yearling steelhead, 320,000 yearling summer Chinook salmon and 484,000 subyearling summer Chinook salmon. Current passage loss targets require the production of 47,571 yearling steelhead; 105,714 yearling summer/fall-run Chinook salmon; and 59,464 yearling spring-run Chinook salmon (Anchor QEA and Douglas PUD, 2010).

The Wells Hatchery is located adjacent to Wells dam on the west tailrace embankment (figure 5). The hatchery produces summer Chinook salmon, summer steelhead and rainbow trout. The Wells Hatchery consists of a 6,100-foot-long channel with portions of the channel modified to hold adults and juveniles, numerous above-ground and in-ground raceways, four large earthen rearing ponds, a centralized incubation, early rearing, cold storage and administration building, a vehicle storage building, a steelhead spawning building and a separate set of residences for hatchery personnel.

The hatchery's four earthen rearing ponds vary in size and purpose. Pond 1 is used for rearing yearling summer Chinook salmon and is connected to the main hatchery outfall channel via a gate and outlet structure. When acclimated and ready for release, the juvenile summer Chinook salmon are allowed access to the main hatchery outfall channel and are volitionally released into the Columbia River below Wells dam. Pond 2 is the largest pond and has historically been used to raise yearling summer steelhead. Ponds 3 and 4 are used each year for the rearing of yearling summer steelhead. All of the earthen steelhead rearing ponds have volitional collection and transportation facilities located downstream of their outlet structures. Summer steelhead raised at the Wells Hatchery are either transported and released by truck or acclimated in the Methow and Okanogan rivers.

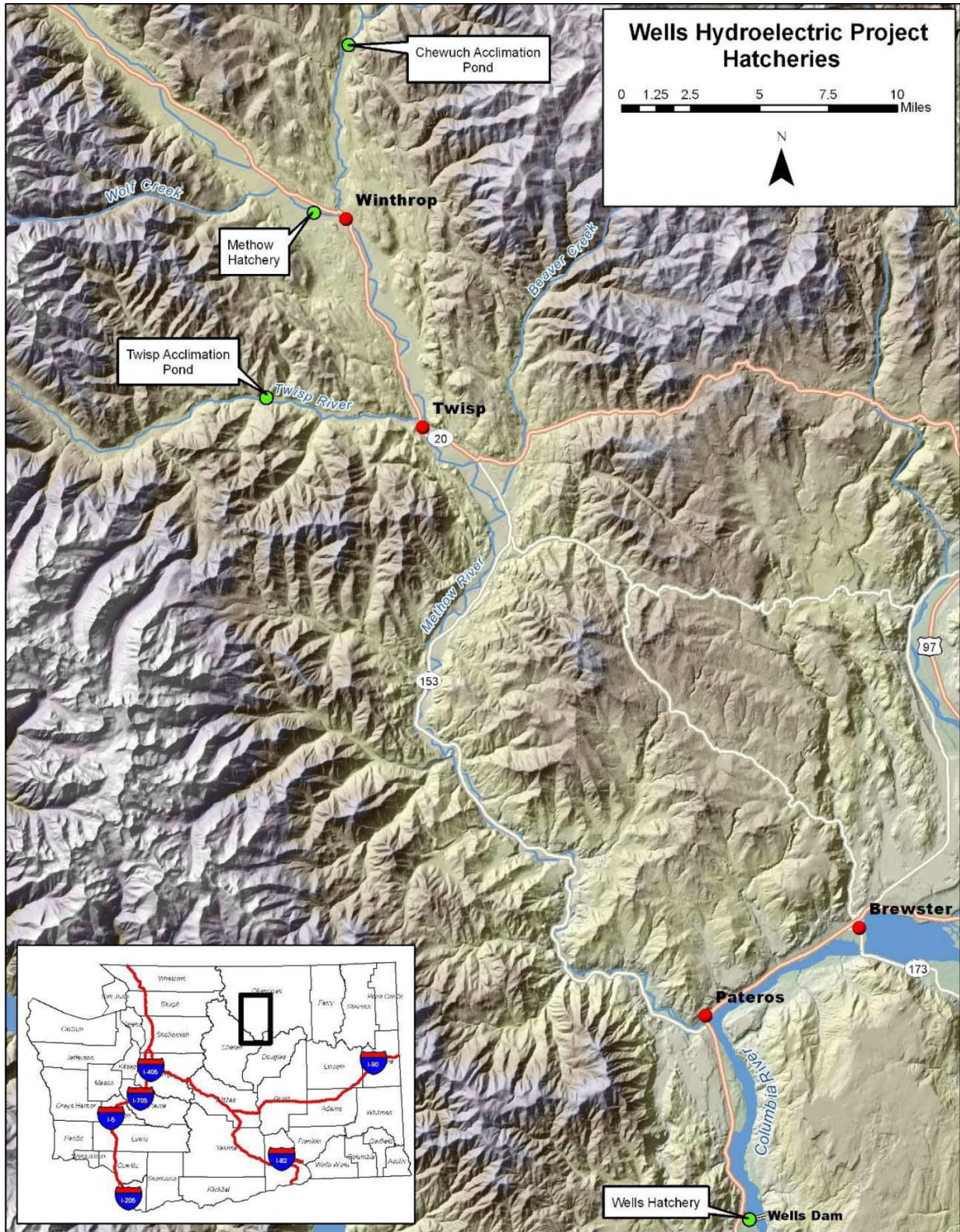


Figure 5. Map of locations of Douglas PUD’s fish hatcheries and acclimation ponds (Source: Patterson, 2010).

The Methow Hatchery is located about 50 miles upstream of the mouth of the Methow River near the town of Winthrop, Washington (figure 5). The hatchery annually produces up to 550,000 yearling spring-run Chinook salmon smolts as mitigation for passage losses at up to five mid-Columbia dams. Current production consists of 59,464 smolts for 3.7 percent unavoidable losses at Wells dam, 288,000 smolts for 7 percent unavoidable losses at Chelan PUD's Rocky Reach and Rock Island dams, and 201,000 smolts for 7 percent unavoidable losses at Grant PUD's Priest Rapids and Wanapum dams. The smolt releases currently occur via acclimation facilities on the Twisp River, Chewuch River, and at the Methow Hatchery according to guidelines established in the Wells HCP.

The Methow Hatchery consists of 12 covered production raceways, 3 covered adult raceways, a centralized incubation, early rearing, administrative and hatchery maintenance building, 1 onsite acclimation pond, 2 satellite acclimation ponds and a separate set of residences for hatchery personnel.

All 12 of the production raceways and the on-site Methow acclimation pond are equipped with an outlet channel to the Methow River for releasing juvenile spring-run Chinook salmon directly from the hatchery into the Methow River. The Twisp Acclimation Pond is located at RM 11 on the Twisp River, and the Chewuch Acclimation Pond is located at RM 7 on the Chewuch River (figure 5).

Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*, formerly *Lampetra tridentata*)²⁶ is a native anadromous species found in the mainstem Columbia River and its tributaries during their migration and juvenile freshwater life stages. Native Americans have historically harvested them for subsistence, ceremonial, and medicinal purposes (Close et al., 2002). Little specific information is available regarding the life history or status of Pacific lamprey in the mid-Columbia River watersheds. However, they are known to occur in the Methow, Wenatchee, and Entiat rivers (NMFS, 2002) and recently have been captured during juvenile salmon and steelhead trapping operations in the Okanogan River.

In general, adult Pacific lamprey are parasitic on fish in the Pacific Ocean while ammocoetes (larvae) are filter feeders that inhabit the fine silt deposits in backwaters and quiet eddies of streams (Wydoski and Whitney, 2003). Adults require access to suitable spawning habitat and generally spawn in low-gradient stream reaches in the tail

²⁶ Pacific lamprey is a parasitic eel-like species that has no true jaw, bones, or fins. They are anadromous, meaning they are born in fresh water streams then migrate to the ocean and return to freshwater streams to spawn. Like salmon, Pacific lamprey do not feed during the spawning migration. Instead they live off fat reserves in their body.

areas of pools and in riffles, over gravel substrates (Jackson et al., 1997). Adults die after spawning. After hatching, the ammocoetes burrow into soft substrate (silt and sand) for an extended larval period, filtering particulate matter from the water column (Meeuwig et al., 2002). The ammocoetes undergo a metamorphosis into macrophthalmia (outmigrating juvenile lamprey), between 3 and 7 years after hatching (NMFS, 2002). Within the Wells Project area, juvenile lampreys initiate migration from their natal streams to the Pacific Ocean from April to June (LGL and Douglas PUD, 2008a).

The number of lamprey passing Wells dam annually from 2000 through 2007 has averaged 386 fish and ranged from 21 in 2006 to 1,410 in 2003 (table 14). In all years since counting was initiated, Pacific lamprey counts at the east fish ladder were greater than at the west fish ladder. It is important to note that historically, counting protocols were designed to assess adult salmonids and did not necessarily conform to lamprey migration behavior. Traditional counting times for salmon did not coincide with lamprey passage activity, which occurs primarily at night; the erratic swimming behavior of adult lamprey also makes them inherently difficult to count. Furthermore, lamprey overwinter in freshwater prior to spawning. Consequently, lamprey counted in one year may actually have entered the system in the previous year, confounding the assessment of annual returns to the Columbia River Basin.

Table 14. Pacific lamprey counts at Columbia River mainstem dams, by dam and year, 1997–2007 (Source: Douglas PUD, 2010).

Year	Bonneville	The Dalles	John Day	McNary	Priest Rapids	Rock Island	Rocky Reach	Wells
2000	19,002	8,050	5,844	1,281	Data unavailable	822	767	155
2001	27,947	9,061	4,005	2,539	1,624	1,460	805	262
2002	100,476	23,417	26,821	11,282	4,007	4,878	1,842	342
2003	117,035	28,995	20,922	13,325	4,340	5,000	2,521	1,410
2004	61,780	14,873	11,663	5,888	2,647	2,362	1,043	647
2005	26,667	8,361	8,312	4,158	2,598	2,267	404	214
2006	38,941	6,894	9,600	2,459	4,383	1,326	370	21
2007	19,304	6,083	5,753	3,454	6,593	1,300	696	35
Average	51,394	13,217	11,615	5,548	3,742	2,427	1,056	386

On average, lamprey observations at Wells dam begin on June 12, although this date is highly variable among years (standard deviation [SD] \pm 36 days). Counts start as early as April 28 or as late as August 12. The average mid-point of the migration period is September 8 (SD \pm 13 days). Likewise, on average 75 percent of the run will pass by

September 24 ($SD \pm 15$ days). On average, the last lamprey to pass Wells Dam will do so by October 22 ($SD \pm 21$ days), ranging from 23 in September (2007) to 15 in November (2003). Based on this information, the bulk of the Pacific lamprey migration occurs between the last calendar week in August and the third week in September.

A majority of the mainstem mid-Columbia River is characterized by a series of reservoirs, and it is likely that returning adult lamprey use Wells reservoir primarily for overwintering and as a migratory corridor leading to tributary streams outside of the Wells Project boundary where habitat conditions are more suitable for spawning.

The abundance and distribution of Pacific lamprey has significantly declined throughout its range over the past three decades (FWS, 2010) and their abundance in the Columbia River has been highly variable in recent years (LGL and Douglas PUD, 2008a) (table 14). The magnitude of the decline is difficult to determine. Historical dam counts for adult lamprey are not widely available and are affected by different counting methods and frequency of counting. Another primary reason for uncertainty regarding dam counts is the behavioral tendency for lamprey to avoid viewing windows during their upstream passage. Because of these factors, all dam count data are likely to be biased low. A combination of factors is associated with this decline, including poor habitat conditions, fish poisoning operations, water pollution, dam passage problems, ocean conditions, and food availability (Close et al., 1995).

Adult Pacific lamprey passage and behavior studies were conducted at Wells dam in 2007 and 2008 (LGL and Douglas PUD, 2008a; Robichaud et al., 2009). The goal of these studies was to evaluate the effect of the Wells Project and its operations on adult Pacific lamprey upstream migration and behavior as it relates to fishway passage, timing, and downstream passage events (drop back) past the dam. Results of these studies suggest that, similar to observations at other Columbia River dams, lamprey are having difficulty negotiating the fishway entrances because approach velocities exceed the swimming capabilities of many adult Pacific lamprey. In addition, lamprey appear to be largely bypassing the adult counting windows. However, once lamprey enter the Wells dam fishway, they are passing the fishway at high rates, in a reasonable amount of time, and with negligible drop back within the ladder.

In 1994, FWS designated Pacific lamprey as a Category 2 candidate species under the ESA. The Northwest Power and Conservation Council's 1995 status report (Close et al., 1995) evaluated the apparent decline of Pacific lamprey and identified several research needs. In 2003, 11 environmental groups petitioned FWS to list the species as threatened, but in 2004, FWS found that the petition did not present enough information to warrant further review. Since that time, the Columbia River Treaty Tribes have repeatedly voiced concern about the decline of Pacific lamprey, a culturally important species (Nez Perce, Umatilla, Yakama and Warm Springs Tribes, 2008). Although the Pacific lamprey is no longer considered a candidate species and has not been listed, several federal and state agencies, tribes, and utilities are involved in research and conservation efforts.

Resident Fish Species

The resident fish assemblage present in Wells reservoir is composed of a diverse community of native and introduced and warm and coldwater fish species. Since the construction of Wells dam, several assessments have either directly or indirectly studied the resident fish assemblage in Wells reservoir.

In a study designed to assess the occurrence of gas bubble disease on fish species in the mid-Columbia River, Dell et al. (1975, as cited in Douglas PUD, 2010) found that northern pikeminnow, threespine stickleback, and suckers were the most abundant resident fish species present in Wells reservoir (table 15). Dell et al. (1975, as cited in Douglas PUD, 2010) also observed that mountain whitefish and pumpkinseed sunfish were the most abundant resident game fish, although these two species accounted for less than two percent of the total sample (32,289 fish). Overall, 27 species of resident and migratory fish were identified in the study area (table 15).

McGee (1979, as cited in Douglas PUD, 2010) found that chiselmouth, red-sided shiners, and largescale suckers were the most abundant non-game fish captured during sampling in Wells reservoir, while pumpkinseed sunfish was the most abundant game fish. In total, 2,480 fish were collected during the study using live traps, beach seines, and angling. Twenty of the 27 known species previously trapped in other mid-Columbia reservoirs were present in Wells reservoir (Dell et al., 1975, as cited in Douglas PUD, 2010).

In 1998, Douglas PUD conducted an updated Wells reservoir resident fish population assessment using a sampling design that was similar to the two previous fish population studies (Beak and Rensel, 1999, as cited in Douglas PUD, 2010). In total, 22 species of fish were observed or captured during sampling. Suckers were the most abundant resident species, representing 41 percent of the beach seine catch and 46 percent of the underwater dive survey count. Other abundant resident species observed in the beach seine catch included bluegill (32 percent), northern pikeminnow (10 percent), peamouth (6 percent), and carp (5 percent). Fifteen other species represented the remaining 7 percent of the total catch of 5,657 fish.

Both McGee (1979, as cited in Douglas PUD, 2010) and Beak and Rensel (1999, as cited in Douglas PUD, 2010) noted that in general, spiny ray species (centrarchids) were most abundant between RM 530 and 540 and in the lower Okanogan River. This unique area of Wells reservoir is shallow and broad with slower water velocities, finer substrate, relatively warmer water temperatures, and higher turbidity (Beak and Rensel, 1999). Both surveys also found that the more streamlined resident fish species, such as chiselmouth and red-sided shiner (cyprinids), were most abundant downstream of RM 530 where water velocities increased, turbidity decreased, and the amount of shallow littoral habitat decreased.

Table 15. Native and non-native resident fish species that have been documented in Wells reservoir from past resident fish assessments, monitoring efforts, and miscellaneous studies (Source: Douglas PUD, 2010).

Common Name	Scientific Name
Native Species	
White sturgeon	<i>Acipenser transmontanus</i>
Chiselmouth	<i>Acrochellius alutaceus</i>
Longnose sucker	<i>Catostomus catostomus</i>
Bridgelip sucker	<i>Catostomus columbianus</i>
Largescale sucker	<i>Catostomus macrocheilus</i>
Lake whitefish	<i>Coregonus clupeaformis</i>
Prickly sculpin	<i>Cottus asper</i>
Threespine stickleback	<i>Gasterosteus aculeatus</i>
Burbot	<i>Lota lota</i>
Peamouth	<i>Mylocheilus caurinus</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>
Mountain whitefish	<i>Prosopium williamsoni</i>
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>
Redsided shiner	<i>Richardsonius balteatus</i>
Dace	<i>Rhinichthys</i> spp.
Bull trout	<i>Salvelinus confluentus</i>
Non-Native Species	
Carp	<i>Cyprinus carpio</i>
Black bullhead	<i>Ictalurus melas</i>
Brown bullhead	<i>Ictalurus nebulosus</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Bluegill	<i>Lepomis macrochirus</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Largemouth bass	<i>Micropterus salmoides</i>
Yellow perch	<i>Perca flavescens</i>
Black crappie	<i>Pomoxis nigromaculatus</i>

Common Name	Scientific Name
Walleye	<i>Stizostedion vitreum</i>
Tench	<i>Tinca tinca</i>

Note: spp. – species

Bull Trout

Bull trout (*Salvelinus confluentus*) are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and east to western Montana and Alberta (Cavender, 1978). They are generally found in interior drainages, but also occur on the Pacific Coast in Puget Sound and in the large drainages of British Columbia.

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre, 1993). Growth, survival, and long-term persistence depend on the availability of very cold water, complex instream habitat, stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity. Stream temperature and substrate type, in particular, are critical factors for the sustained long-term persistence of bull trout. Spawning is often associated with the coldest, cleanest, and most complex stream reaches within a basin. Bull trout may exhibit a patchy distribution, even in pristine habitats, and should not be expected to occupy all available habitats at the same time (Rieman and McIntyre, 1995; Rieman et al., 1997). Spawning is typically limited to water temperatures that are less than 48°F (9°C).

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. Adults spawn in headwater streams outside the Wells Project Boundary. Resident bull trout populations are generally found in small headwater streams where fish remain their entire lives. The majority of growth and maturation for adfluvial bull trout occurs in lakes or reservoirs, and in large river systems for fluvial bull trout. The fluvial, adfluvial, and resident forms exist throughout the range of bull trout (Rieman and McIntyre, 1993). These forms spend their entire life in freshwater. The anadromous life history form is currently only known to occur in the Coastal-Puget Sound region within the coterminous United States (Volk, 2000). To date, only adfluvial bull trout have been documented within Wells reservoir.

For migratory life history types, juveniles tend to rear in tributary streams for 1 to 4 years before migrating downstream into a larger river or lake to mature (Rieman and McIntyre, 1993). Juvenile and adult bull trout in streams frequently inhabit side channels, stream margins and pools with suitable cover, and areas with cold hyporheic zones or groundwater upwelling (Baxter and Hauer, 2000). The timing and extent of movements and spawning migrations varies substantially among populations of bull trout.

The conservation needs of the bull trout are often expressed as the need to provide the four “Cs”: cold, clean, complex, and connected habitat. Cold stream temperatures, clean water that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout at multiple scales ranging from the coterminous to local populations. The recovery planning process for bull trout (FWS, 2002) has also identified the following conservation needs for the species: (1) maintain and restore multiple, interconnected populations in diverse habitats across the range of each interim recovery unit; (2) preserve the diversity of life-history strategies; (3) maintain genetic and phenotypic diversity across the range of each interim recovery unit; and (4) establish a positive population trend.

Bull trout have been observed and counted during upstream passage at Wells dam since 1998. Upstream passage of bull trout is monitored in the Wells Project fish ladders from May 1 through November 15. However, in recent years, Douglas PUD has initiated an experimental winter count for bull trout (November 16 through April 30). To date, no bull trout have been observed in the fish ladders during the experimental winter monitoring period. From 1998 through 2008, an average of 68 bull trout were annually counted in the Wells dam fish ladders (table 16). On November 1, 1999, FWS listed bull trout within the coterminous United States as threatened under the ESA. On September 30, 2010, FWS designated critical habitat for bull trout. Within the Wells Project, 31 miles of the mainstem Columbia River downstream from Chief Joseph dam, and 1.5 miles of the Methow River are designated bull trout critical habitat.

Table 16. Summary of bull trout passage up adult fish ladders at three mid-Columbia projects (Source: Douglas PUD, 2010).

Project	Year											Total	Avg.
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008		
Rocky Reach	831	1,281	2,161	204	194	246	161	155	142	77	100	5,552	505
Rock Island	67	61	87	82	84	102	114	69	35	46	36	783	71
Wells	17	49	93	108	76	53	47	49	100	65	43	700	64

In April 2008, FWS completed its 5-year status review for Columbia River bull trout with two recommendations: maintain “threatened” status for the species, and determine if multiple DPSs exist within the Columbia River and if present, determine whether distinct populations merit specific protection under the ESA. The recommendations intend to facilitate analysis of project effects over more specific and biologically appropriate areas, ultimately allowing a greater focus of regulatory protection and recovery resources (FWS, 2008).

The Wells Project is located within the Upper Columbia River Recovery Unit, and FWS has identified the Wenatchee, Entiat, and Methow rivers as its core areas. A core area represents the closest approximation of a biologically functioning unit for bull trout.

Two sets of studies provide the majority of information on the migratory behavior of bull trout within the Wells Project vicinity. The three mid-Columbia PUDs (Chelan, Grant, and Douglas PUDs) jointly conducted the first study to evaluate the movement and status of bull trout in their project areas (BioAnalysts, 2004). The goal of the study was to monitor the movements and migration patterns of adult bull trout in the mid-Columbia River using radio telemetry. From 2001 to 2003, bull trout were collected from the Wells, Rocky Reach, and Rock Island dams, radio-tagged, and monitored through 2004. Study activities included quantifying incidental take of migratory adult and sub-adult bull trout passing the Wells Project.

In total, 79 bull trout were tagged during the study with 19 bull trout tagged at Wells dam. Between 2001 and 2003, a total of 22 tagged bull trout were detected moving upstream through the ladders at Wells dam (BioAnalysts, 2004). Median travel times (tailrace detection to ladder exit detection) at Wells dam in 2001, 2002 and 2003 were 8.87, 7.60, and 1.16 days, respectively. Median ladder passage times (entrance detection to ladder exit detection) at Wells dam in 2001, 2002 and 2003 were 5.70, 0.23, and 0.16 days, respectively (BioAnalysts, 2004). Based on the results of this study, all adult bull trout migrating upstream of Wells dam appear to be destined for the Methow River, as no tagged bull trout were detected entering the Okanogan River. No injury or mortality of radio-tagged bull trout associated with passage past Wells dam or reservoir was observed during telemetry monitoring conducted in 2001, 2002, and 2003 (BioAnalysts, 2004).

Douglas PUD's second series of bull trout studies were conducted from 2005 through 2008 and were associated with the implementation of the Wells 2004 Bull Trout Monitoring and Management Plan. The goals of the 2004 Bull Trout Monitoring and Management Plan were to identify, develop, and implement measures to monitor and address potential Wells Project-related impacts on bull trout associated with the operations of the Wells Project and associated facilities (BioAnalysts, 2004). The 2004 Bull Trout Monitoring and Management Plan had four objectives, which were addressed by implementing various field studies from 2004 to 2008.

The first objective was to identify potential project-related effects on the upstream and downstream passage of adult bull trout (fish \geq 16 inches in length) at Wells dam and through Wells reservoir, and to implement appropriate measures to monitor any incidental take of adult bull trout. To meet this objective, radio telemetry was again used to monitor upstream and downstream passage, and off-season video counting was used to monitor passage in the Wells Project fishways during the winter. Between 2005 and 2008, 26 adult bull trout were trapped at Wells dam and radio-tagged. Concurrent with implementation of the 2004 Bull Trout Monitoring and

Management Plan, FWS and Chelan PUD radio-tagged and released 136 adult bull trout at other mid-Columbia River Basin locations including the Methow River, Rock Island, and Rocky Reach dams.

From 2005 to 2008, 25 downstream passage events and 52 upstream passage events by 40 bull trout were recorded at Wells dam. Of these, 17 downstream and 41 upstream passage events occurred within 1 year of tagging and release. Of all tagged bull trout released from 2001 to 2004, there were 2 downstream passage events and 41 upstream passage events. Of these, 2 downstream and 38 upstream passage events occurred within 1 year of release. The take estimates for the Wells Project were based upon the number of unique upstream and downstream passage events that took place within 1 year of each bull trout being tagged and released. During the 6-year study and 8 years of monitoring, 19 downstream and 79 upstream passage events were recorded at Wells dam within 1 year of release. Radio-tagged bull trout passed downstream through the turbines or spillways, as no downstream passage events were recorded via the fishways. Out of the 19 downstream passage events and 79 upstream passage events that occurred within 1 year of tagging, no bull trout injury or mortality was observed at the Wells Project (LGL and Douglas PUD, 2008b).

Upstream passage of adult bull trout through the fish ladders at Wells dam has historically occurred between early May and late October, with peak passage typically occurring in May and June. During the 2005 to 2008 study, 214 adult bull trout were counted passing upstream past Wells dam, and 52 (24 percent)²⁷ of these fish were radio tagged. Project operations did not appear to influence the movements of adult bull trout. Instead, adult bull trout passage events appeared to be more closely associated with water temperature, photoperiod, and time of year, with rather predictable patterns of upstream and downstream movement (LGL and Douglas PUD, 2008b). Because no take (injury or mortality) was observed during the study, there was no need to investigate how project operations affected take at Wells dam. During the 2005 to 2008 monitoring period, no adult bull trout were counted during the 24-hour off-season fishway counting period (November 16 to April 30). No upstream or downstream passage problems were identified during this study. Passage times upstream through the fishway appeared reasonable relative to the species migration and spawn timing. Because no passage problems were identified during the study, there was no need to develop recommendations to change or modify the fishway operations at Wells dam (LGL and Douglas PUD, 2008b).

The third objective of the Bull Trout Monitoring and Management Plan was to investigate the potential for sub-adult entrapment or stranding in off channel or backwater areas of Wells reservoir. Douglas PUD contracted with GeoEngineers in March 2005 to develop detailed bathymetric maps of the Wells Project. The maps were

²⁷ Includes bull trout that were radio tagged at other mid-Columbia River Basin locations, including the Methow River, Rock Island, and Rocky Reach dams.

produced at a 1-foot contour interval and were combined with Wells dam operational data to assess potential areas of bull trout entrapment or stranding. The analysis identified several locations where stranding or entrapment of bull trout could potentially occur, including the Methow River mouth, the Okanogan River mouth, the Kirk Islands, the shallow water habitat in the Columbia River directly across from the mouth of the Okanogan River, Schluneger Flats, and the off-channel areas of the Bridgeport Bar Islands.

On May 18, 2006, Douglas PUD field crews surveyed five reservoir sites during operational and environmental conditions that could potentially result in bull trout stranding or entrapment (LGL and Douglas PUD, 2008b). Boat and foot surveys were conducted and included a combination of shoreline transects and inspection of isolated sanctuary pools to visually identify entrapped or stranded bull trout. On November 5, 2008, an additional stranding survey was conducted at three of the five sites and one new site identified as having the highest probability of stranding during the 2006 study. No bull trout were observed during any of the stranding surveys.

The fourth objective of the Bull Trout Monitoring and Management Plan was to identify the core areas and local populations of bull trout that use the Wells Project. Douglas PUD funded the collection of genetic samples from 22, 20, and 24 bull trout in 2005, 2006 and 2007, respectively (LGL and Douglas PUD, 2008b). In 2005, six samples were collected at Wells dam and 16 were collected at off-project operations (Methow and Twisp River screw traps). In 2006, 10 samples were collected at Wells dam and 10 samples were collected at off-project operations. In 2007, 10 samples were collected at Wells dam and 14 samples were collected at off-project operations. All genetic samples were provided to FWS for analysis.

The majority of radio-tagged bull trout movements from the Wells dam were to the Methow River and associated tributaries (e.g., Twisp River) located upstream of Wells dam; only four detections (12 percent of 34 total detections) were of movement into the Entiat River, located downstream of Wells dam (LGL and Douglas PUD 2008b). Most of the radio-tagged bull trout passed Wells dam during the months of May and June (BioAnalysts, 2004). Adults generally exited presumed spawning locations in the Methow by late October; however, some bull trout were observed returning to Wells reservoir as late as mid-December. Bull trout did not select the Okanogan River in either telemetry study (one individual entered the Okanogan for a short period before leaving to enter the Methow River).

White Sturgeon

The white sturgeon (*Acipenser transmontanus*) is a Washington State priority species with recreational, commercial, and tribal importance. It is a long-lived, primitive fish species that forages primarily along the bottom of large river systems in the Pacific Northwest. The white sturgeon is amphidromous, having a facultative ability to move between salt and freshwater to take advantage of favorable foraging

conditions. In undammed systems, white sturgeon freely migrate downstream to feed in the rich estuary or marine areas before migrating back upstream to spawn. However, white sturgeon do not readily pass through most fish ladders, and it is suspected that the construction of dams on the Columbia River has resulted in the fragmentation of the white sturgeon population into a number of small populations, which may or may not be isolated.

Current white sturgeon populations in the Columbia River Basin can be divided into three groups: fish below Bonneville dam, with access to the ocean; fish isolated functionally, but not genetically, between the dams; and fish in several large tributaries. However, the population dynamics and factors regulating production of white sturgeon within isolated populations in the mid-Columbia River reservoirs such as the Rocky Reach and Wells reservoirs are not well understood.

While white sturgeon are not a federally listed or state-listed species, Washington DFW closed fishing for white sturgeon in the upper Columbia River above Chief Joseph dam in 2002. There is no legal harvest of sturgeon in the mid-Columbia River from Priest Rapids dam upstream to Chief Joseph dam; however, it is a year-round catch-and-release fishery. Male sturgeon may mature at 10 to 12 years of age, while females may not mature until 15 to 32 years of age. Spawning occurs between February and July, depending on water temperature; most spawning occurs when water temperatures are 50° to 63°F (10° to 17°C) (PSMFC, 1992). Sturgeon spawn in swift currents (2 to 9 feet per second) over cobble, boulder, and bedrock substrates (Parsley and Beckman, 1994), similar to those occurring in the tailrace areas throughout the mid-Columbia River. Eggs and sperm are broadcast in fast-moving water, allowing the adhesive eggs to disperse before settling to the bottom. Incubation occurs in 7 to 14 days, depending on water temperature. The hatched larvae are planktonic and drift downstream. Sturgeon are opportunistic feeders that prey on benthic organisms as juveniles, and a variety of benthic-oriented prey as adults (including fish).

To gather additional information on white sturgeon populations in Wells reservoir, Douglas PUD completed a white sturgeon population assessment and behavior study during 2001, 2002, and 2003 (Jerald, 2007). The study used setlines for the collection and tagging of sturgeon greater than 20 inches in total length. Fish captured on setlines were measured and marked with PIT tags and with scute markings. Some of the fish were also radio-tagged and had pectoral fin rays removed for age analysis. Setline sampling took place over a two-year timeframe with a total of 129 setlines deployed and retrieved from throughout Wells reservoir.

During the study, 13 white sturgeon were captured, with the majority captured in the Columbia River within 5 miles of the mouth of the Okanogan River (Jerald, 2007). Results of the two-year mark-recapture portion of the study indicated that the sturgeon population in Wells reservoir is small with a population estimate that ranged from 13 to 217 adult fish with a point estimate of 31 fish over 20 inches in length (Skalski and Townsend, 2005, as cited in Douglas PUD, 2010). The length of the fish captured and

tagged ranged from 24 to 80 inches. Of the 11 fish whose age could be determined, all were between 6 and 30 years of age, indicating that these fish recruited to Wells reservoir after Wells dam was completed in 1967, with the strongest year-class recruitment between the years 1972 to 1978 and again from 1988 to 1996.

Radio-tags were applied to 6 of the 13 sturgeon captured during 2001 and 2002. Telemetry results indicate that all of these fish remained in the reach between Brewster (approximately 14 miles above Wells dam) and Park Island (approximately 23 miles above the dam). Of the five mature sturgeon that were radio-tagged, one made an upstream migration into the Okanogan River during the spring of 2002 and two made migrations into the Okanogan River during 2003 (Jerald, 2007).

The presence of sub-adult and adult white sturgeon younger than the project suggests that successful rearing does take place within Wells reservoir. It is unknown whether the white sturgeon population in Wells reservoir is a result of natural recruitment by the existing adult population or from immigration of juveniles outside of the Wells Project area. If spawning is occurring in Wells reservoir, it is likely taking place in the tailrace of Chief Joseph dam.

Northern Pikeminnow

Northern pikeminnow (*Ptychocheilus oregonensis*) is one of the largest native minnows (family Cyprinidae) in North America. Individuals from the Columbia River Basin are reported to grow as large as 24 inches and weigh as much as 8 pounds. The species is distributed throughout the Pacific drainages of North America from the Nass River in British Columbia, Canada to the Harney River Basin in Oregon, and eastward over to the Columbia River to Nevada (Page and Burr, 1991).

The northern pikeminnow is typically a lake and reservoir species, preferring still waters to swift flowing streams and rivers (Scott and Crossman, 1973). Spawning occurs from April to July depending of geographic location. Spawning northern pikeminnow tend to gather in large numbers, but no nest is built. Typically, the males greatly outnumber the females. During spawning, the female swims along the edges of large groups of males until a male or multiple males break off and follow the female. Eggs and sperm are released in the water column; fertilized eggs, which are adhesive and demersal, settle and adhere to the gravel-cobble substrate (Scott and Crossman, 1973). Fertilized eggs hatch in about 1 week and the young fish swim freely about 2 weeks after hatching. Juvenile northern pikeminnow spend their first year in the shallow shoreline margins. As the fish reach 1 year of age they begin to move slightly offshore, continuing in groups but expanding habitats to include deeper waters, pools, and sloughs. In summer, northern pikeminnow occupy the shallows or move to the surface in the pelagic zone of the lake or reservoir where water temperatures are similar to those in nearshore areas. In winter, northern pikeminnow are typically found in deeper water (Wydoski and Whitney, 1979).

Northern pikeminnow are slow growing and long lived. Life expectancy for the species is 15 to 20 years (McPhail and Lindsey, 1970). Northern pikeminnow are opportunistic feeders, consuming a wide variety of prey depending upon availability. Young northern pikeminnow (4 to 10 inches in length) are known to consume fish eggs and larvae, aquatic plants, terrestrial insects, and aquatic invertebrates (primarily insects and crustaceans). Fish become an increasingly important dietary component when pikeminnow reach and exceed 12 inches in length. Sculpins are probably the most common prey item, but northern pikeminnow also prey on juvenile salmonids when available. Losses of juvenile anadromous salmonids can be significant in severely altered habitats such as near hydroelectric dams in the Columbia River Basin. Dams concentrate, disorient, and injure outmigrating juvenile salmonids, making them more vulnerable to northern pikeminnow and other predators.

Throughout their range, populations of northern pikeminnow are managed mainly as game fish predators, and as such, management is focused on reduction of the species. Many studies have been done relating to this goal, covering chemical eradication, ecosystem manipulation, and dynamite control of pikeminnow populations (Scott and Crossman, 1973). Agencies and hydropower operators in the Columbia River Basin have implemented a program for system-wide predator control that includes bounty programs for northern pikeminnow in order to control the predation on salmonids.

Dell et al. (1975, as cited in Douglas PUD, 2010) observed that the most abundant resident fish species in Wells reservoir were northern pikeminnow. However, in 1998, Douglas PUD conducted an updated Wells reservoir resident fish assessment (Beak and Rensel, 1999, as cited in Douglas PUD, 2010). In this study, 22 species of fish were identified with 5,657 fish captured using beach seines and 716 fish observed via diving transects. Northern pikeminnow consisted of 10 percent of the total catch.

3.3.1.2 Environmental Effects

Water Quality Management Plan

Douglas PUD and the parties to the Aquatic Settlement propose to implement a Water Quality Management Plan to help ensure that the project remains in compliance with the water quality standards for the term of any new license issued for the project. Objectives of the Water Quality Management Plan are as follows:

Objective 1: Maintain compliance with state water quality standards for TDG. If non-compliance is observed, the Aquatic SWG would identify reasonable and feasible measures, which would be implemented by Douglas PUD.

Objective 2: Maintain compliance with state water quality standards for water temperature. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG would identify reasonable and feasible measures, which would be implemented by Douglas PUD.

Objective 3: Maintain compliance with state water quality standards for other numeric criteria. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG would identify reasonable and feasible measures, which would be implemented by Douglas PUD. Also, Douglas PUD would demonstrate whether it is in compliance with turbidity on the Okanogan River, and if not in compliance, Douglas PUD would work with the Aquatic SWG to identify appropriate implementation measures.

Objective 4: Operate the project in a manner that would avoid, or where not feasible to avoid, minimize spill of hazardous materials and implement effective countermeasures in the event of a hazardous materials spill.

Objective 5: Participate in regional forums tasked with improving water quality conditions and protecting designated uses in the Columbia River Basin.

Specifically, Douglas PUD, in consultation with the Aquatic SWG, would implement the following measures under the Water Quality Management Plan:

Total Dissolved Gas Measures

- Continue to maintain fixed monitoring stations in the forebay and tailrace area of Wells dam to monitor TDG and barometric pressure during the juvenile fish passage season, consistent with activities described in the current GAP, and provide an annual report of all spill occurring outside the juvenile fish passage season and predicted TDG levels in the tailrace.
- Coordinate the annual project Wells HCP Project Fish Bypass/Spill Operations Plan with the Aquatic SWG and the GAP, using best available information to minimize the production of TDG during periods of spill. All operations identified within the annual plan would require the approval of the Wells HCP Coordinating Committee and the Aquatic SWG in order to ensure that spill operations are aimed at protecting designated uses and complying with numeric criteria for TDG. In consultation with the Wells HCP Coordinating Committee and Aquatic SWG, the Wells HCP Project Fish Bypass/Spill Operations Plan would be reviewed and updated, as necessary.
- Pending Washington DOE's approval of each subsequent GAP, Douglas PUD would continue to implement the activities identified within the previously-approved plan. Douglas PUD would submit the GAP to Washington DOE by February 28 of each year, or on a less frequent basis, if agreed to by Washington DOE as documented by Washington DOE in writing. Douglas PUD would submit the GAPs, including Wells HCP Project

Fish Bypass/Spill Operations Plan and fisheries management²⁸ and biological monitoring plans, through the term of the new license or until no longer required by Washington DOE. Douglas PUD would provide an annual TDG report as required by the Washington DOE-approved GAP.

- Douglas PUD would report all occurrences of non-compliance with TDG numeric criteria immediately to Washington DOE for regulatory discretion and to the Aquatic SWG for consideration.
- If the project is found to be consistently out of compliance with TDG at any time during the new license term, Douglas PUD would, in coordination with the Aquatic SWG, evaluate any new reasonable and feasible technologies that have been developed; and after the evaluation, if no new reasonable and feasible improvements have been identified, propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

Temperature Measures

- Douglas PUD would continue to monitor temperature at the Wells forebay and tailrace in conjunction with its TDG monitoring program (currently April 1-September 15). Temperature data from the TDG monitoring program would be recorded hourly and reported daily to regional databases. Water temperatures would also be monitored at all boundary conditions of the project (Methow River RM 1.5, Okanogan River RM 10.5, and Columbia River RM 544.5) and in the Wells forebay and tailrace as required by the Aquatic SWG.
- Douglas PUD would continue to collect hourly fish ladder temperatures 24 hours a day during the fish passage season (May 1 to November 15) at Pool 39 on the east ladder. Water temperatures would also be monitored hourly in the auxiliary water supply system and near the east shore of the Wells forebay (bottom, middle, and surface depths) during this same time period.
- Douglas PUD would participate in EPA Region 10's water temperature TMDL development for the U.S. portion of the Columbia River, in coordination with the Aquatic SWG. Temperature data from the monitoring program at Wells dam and software and results of the CE-QUAL-W2 model would be made available to EPA and other entities to assist in the development of the Columbia River temperature TMDL.

²⁸ Douglas PUD expects that the Wells HCP and Aquatic Resource Management Plans in the Aquatic Settlement with respect to fish passage will be adequate for fish management plans, for the purposes of the 401 Water Quality Attainment Plan.

- Where the measures identified in the TMDL are more protective than other measures in this plan, provisions of the temperature TMDL and implementation plans relevant to the project and its operations, including specified time frames for implementing improvement measures, would be implemented at the project.
- If a TMDL is not timely approved by EPA, Washington DOE may establish an allocation. In this case, Washington DOE would work with the Aquatic SWG and other interested parties to identify reasonable and feasible measures.
- Douglas PUD would report information indicative of non-compliance with water temperature immediately to Washington DOE for regulatory discretion and to the Aquatic SWG for consideration.
- If the project is found to be consistently out of compliance with water temperature at any time during the new license term, Douglas PUD would, in coordination with the Aquatic SWG, evaluate alternative project operations or any new reasonable and feasible technologies that have been developed; and if no new reasonable and feasible improvements have been identified, propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

Other Numeric Criteria

- Douglas PUD would report information indicative of non-compliance with other numeric criteria immediately to Washington DOE for regulatory discretion and to the Aquatic SWG for consideration. This includes existing or developed criteria for toxic substances in water or sediments within the project boundary. The Aquatic SWG would evaluate the information, and, if needed, require Douglas PUD to develop a plan to identify and address project-related impacts, if any. If no reasonable and feasible improvements have been identified, Douglas PUD may propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

Spill Prevention and Control

- Douglas PUD would operate the project in a manner that minimizes spill of hazardous materials and implement effective countermeasures in the event of a hazardous materials spill. The project SPCC Plan (Jacobs, 2007) would be updated pursuant to FERC requirements and recommendations provided by Washington DOE. Douglas PUD would comply with the updated version(s) of the SPCC Plan.

- Douglas PUD would continue participation in the CSR-SRI. The CSR-SRI is a collaborative effort made up of local, state, and federal oil spill response community as well as members of industry and was developed to address the immediate need for oil spill preparedness and response in the area along the Columbia and Snake rivers. In addition to participation in the CSR-SRI, Douglas PUD would continue to operate the project in accordance with its SPCC Plan.
- For the term or the new license, Douglas PUD would, upon reasonable notice, allow Washington DOE staff or representatives access to inspect the project, including inside the dam, for the purpose of assessing SPCC Plan measures and compliance. Following inspection, Douglas PUD would address oil and hazardous material prevention and control issues identified by Washington DOE.

Regional Forums, Project Operations, Reporting, and Study Plans

- Douglas PUD would continue to participate in regional forums to address water quality issues, including sharing the results from monitoring, measuring, and evaluating water quality in the project. However, Douglas PUD would not advocate for any water quality measures in regional forums without consulting with the Aquatic SWG.
- Douglas PUD may, following notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with other mid-Columbia hydroelectric operations to the extent practicable. Coordinated operations are intended to reduce spill, increase generating efficiencies and, thereby, reduce the potential for exceedances of the TDG numeric criteria. These coordinated operations should be beneficial to TDG compliance and aquatic resources.
- Douglas PUD would provide a draft annual report to the Aquatic SWG summarizing the previous year's water quality activities and activities proposed for the coming year. The report would include any decisions, statements of agreement, evaluations, or changes made pursuant to the Water Quality Management Plan. If significant activity was not conducted in a given year, Douglas PUD may prepare a memorandum providing an explanation of the circumstances in lieu of the annual report. A summary of monitoring results, any analyses, and compliance with numeric criteria would be included in an appendix to the annual report.
- Douglas PUD would prepare study plan(s) that include QAPPs for each parameter to be monitored. The QAPPs would follow the *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. QAPPs would contain, at a minimum, a list of parameter(s) to be monitored, a map of sampling locations, and descriptions of the purpose of the monitoring,

sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures and reporting protocols.

- Douglas PUD would review and update the QAPPs annually based on a yearly review of data and data quality. Washington DOE may also require future revisions to the QAPP based on monitoring results, regulatory changes, changes in project operations, and/or the requirements of TMDLs. The initial QAPPs and any changes would be submitted to the Aquatic SWG for review and are subject to approval by Washington DOE. Implementation of the monitoring program would begin upon Washington DOE's written approval of the QAPP, unless otherwise provided by Washington DOE.

Our Analysis

Temperature

Water quality monitoring data indicate that the project has only a minimal adverse effect on water temperature. Water quality modeling demonstrated that temperature effects on project waters (Columbia, Okanogan, and Methow rivers) were within state standards, which allow for a 0.3°C increase over background levels when temperature standards are exceeded due to non-project causes. In this case, water flowing into the project area already exceeds state standards in all three rivers during the summer months, and in the lower Methow River in the fall. Since Douglas PUD is not proposing any modifications to project operations, it is likely that the project would continue to be in compliance with state standards. Douglas PUD's proposed water temperature monitoring program would enable the Commission and Washington DOE to ensure that the project continues to comply with state temperature standards during the term of any license issued.

Dissolved Oxygen, pH, Turbidity

As described in section 3.3.1.1, water quality within the project area has been intensively studied and analyzed during the past 10 years. Based on these studies DO, pH, and turbidity have normally been in compliance with the water quality standards. Most of the occurrences of non-compliance were noted in the Okanogan River at the Malott Bridge monitoring station, upstream of the project boundary. In the summer and early fall, this location is subject to low flow conditions and sometimes DO levels below 8.0 mg/L. In the Columbia River and at the Wells forebay, most of the few occurrences of the low DO were classified as outliers or are likely related to instrument equilibration and calibration issues and not characteristic of the Columbia River. Readings of pH slightly above 8.5 (a maximum of 8.78) were recorded in the Methow and Okanogan Rivers at locations mostly upstream of the project boundary but all pH readings in the Columbia River within the project boundary were within the 6.5 to 8.5 criteria. Since Douglas PUD is not proposing any modifications to project operations, it is likely that the project would continue to operate in compliance with state standards

for DO, pH, and turbidity. Douglas PUD's proposed water quality monitoring program would enable the Commission and Washington DOE to ensure that the project continues to comply with state standards during the term of any license issued.

Total Dissolved Gas

Although TDG levels frequently exceed the state standard of 110 percent saturation during spill events, Douglas PUD has conducted extensive monitoring, testing, and modeling efforts to develop spillway operating protocols that minimize production of TDG. In 2006, Douglas PUD hired a team of hydraulic and TDG experts from the Pacific Northwest to help design a monitoring program to study various operational scenarios and their respective TDG production dynamics. Thirteen sensors were placed along three transects in the tailrace at 1,000, 2,500, and 15,000 feet below Wells dam. Three sensors were placed across the forebay, one being the fixed monitoring station midway across the face of the dam and two at a distance of 300 feet upstream from the dam. Each test required the project to maintain static flows through the powerhouse and spillway for at least a 3-hour period.

There were 30 scheduled spill events during the study and an additional 50 events where the powerhouse and spillway conditions were held constant for a minimum 3-hour period. Spill amounts ranged from 5.2 to 52 percent of project flow and volume of spill and total flows ranged from 2,200 to 124,700 cfs for spill and 16,400 to 254,000 cfs for total discharge (EES Consulting et al., 2007). For six of the tests, flows exceeded the Wells dam 7Q10 flows of 246,000 cfs.

The results of the 2006 monitoring study were used to develop a three-dimensional numerical model capable of predicting the dynamics of flows and TDG distribution within the Wells tailrace. The primary goal of the modeling effort was to identify project operations that minimize TDG downstream of the Wells dam (Politano et al., 2009a). The results of the modeling analysis indicated the following:

- Concentrating spill flow through a single gate results in the lowest TDG values downstream. Operations with moderate flow through each of the eleven gates produces the highest TDG values as a result of entraining more air and less degasification in the tailrace.
- TDG production is directly related to the percentage and volume of water spilled. In general, higher downstream TDG is observed as the spill percentage increases. Likewise, TDG production increases as the amount of spill increases. TDG levels downstream are reduced by dilution as powerhouse flow increases.
- The operating condition that produced the lowest downstream TDG was a full open gate in bay 7, which is located near the middle of the dam, with most of the remaining flow released through bay 3. This operation promotes degasification and downstream mixing. According to the model, spilling with

a full open gate in bay 7 performs better than a mirror operation with full open gate in bay 5.

Since 2007, this model has been used to develop spill operational guidelines (playbooks) that are used to limit TDG levels within the tailrace under a range of operating conditions. The original spill playbook used in 2007 focused on a range of operations to evaluate TDG production along with potential operational constraints. Subsequent playbooks evolved into the current 2009 format that simply focuses on strategies that have been identified to effectively manage TDG production in the tailrace of Wells dam. The resulting spill strategies are based on three basic principles developed from the monitoring and modeling efforts described above:

- Spill operations concentrated through a single spillbay (as opposed to spread through several spillbays) reduce TDG production and increase degasification at the tailwater surface;
- In general, discharge from spillbays located near the middle of the dam prevent water with high TDG from attaching to the shoreline; and
- Forced spill exceeding juvenile bypass system flows of 2,200 cfs must be increased to $\geq 15,000$ cfs to ensure that the submerged spillway lip below the ogee is engaged. The resulting force creates flows that are surface oriented, promoting degasification at the tailwater surface.

The above principles are used as a guideline for project operators to spill at a range of outflows to ensure the future compliance with the Washington State water quality standards for TDG. Modeling results indicate that these guidelines should allow the project to remain in full compliance with the 115 percent TDG standard required under the current GAP, as measured at the forebay of Rocky Reach dam when incoming TDG values in the Wells forebay are in compliance with the 115 percent standard (Politano et al., 2009a).

Continued TDG monitoring would provides a means to document whether the project is meeting state standards for TDG and would form the basis for future GAPs, which are required by Washington DOE to obtain the TDG exemption.

Oil and Hazardous Spill Prevention

Douglas PUD's existing SPCC Plan fulfills the requirements of 40 CFR 112, *EPA Oil Pollution Prevention Regulations*. To continue to comply with 40 CFR 112, Douglas PUD needs to periodically review and revise the plan for the project. Continued implementation of the current components of the SPCC Plan (e.g., training personnel in appropriate notification and cleanup procedures), would continue to ensure that project spills would be identified before they could enter project waters or cause much biological harm. Implementing relevant measures identified in the Columbia-Snake River Spill Initiative, as is being proposed by Douglas PUD, may provide further protection from oil spills.

Adaptive Management

The Water Quality Management Plan includes provisions for implementing future as-yet unidentified measures that may be required as a result of the Columbia River temperature TMDL or that may be necessary to address future instances of non-compliance with state water quality standards. The contemplated measures could potentially benefit water quality in the project area by identifying issues that led to non-compliance; however, the plan does not provide any specific measures that would be implemented. Without specific measures, we cannot evaluate the environmental effects.

Aquatic Nuisance Species Management Plan

Aquatic plants are an integral component of the aquatic ecosystems in which they occur. Macrophytes act as major structural components of littoral habitats, functioning as shelter, nesting, and feeding grounds for a wide variety of micro-organisms, fish, and waterfowl (Hudon et al., 2000). The nature of these plant communities has also been shown to affect light, temperature, turbulence, water and sediment chemistry, and the abundance and composition of other biotic assemblages from epiphytes to phytoplankton (Johnson and Ostrofsky, 2004). Within the mid-Columbia River, healthy and productive native aquatic plant communities are essential to the viability of many fish and wildlife populations.

Douglas PUD does not propose to make any changes in project operations compared to existing conditions; however, as a component of the Aquatic Settlement, Douglas PUD proposes to implement an Aquatic Nuisance Species Management Plan. Objectives of the Aquatic Nuisance Species Management Plan include the following:

Objective 1: Implement BMPs to prevent Eurasian watermilfoil proliferation during in-water (i.e., construction, maintenance, and recreation improvements) improvement activities in the project.

Objective 2: Continue participation in regional and state efforts to prevent the introduction and spread of aquatic nuisance species. Activities include continued monitoring for the presence of aquatic nuisance species, monitoring by-catch data collected during other aquatic management plan activities and conducting education outreach within the project.

Objective 3: In response to proposed changes in the project requiring FERC approval, the Aquatic SWG would assess the potential effects, if any, with respect to the introduction or proliferation of aquatic nuisance species in the project to inform management decisions to support success of the Aquatic Nuisance Species Management Plan and would implement reasonable and appropriate measures to address any potential effects.

Specifically, Douglas PUD, in consultation with the Aquatic SWG, would implement the following measures under the Aquatic Nuisance Species Management Plan:

- Implement containment efforts using BMPs agreed to by the Aquatic SWG if at any time during the new license term, Douglas PUD is required to construct, improve or maintain recreation access at boat launches and swim areas and the removal or disturbance of aquatic macrophyte beds that contain Eurasian watermilfoil may potentially occur.
- Continue to coordinate with regional and state entities to implement activities in project waters to monitor for the presence of zebra and quagga mussels. Activities covered by this objective would consist of monitoring for the presence of zebra and quagga mussels. If aquatic nuisance species are detected during monitoring activities, Douglas PUD would immediately notify the appropriate regional and state agencies and assist in the implementation of reasonable and appropriate measures to address the aquatic nuisance species presence as is consistent with Aquatic Nuisance Species Management Plan protocols.
- Monitor by-catch data collected from ongoing project aquatic resource management activities for aquatic nuisance species presence to support regional and state efforts and the Aquatic Nuisance Species Management Plan.
- Make information regarding the effects of aquatic nuisance species introductions and the importance of prevention available to the public. Such outreach activities may consist of posting signage at project recreation areas and boat launches and providing literature for distribution at the visitor centers of local communities.
- Implement an assessment to identify potential effects, if any, at any time during the new license term, future changes in project operations requiring FERC approval are proposed and the Aquatic SWG concludes that such proposed operations may encourage the introduction or proliferation of aquatic nuisance species within the project.
- Prepare an annual report.

Our Analysis

Past aquatic plant (Lê and Kreiter, 2006), macroinvertebrate (BioAnalysts, 2006), and resident fish (McGee, 1979; Beak and Rensel, 1999) assessments have identified the presence of non-native species as well as several nuisance species in the Wells Project area.

As described in section 3.3.1.1, native aquatic plants were the dominant species observed in over 89 percent of the macrophyte beds sampled within the Wells Project study sites. Eurasian watermilfoil and curly leaf pondweed were the only non-native species found and were typically sub-dominant to several native species. Few macrophytes occurred at depths of less than 4 feet (Lê and Kreiter, 2006), suggesting

that normal daily reservoir fluctuations limit the establishment of macrophytes in areas that are subject to periodic dewatering during normal operations.

Drawdowns exceeding 4 feet, which occur about 1.1 percent of the time, do not appear to have a substantial adverse effect on aquatic macrophytes. Aquatic macrophytes are generally considered to be well-adapted to short-term dewatering (lasting hours or days) (Cooke, 1980), and the median duration of infrequent reservoir operations at the project was 3 hours (DTA, 2006a). Based on the frequency at which these types of operations occur and the typical duration of such operations, infrequent drawdowns of more than 4 feet are expected to have minimal effect on the overall native aquatic macrophyte community at the Wells Project. Douglas PUD does not propose any changes in project operations (i.e., changes in daily fluctuations); therefore the current macrophyte community in Wells reservoir is likely to be sustained over the long term.

In 2006, Douglas PUD, in coordination with the Aquatic Nuisance Species section of the Washington DFW, began monitoring for zebra mussels and quagga mussels in Wells Project waters. Activities consisted of monthly plankton tows to target veligers (the larval lifestage) of these mussel species at sites downstream of boat launches within Wells reservoir. Sampling activities were conducted during the summer and early fall when recreational boating activity is at a peak. Sampling protocols were provided by Washington DFW. All samples were sent to Washington DFW for analysis. To date, none of the samples collected within the Wells Project have contained any signs of zebra or quagga mussels.

In 2007, Douglas PUD, in coordination with the Center for Lakes and Reservoirs at Portland State University, installed a permanent substrate sampler in the Wells dam forebay to monitor for zebra and quagga mussel colonization within the Wells Project. Douglas PUD staff checks the substrate sampler monthly throughout the year as specified by the monitoring protocol. To date, no signs of zebra or quagga mussel presence have been detected. Both of these monitoring activities are ongoing.

Implementation of the Aquatic Nuisance Species Management Plan as proposed by Douglas PUD would likely help maintain the existing aquatic macrophyte assemblage in the project area and minimize the spread of non-native Eurasian watermilfoil through information and education outreach and implementation of BMPs and containment measures during in-water construction activities or in the event that new aquatic nuisance species are discovered during proposed monitoring efforts. We note, however, that the plan does not currently identify the specific BMPs that would be implemented.

Notifying state and federal agencies of the presence of non-native mussels would help to prevent the introduction and spread of aquatic invasive species that may threaten the diversity or abundance of native species, aquatic habitat, and energy infrastructure. Participating in regional coordination efforts could also help prevent the proliferation and spread of aquatic nuisance species.

One of the provisions of the Aquatic Nuisance Species Management Plan would require Douglas PUD to implement future as-yet unidentified measures to address the potential spread of aquatic nuisance species in the event that project operations are modified in the future that could have an effect on the proliferation or spread of aquatic nuisance species. However, the plan does not provide any specific measures that would be implemented. Without specific measures, we cannot evaluate the environmental effects of these measures or their relationship to the project.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates are a food source for both fish and water birds that use the Wells Project area and are an indicator of the overall ecological health of the aquatic environment. As is the case for aquatic plants, reservoir fluctuations that result from Wells Project operations have the potential to adversely affect aquatic macroinvertebrates in the project area. As the water level recedes in the reservoir on a daily basis, macroinvertebrates inhabiting shallow areas (less than about 2 feet deep) can become dewatered or stranded in shallow pools, resulting in immediate or delayed mortality or temporary loss of habitat; or they may survive by burrowing into the substrate or by following the receding reservoir water level, maintaining contact with the water.

As described in section 3.3.1.2, subsection *Aquatic Nuisance Species Management Plan*, Douglas PUD does not propose any changes in project operations. Therefore, Douglas PUD does not propose any measure to address the effects of daily reservoir drawdown on aquatic macroinvertebrates nor do the resource agencies or the Tribes recommend any measures to address this issue.

Our Analysis

The results of Douglas PUD's aquatic macroinvertebrate inventory indicate that chironomids, gastropods, trichoptera, crustaceans, and annelids are the most abundant taxa in the Wells Project area (BioAnalysts, 2006). Mollusks in the Wells Project were more diverse than areas studied in downstream reservoirs and this appears to be linked to the greater habitat complexity found within Wells reservoir. Observations also suggested that taxa richness appeared to increase with habitat complexity (BioAnalysts, 2006).

Macroinvertebrate taxa associated with aquatic vegetation and detritus are often the most numerous organisms affected by water fluctuations. Aquatic macroinvertebrate biomass and density is typically much reduced in zones with fluctuating water levels, whereas the areas just below the lowest pool elevation are typically the most productive for aquatic macroinvertebrates (Oak Ridge National Laboratory, 1980, as cited in Douglas PUD, 2010; Furey et al., 2006). Although Furey et al. (2006) found no overall difference in benthic density and biomass between a regulated and unregulated lake system, some differences in community structure were evident in Douglas PUD's review of existing information on the subject (DTA, 2006a).

It is likely that aquatic macroinvertebrates are less abundant in the shallow water areas of the Wells Project that are subject to daily water fluctuations of 1 to 2 feet (DTA, 2006a). Infrequent reservoir operations, which may include drawdowns of more than 4 feet in a 24-hour period, may reduce or modify the composition of macroinvertebrate communities. However, because drawdowns greater than 4 feet are uncommon and typically of short-duration, they are unlikely to have a substantial adverse effect on macroinvertebrate populations because many aquatic macroinvertebrates have structural and/or behavioral mechanisms to survive short-duration dewatering events, and there would be no impediment to recolonization (DTA, 2006a).

Freshwater mussels and other bivalves, such as sphaeriid clams, can respond to progressively-drying conditions by burrowing into the substrate, moving in search of more suitable conditions, or tightly closing their shells to reduce loss of water (DTA, 2006a). However, not all mollusks are able to move to deeper water and may be stranded as water levels recede. Under conditions of stress resulting from lack of oxygen, some mussels would exhibit mantle edge exposure as they attempt to maximize oxygen exchange (DTA, 2006a). Tolerance to emersion and desiccation appear to be highly variable, depending on the species. Mortality can result from desiccation or thermal stress as the temperature buffering capacity of the water is reduced in shallower pools (Vaughn, 2005). Indirect effects might also include increased predation.

Overall, the mollusk community found within the shallow-water areas of the project appears to tolerate daily reservoir fluctuations under current project operations. Under existing conditions, the Wells Project aquatic macroinvertebrate community is characterized by a diverse assemblage dominated by native species, suggesting project operations have been compatible with the persistence of native aquatic macroinvertebrate populations. Since Douglas PUD does not propose to make any changes to project operations; this diverse assemblage is likely to be sustained under the proposed action.

Wells Anadromous Fish Agreement and Habitat Conservation Plan

As previously discussed, the Wells HCP was authorized on June 21, 2004 under the existing license and commits Douglas PUD to a 50-year program to ensure that the Wells Project has “no net impact” on five populations of anadromous salmon and steelhead. The Wells HCP requires that this be accomplished through a combination of juvenile and adult fish passage measures at the dam, off-site hatchery programs and evaluations, and habitat restoration work in tributary streams upstream of the project. The no net impact goal consists of two components including: (1) a 91 percent combined adult and juvenile project survival standard, and (2) up to 9 percent compensation for unavoidable project-related losses. Compensation for unavoidable losses is achieved through hatchery and tributary programs under which 7 percent compensation is provided through hatchery production and 2 percent compensation is provided through the funding of enhancements to tributary habitats that support Plan

Species. The Wells HCP also requires the formation of four committees, including the policy, coordinating, hatchery, and tributary committees.

NMFS filed a final fishway prescription that would require Douglas PUD to implement the Wells HCP in its entirety, and recommends that any new license issued for the Wells Project not extend beyond the term of the Wells HCP. Interior filed a final fishway prescription that includes requiring construction, operation, maintenance, and effectiveness monitoring of upstream and downstream fishways for Plan Species consistent with the Wells HCP and the aquatic resource management plans included in the Aquatic Settlement. Washington DFW also recommends that the terms of the Wells HCP be adopted into any new license issued for the project.

The following sections discuss specific issues addressed by the Wells HCP, including fish passage, hatchery programs for anadromous fish, and tributary enhancement measures. Proposed measures to address non-plan species (Pacific lamprey, bull trout, white sturgeon, and resident fish) are discussed in subsequent sections.

Fish Passage

The project dam and its associated fish passage facilities affect the upstream passage of adult fish and the downstream passage of juvenile and adult fish, particularly juvenile anadromous salmonids. Fish passage survival is an important issue for all of the anadromous species due to the potential for cumulative losses during passage at eight other mainstem dams on the mid- and lower Columbia River. Furthermore, all of the anadromous species contribute to commercial and recreational fisheries, are of substantial cultural importance to the tribes, or are protected under the ESA.

To address anadromous fish passage at Wells dam, Douglas PUD proposes to continue to implement the measures described in the Wells HCP, as well as any additional measures that are needed to meet the no net impact goal defined in the Wells HCP and described above. Juvenile project survival estimates, when available, would be used to adjust hatchery based compensation programs and adult survival estimates would be used to adjust the funding level that is provided for tributary habitat enhancement. The Wells HCP sets a requirement for Douglas PUD to achieve the no net impact goal by 2013. If Douglas PUD fails to meet the no net impact goal in the required time frame or if the species are not rebuilding, and the project is a significant factor in the failure to rebuild, the Wells HCP agreement provides a mechanism for the fisheries parties to withdraw and pursue other legal remedies.

The Wells HCP is currently implemented in three phases that provide for adjustments to ensure biological success. Phase I includes implementing the juvenile and adult operating plans and criteria specified in the Wells HCP and a 3-year monitoring and evaluation program to determine compliance with the standards. At the completion of Phase I, the Coordinating Committee would determine whether the pertinent survival standards have been achieved. If a standard has not been achieved for

a particular Plan Species, Douglas PUD would proceed to Phase II, in which additional measures would be implemented to meet the pertinent survival standard. Douglas PUD would continue to implement Phase II until the standards have been met or until the Wells HCP Coordinating Committee determines the standards are impossible to achieve.

Douglas PUD would proceed to Phase III when the Wells HCP Coordinating Committee has verified compliance with the combined adult and juvenile survival or juvenile survival standard of 93 percent, has documented juvenile project survival (survival during passage through the reservoir and past the dam) between 91 and 93 percent, or has documented 95 percent juvenile dam passage survival. Phase III includes three sub-phase designations: Phase III (Standards Achieved), Phase III (Provisional Review) and Phase III (Additional Juvenile Studies). The separate sub-phases within Phase III provide a means to address existing limitations in the measurement of adult survival and juvenile project survival for sockeye and subyearling Chinook salmon.

In February 2005, the Wells HCP Coordinating Committee determined that the Wells Project had achieved Phase III (Standard Achieved) for yearling Chinook salmon and steelhead, and Phase III (Additional Juvenile Studies) for subyearling summer/fall-run Chinook salmon and sockeye. In December 2007, the Wells HCP Coordinating Committee determined that the Wells Project had achieved Phase III (Additional Juvenile Studies) for coho salmon. Phase III (Standard Achieved) includes re-evaluation of passage survival every 10 years, and Phase III (Additional Juvenile Studies) include a provision for conducting additional studies to evaluate juvenile project survival if new survival methodologies to evaluate reservoir survival are approved by the Coordinating Committee.

Downstream Passage and Project Survival—Under Douglas PUD's proposal, it would continue to operate the juvenile fish bypass system as described in the Wells HCP as the primary method for increasing the survival of juvenile salmonids passing the project. The juvenile bypass system uses five of eleven spillways equipped with constricting barriers to help guide juvenile migrating fish. Since most juvenile salmon migrate near the surface, with the help of the bypass system, most juvenile salmon pass through the bypass system and avoid the turbine intakes located deeper in the forebay. The juvenile bypass system serves as an effective method of bypassing fish away from turbines and safely past the dam. This configuration has demonstrated exceptionally high levels of protection while using only 6 to 8 percent of the Columbia River flow. The efficiency and effectiveness of the bypass system are important factors in limiting the amount of spill and TDG, while maximizing fish passage and survival.

In February 2004, the Wells HCP Coordinating Committee agreed to a slight modification of the timing of operation of the juvenile bypass system, to initiate

operation on April 12 and to shut it down on August 26.²⁹ Based on an analysis of 21 years of hydroacoustic data and 14 years of species composition information collected on juvenile run patterns at Wells dam, this operating period is expected to provide bypass operations during at least 95 percent of both the spring and summer outmigrations³⁰ of juvenile anadromous salmonids (Douglas PUD, 2009).

The Wells HCP is based on a survival standard of 91 percent combined juvenile and adult project survival. However, in 2002 the Wells HCP signatories agreed that adult fish survival cannot be conclusively measured for each Plan Species because the technology is not available to differentiate project-related mortality from natural adult losses. Based on an assumption that adult mortality is less than 2 percent, the parties agreed that Douglas PUD's achievement of the adult and juvenile survival standard of 91 percent would be determined based upon the measurement of the 93 percent juvenile project survival standard. If juvenile project survival cannot be measured, the Wells HCP stipulates use of a juvenile dam passage survival standard of 95 percent. If juvenile dam passage survival cannot be measured directly, the Wells HCP provides that juvenile dam passage survival would be calculated based on best available information.

Upstream Passage—Wells dam is equipped with two fishways, each of which have a single main entrance, a collection gallery, a fish ladder, an adult counting station, trapping facilities, and an exit in the forebay adjacent to the earthen embankment section of the dam. Douglas PUD proposes to continue the use of these facilities to facilitate upstream passage for adult salmon and steelhead (as well as other fish species that use this pathway, including Pacific lamprey and bull trout). However, as discussed above, the Wells HCP signatories agreed that adult fish survival cannot be conclusively measured for each Plan Species at this time, and that until appropriate methodologies are developed to measure adult fish survival, Douglas PUD's achievement of the adult and juvenile survival standard of 91 percent would be determined based upon measurement of the 93 percent juvenile project survival standard or the 95 percent juvenile dam passage standard.

Our Analysis

The ongoing monitoring and mitigation programs contained in the Wells HCP would provide useful information to assess project influences on salmon stocks and other fish that pass through Wells reservoir and past Wells dam via the upstream and downstream passage facilities. The terms of the Wells HCP agreement provide sufficient safeguards to ensure that Plan Species pass through the project with high rates

²⁹ The HCP identified an operating period from April 10 to August 15.

³⁰ Yearling smolts (primarily spring-run Chinook, coho and sockeye salmon) outmigrate primarily during the spring and subyearling smolts (primarily summer/fall-run Chinook salmon) outmigrate during the summer.

of survival, and that the effects of any unavoidable mortality on the Plan Species are mitigated. Furthermore, HCPs have also been incorporated into the existing licenses for the Rocky Reach and Rock Island projects, allowing for more regional collaboration than if different plans were approved for each project.

In its Master Order Granting Interventions; Approving Anadromous Fish Agreements, Settlement Agreement, and Applications to Amend Licenses; and Terminating Proceeding³¹ and its Order Amending the Wells Project license,³² the Commission accepted the proposed Wells HCP and its associated approach for attaining passage goals as described in the terms of the HCP, indicating that “the orders will serve the public interest by putting into place a long-term program to aid in the recovery of the endangered species and help to prevent other salmonids from becoming listed.” The Commission based its approval of the Wells HCP on the environmental analysis presented in the final EIS for the HCPs (NMFS, 2002), with the Commission participating as a cooperating agency, and after consideration of all comments from other parties that pertained to the HCPs. No new evidence or arguments have been presented that would cause us to change our previous conclusions regarding the HCPs.

Hatchery Programs for Anadromous Salmonids

The Wells HCP commits Douglas PUD to continue hatchery production to compensate for the original effects of inundation, as required under the current license, and to compensate for unavoidable mortality caused to adult and juvenile anadromous fish passing through the project. Section 8.4.6 of the Wells HCP specifies that Douglas PUD continue the annual production of 320,000 yearling summer/fall-run Chinook salmon, 484,000 subyearling summer/fall-run Chinook salmon and 300,000 yearling summer steelhead to compensate for habitat inundated by Wells reservoir.

Section 8.4.4 of the Wells HCP identifies initial hatchery production levels required to meet Douglas PUD’s obligation to compensate for unavoidable passage mortality. These hatchery production commitments would be adjusted in 2013 and every 10 years thereafter to achieve and maintain the no net impact goal, as required to adjust for any measured changes in survival rates. The initial hatchery production objectives to mitigate for unavoidable passage mortality for spring-run Chinook salmon, yearling summer Chinook salmon and steelhead were set at 3.8 percent based on an average juvenile project survival of 96.2 percent measured for juvenile yearling Chinook salmon and steelhead over 3 years of studies conducted by Douglas PUD. The initial commitments to compensate for unavoidable passage mortality established in the

³¹ 107 FERC ¶ 61,280.

³² 107 FERC ¶ 61,281.

Wells HCP call for the production of 61,071 spring-run Chinook salmon smolts, 48,858 steelhead smolts, 225,000 sockeye salmon smolts, and 108,570 summer Chinook salmon smolts.

In 2004, the Wells HCP Coordination and Hatchery committees accepted Douglas PUD’s proposal to meet their sockeye mitigation responsibility by funding the input and maintenance of a flow management model that is used to manage flows in the Okanogan River to improve sockeye salmon smolt production (Anchor Environmental, LLC and Douglas PUD, 2005). On December 12, 2007, the Hatchery Committee accepted a proposal by Douglas PUD to meet its mitigation responsibility for coho salmon by funding a hatchery program through an agreement with the Yakama Nation (Anchor Environmental, LLC and Douglas PUD, 2008). Douglas PUD’s production objectives established in the Wells HCP for the passage loss compensation program are summarized in table 17. These objectives were revised on November 16, 2010, by the Wells HCP Coordinating Committee to the values shown in table 18 based on an average juvenile project survival of 96.3 percent determined from the results of Douglas PUD’s 2010 Wells Project Survival Verification Study.

Table 17. Initial production objectives for the Wells HCP passage loss compensation program (Source: Douglas PUD, 2002).

Species	Target
Yearling summer steelhead	48,858 smolts
Yearling summer/fall-run Chinook salmon	108,570 smolts
Yearling spring-run Chinook salmon	61,071 smolts
Yearling sockeye salmon	7%
Coho salmon	7%

Table 18. Current production objectives³³ for the Wells HCP passage loss compensation program (Source: Anchor QEA LLC, and Douglas PUD, 2011).

Species	Target
Yearling summer steelhead	47,571 smolts
Yearling summer/fall-run Chinook salmon	105,714 smolts
Yearling spring-run Chinook salmon	59,464 smolts
Yearling sockeye salmon	7% ^a
Coho salmon	7% ^b

^a Okanogan sockeye obligation for no net impact is covered by Douglas PUD’s funding of the Fish/Water Management Tool Program managed through the Okanogan Nation Alliance. The Wells HCP Hatchery and Coordinating Committees agreed that the continued implementation of this program would satisfy Douglas PUD’s 7 percent hatchery compensation requirement for sockeye salmon, based on a retrospective analysis of 5 years of historical data on sockeye salmon production. This analysis estimated an average 55 percent increase in annual sockeye salmon smolt production if flows in the Canadian Okanogan had been annually managed by the Fish/Water Management Tool Program.

^b No net impact for Methow coho salmon is achieved through the funding provided to the Yakama Nation Fisheries Enhancement Program as approved by the Wells HCP Hatchery Committee at its December 12, 2007, meeting.

Our Analysis

Douglas PUD proposes to continue meeting the hatchery compensation objectives specified in the Wells HCP. Hatchery supplementation of Plan Species would continue to mitigate for the loss of anadromous fish production due to the original impacts of inundation of riverine habitat by Wells reservoir and to mitigate for ongoing unavoidable project-related mortality to fish that migrate through the project reservoir and past Wells dam. An increase in the number of juveniles released to migrate to the ocean would likely contribute to the number of adult fish returning to the project area and would help to support Indian treaty fisheries, as well as sport and commercial fisheries. Douglas PUD and representatives of the other Wells HCP signatory parties who make up the Wells HCP Hatchery Committee, including NMFS,

³³ In its comments on the draft EIS, Douglas PUD stated that the production objectives were 59,395 yearling spring Chinook salmon; 47,572 steelhead; and 105,712 yearling summer/fall Chinook salmon. The numbers given in this table are taken from the November 16, 2010, Wells HCP Coordinating Committee agreement provided in the 2010 annual HCP report.

would be responsible for evaluating how to provide the most efficient and effective program for future hatchery needs to achieve the goals stated in the HCP. This may require renovation and/or upgrades of existing facilities.³⁴

Tributary Conservation Plan

The Wells HCP includes a Tributary Conservation Plan that would provide for enhancement of habitat used by salmon and steelhead within the mid-Columbia River Basin (from the Chief Joseph tailrace to the Wells tailrace), including the Methow and Okanogan watersheds. Under the proposed action, Douglas PUD would annually contribute \$176,178 (in 1998 dollars) to a Plan Species account to mitigate for up to 2 percent of the no net impact goal to compensate for unavoidable project mortality.³⁵ The Wells HCP Tributary Committee, composed of one representative from each of the HCP signatories, would be charged with ensuring that an appropriate number of projects are implemented upstream of the project tailrace. In addition, Douglas PUD would fund a tributary assessment program (not to exceed \$200,000) for the purpose of monitoring and evaluating the performance of projects supported through the Tributary Conservation Plan.

Our Analysis

Restoration and enhancement of tributary habitat is an important component of ongoing efforts to increase access to and use of habitat for impaired populations of coldwater fish species, including salmon, steelhead, resident trout, and bull trout. Viable habitat restoration projects specified in the Wells HCP include habitat protection, flood plain rehabilitation, channel function improvement, instream flow improvement, passage provision, riparian restoration, and water quality improvement. Improving and enhancing existing habitat conditions for spawning and rearing fish would make more habitat available for these lifestages and contribute to increased production and survival of natural and hatchery-supplemented populations. According to section 7.3.7.3 of the Wells HCP, acquisition of land or interests in land, such as conservation easements or water rights, or interests in water, such as dry year lease options, would be a high priority. Additionally, project selection would be based on a unanimous vote by the

³⁴ Douglas PUD indicates that implementing new HGMPs for ESA-listed UCR spring-run Chinook salmon and UCR steelhead will require substantial modifications and upgrades to the facilities and operations at the Methow and Wells fish hatcheries. Any such modifications would already be authorized under the existing license as set forth in the Wells HCP.

³⁵ The HCP provided for an initial contribution of \$1,982,000 in 1988 dollars, and after 5 years a decision would be made to make a second lump sum payment of \$1,761,789 in 1988 dollars or begin annual payments of \$176,178 as long as the agreement is in effect. On March 24, 2009, the HCP parties agreed to the annual payment plan (Anchor QEA and Douglas PUD, 2010).

Tributary Committee appointed by the signatories to the Wells HCP. The Wells Tributary Committee may also include expert non-voting advisors such as land and water conservancy groups.

Projects funded through the Wells Tributary Conservation Plan through calendar year 2009 are listed in table 19. The types of projects funded to date are likely to improve and/or increase available spawning and rearing habitat for Plan Species in the project area, resulting in potential increases in recruitment to existing populations. Given the collaborative structure of the Wells HCP Tributary Committee, we are confident that the types of projects selected for funding in the future would benefit Plan Species that migrate through the project area. As noted previously, the Commission was a cooperating agency with NMFS in preparing the final EIS for the HCPs, and in the Commission’s Order Amending the License of the Wells Project, determined that implementing the Wells HCP measures, including the proposed tributary conservation program, is in the public interest.

Table 19. Projects funded through the Wells Tributary Conservation Plan through calendar year 2010 (Source: Wells HCP annual reports for calendar years 2004–2009).

Year	Project Name	Sponsor	Funding from Wells HCP	Funding from Other Sources
2007	Okanagan River Restoration Initiative—Construction (Phase IV)	Canadian Okanagan Basin Technical Working Group	\$411,000	\$611,000
2007	Lower Beaver Creek Livestock Exclusion	Okanogan Conservation District	\$18,559	\$6,111
2007	Heath Floodplain Restoration	Methow Salmon Recovery Foundation	\$48,695	none
2008	Poorman Creek Barrier Removal	Methow Salmon Recovery Foundation	\$53,748	\$137,831
2008	Twisp River Riparian Protection—Pampanin Property	Methow Conservancy	\$48,649	\$71,071
2008	Twisp River Riparian Protection—Neighbor-Vasques Property	Methow Conservancy	\$55,000	\$205,000
2008	Twisp River Riparian Protection—Speir Property	Methow Conservancy	\$23,993	\$55,983

Year	Project Name	Sponsor	Funding from Wells HCP	Funding from Other Sources
2008	Riparian Regeneration and Restoration Initiative	Methow Conservancy	\$15,537	\$7,200
2008	Fort-Thurlow Pump Project	Methow Salmon Recovery Foundation	\$7,000	\$41,500
2008	Goodman Livestock Exclusion Project	Okanogan Conservation District	\$7,980	\$100

Bull Trout Management Plan

As described in section 3.3.1.1, FWS identified habitat degradation, habitat fragmentation, and habitat alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. In addition, they noted that dams (and natural barriers) have isolated population segments resulting in a loss of genetic exchange among these segments (64 Federal Register 58,910–58,933).

Operation of the Wells Project has the potential to affect the upstream and downstream migration of adult and juvenile bull trout and alter the quality and quantity of available bull trout habitat in the project area. To address these issues, Douglas PUD, in consultation with federal, state, and tribal entities who are parties to the Aquatic Settlement, developed a Bull Trout Management Plan. The goal of the Bull Trout Management Plan is to identify, monitor, and address impacts, if any, on bull trout resulting from the Wells Project in a manner consistent with the FWS' Bull Trout Recovery Plan (FWS, 2002). The Bull Trout Management Plan is intended to continue the implementation of management activities to protect bull trout during any new license term in a manner consistent with the 2004 Bull Trout Monitoring and Management Plan (Douglas PUD, 2004). The 2004 Bull Trout Monitoring and Management Plan was developed in consultation with FWS, as required by the FWS Bull Trout Section 7 Biological Opinion in association with FERC's approval of the Wells HCP (Douglas PUD, 2002). The measures presented within the Bull Trout Management Plan are designed to meet the following objectives:

- Objective 1: Operate the upstream fishways and downstream bypass system in a manner consistent with the Wells HCP.
- Objective 2: Identify any adverse project-related impacts on adult and sub-adult bull trout passage.

- Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass system, or operations if adverse impacts on bull trout are identified and evaluate the effectiveness of these measures.
- Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells reservoir elevations.
- Objective 5: Participate in the development and implementation of the FWS Bull Trout Recovery Plan, including information exchange and genetic analysis. If bull trout are delisted, the Aquatic SWG would re-evaluate the needs and objectives of the Bull Trout Management Plan.
- Objective 6: Identify any adverse impacts of project-related hatchery operations on adult and sub-adult bull trout.

Specifically, Douglas PUD, in consultation with the Aquatic SWG, would implement the following measures for bull trout:

- Continue to provide upstream passage for adult bull trout through the existing upstream fishways and downstream passage of adult and sub-adult bull trout through the existing downstream bypass system;
- Continue to conduct video monitoring in the Wells dam fishways from May 1 through November 15 to count and provide information on the population size of upstream moving bull trout;
- Continue to operate the upstream fishway and bypass system at Wells dam in accordance with criteria outlined in the Wells HCP;
- Continue to monitor upstream and downstream passage and incidental take of adult bull trout at Wells dam and in Wells reservoir through the implementation of a radio telemetry study in years 5 and 10 of the new license, and every 10 years thereafter;
- Assess upstream and downstream passage and incidental take of adult migratory bull trout at off-project (outside of the project boundary) adult salmon and steelhead broodstock collection facilities associated with the Wells HCP using radio telemetry;
- Implement methods for monitoring sub-adult bull trout, if at any time during the new license term sub-adult bull trout are observed passing Wells dam in significant numbers;
- Identify and implement, in consultation with the Aquatic SWG and Wells HCP Coordinating Committee, reasonable and appropriate options to modify the upstream fishways, downstream bypass system, or operations to reduce the identified impacts to bull trout passage (if upstream or downstream

passage problems for bull trout are identified, as agreed to by FWS and Douglas PUD);

- Implement up to five bull trout entrapment/stranding assessments during periods of low reservoir elevation (below 773 feet msl) during the first 5 years of the new license, and if no incidences are observed, conduct additional assessments at 5-year intervals through the remainder of the license term;
- Develop a plan, in consultation with the Aquatic SWG, to address identified factors contributing to exceedance of the allowable level of incidental take, if the incidental take of bull trout is exceeded due to the implementation of other aquatic resource management plan activities;
- Collect up to 10 adult bull trout tissue samples in the Wells dam fishway facilities over a period of 1 year and fund their genetic analysis (beginning in year 10 of the new license and every 10 years thereafter, if recommended by the Aquatic SWG);
- Continue to participate in information exchanges with other entities conducting bull trout research and regional efforts to explore availability of new monitoring methods and coordination of radio-tag frequencies for bull trout monitoring studies in the project;
- Make available an informational and educational display at the Wells Dam Visitor Center to promote the conservation and recovery of bull trout in the upper Columbia River and associated tributary streams;
- Monitor hatchery actions (e.g., salmon trapping, sturgeon broodstocking and capture activities) that may encounter adult and sub-adult bull trout for incidental capture and take; and
- Prepare an annual report and provide a draft of the report to the Aquatic SWG for review.

Our Analysis

Continued implementation of the Wells HCP measures would benefit bull trout by providing safe passage routes through the project. Wells HCP implementation would also provide tributary habitat improvement measures to benefit bull trout spawning, migration, and rearing, and hatchery juveniles for prey items. Eight years of monitoring has demonstrated no project-related adverse effects on adult or sub-adult bull trout as a result of passage through the Wells Project. Studies implemented as part of the 2004 Bull Trout Monitoring and Management Plan also determined that there is no correlation between project operations and downstream passage events, and that there is no upstream movement of adult bull trout through the Wells dam fishways during the off-season period of November 16 through April 30. Bull trout captured and tagged at Wells dam were radio-tracked to the Methow and Entiat core areas during

spawning periods, and have also demonstrated movement between these systems by successfully passing upstream or downstream past Wells dam (LGL and Douglas PUD, 2008b). Continued operation of the project would, therefore, not likely result in adverse effects to bull trout.

As outlined in the Aquatic Settlement, the proposed Bull Trout Management Plan would provide for ongoing monitoring and evaluation, and include the flexibility to adjust the monitoring program over the term of any new license as new information is gathered (i.e., through adaptive management). Implementation of the Bull Trout Management Plan would ensure continued monitoring of any adverse effects to bull trout and any potential incidental take as a result of the project, thereby assisting with the recovery of bull trout in the mid-Columbia River.

The plan provides for collection of tissue samples and funding of genetic analysis of the collected samples. Genetic analysis of bull trout samples would assist the resource agencies in monitoring the origination and migration patterns of bull trout throughout the mid-Columbia River and tributaries. This information would likely be used to assist the agencies in their management of bull trout populations in the Columbia River. It is unclear, however, how this information would relate to the project.

The plan proposes that Douglas PUD participate in regional information exchanges for bull trout. Regional bull trout information exchanges would likely be used by the agencies to inform their ongoing management of Columbia River bull trout populations. We note, however, that the monitoring information would be readily accessible to the agencies through the preparation of annual reports as proposed in the Bull Trout Management Plan, which would also be filed with the Commission with Douglas PUD's annual report summarizing all activities undertaken under the aquatic resource management plans included in the Aquatic Settlement.

Several provisions of the Bull Trout Management Plan would enable Douglas PUD, in consultation with the Aquatic SWG, to implement as-yet unidentified plans, measures, or modifications to project operations or facilities to address potential bull trout passage criteria exceedances or allowable incidental take exceedances. However, the plan does not provide any specific measures that would be implemented. Without specific measures, we cannot evaluate the environmental effects of the measures or their relationship to the project.

The Bull Trout Management Plan also includes measures for monitoring bull trout incidental take that may occur as a result of implementing other Aquatic Settlement resource management plans, and conducting up to five stranding surveys during the first 5 years of a new license, and if no incidences are observed, at 5-year intervals thereafter, when Wells reservoir elevations fall below 773 feet msl. These evaluations would assist in determining whether project operations as well as protection and enhancement measures designed to benefit other aquatic species are adversely affecting bull trout. However, as written, the evaluations are very broad in scope and

would be difficult to enforce. The Commission could include a requirement in any license issued to require detailed plans to enable the Commission to ensure that the objectives of the evaluations are achieved.

Finally, the plan proposes a comprehensive monitoring program for assessing passage performance and incidental take at off-project broodstock collection facilities and the off-project Methow Hatchery and associated acclimation facilities in the Methow River Basin. Monitoring at these facilities would enable FWS to determine whether the facilities are adversely affecting Methow River bull trout; however, since none of these facilities are project facilities, it is unclear how these monitoring measures would be related to the proposed relicensing action.

Pacific Lamprey Management Plan

Recent research suggests that Pacific lamprey abundance has steadily declined in the Columbia River Basin and in other regional rivers since the early 1960s (Close et al., 2002; Kostow, 2002) and the species continues to decline despite of, or in part because of, measures taken to protect and restore salmonid species (Nez Perce, Umatilla, Yakama and Warm Springs Tribes, 2008). Habitat loss, river impoundment, poor ocean conditions, and water pollution have all likely contributed to this decline. Pacific lamprey are also relatively poor swimmers and have difficulty passing through fishways designed for adult salmonids (Keefer et al., 2009). In particular, recent radio telemetry studies conducted in the Columbia River have indicated that lamprey have difficulty negotiating fishway entrances, collection channels, transition areas, and areas at the top of fishways (Moser et al., 2005). During their downstream migration, juvenile Pacific lamprey must also negotiate project turbines, spillways, and various types of downstream fish passage facilities.

The continued operation of the Wells Project has the potential to affect the upstream and downstream passage of adult and juvenile Pacific lamprey and the quality and quantity of the species' available spawning and rearing habitat. To address these issues, Douglas PUD's proposed Aquatic Settlement includes the implementation of a Pacific Lamprey Management Plan. The Pacific Lamprey Management Plan is intended to fully address any measurable adverse effects on Pacific lamprey resulting from the Wells Project during the term of the new license. Overall, the measures presented within the Pacific Lamprey Management Plan are designed to meet the following objectives:

- Objective 1: Identify and address any adverse project-related impacts on passage of adult Pacific lamprey.
- Objective 2: Identify and address any project-related impacts on downstream passage and survival and rearing of juvenile Pacific lamprey.
- Objective 3: Participate in the development of regional Pacific lamprey conservation activities.

Specifically, Douglas PUD, in consultation with the Aquatic SWG, would implement the following measures for adult Pacific lamprey at the Wells Project:

- Operate the upstream fishways at Wells dam in accordance with criteria outlined in the Wells HCP, and if requested by the Aquatic SWG, evaluate various operational and structural modifications to the upstream fishways for the benefit of Pacific lamprey through the implementation of an operations study plan;
- Continue to implement fish salvage activities associated with fish ladder maintenance and dewatering (as required by the Wells HCP);
- Continue to conduct annual adult fish passage monitoring in the Wells dam fishways using the most current technology available to count and provide information on adult upstream migrating Pacific lamprey (monitor 24 hours a day from May 1 through November 15) and implement other measures to improve the accuracy of lamprey counts;
- Complete a literature review on the effectiveness of upstream passage measures recently implemented at other Columbia and Snake River hydroelectric facilities and use this information to potentially develop further fishway modifications to improve upstream passage at Wells dam (if additional passage improvement measures are deemed necessary by the Aquatic SWG);
- Conduct a fishway inspection and identify, design, and implement, if necessary after consultation with the Aquatic SWG, structural or operational fishway modifications to address entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools.
- Conduct a 1-year study to monitor the effectiveness of additional upstream passage measures on upstream passage performance (if such additional upstream passage measures are implemented in the future);
- Develop and implement additional measures to improve upstream Pacific lamprey passage (if monitoring results indicate that passage rates are not similar to passage rates at other mid-Columbia River dams or within standards defined in the Pacific Lamprey Management Plan);³⁶ and
- Periodically monitor adult Pacific lamprey passage performance through Wells dam fishways to verify the effectiveness of passage improvement measures (every 10 years after compliance has been achieved).

³⁶ Measures may be repeated, as necessary, until adult passage through Wells dam is similar to passage rates at other mid-Columbia River dams or within standards described in section 4.1.5 of the Pacific Lamprey Management Plan.

Douglas PUD, in consultation with the Aquatic SWG, would also implement the following measures to address juvenile Pacific lamprey in the Wells Project area:

- Operate the downstream bypass system at Wells dam in accordance with criteria outlined in the Wells HCP.
- Continue to conduct salvage activities as required by the Wells HCP's Adult Fish Passage Plan during fishway dewatering operations. Any juvenile Pacific lamprey that are captured during salvage activities would be released downstream of Wells dam.
- Conduct a literature review to summarize available technical information related to juvenile lamprey passage and survival through Columbia and Snake River hydroelectric facilities (beginning in year 5 and every 5 years thereafter during any new license).
- Conduct a 1-year juvenile Pacific lamprey downstream passage and survival study (if an appropriate tag technology becomes available and a sufficient source of macrophthalmia are identified to ensure that a field study would yield statistically rigorous and unbiased results).
- Identify and implement scientifically rigorous and regionally accepted measures or additional studies to address such project impacts on juvenile Pacific lamprey (if study results indicate that project operations have a significant negative impact on the Pacific lamprey population above Wells dam).
- Implement a 1-year study to examine the presence and relative abundance of juvenile Pacific lamprey in habitat areas within the project that may be affected by project operations.

In addition to the above measures, Douglas PUD would participate in Pacific lamprey work groups to support regional conservation efforts (e.g., the Pacific Lamprey Technical Work Group and the FWS Lamprey Conservation Initiative). Douglas PUD would also prepare an annual report summarizing the previous year's activities and proposed activities for the upcoming year.

The measures included in the Pacific Lamprey Management Plan are intended to be compatible with other Pacific lamprey management plans in the Columbia River mainstem. Furthermore, the Pacific Lamprey Management Plan is intended to be supportive of the Wells HCP.

The Umatilla recommends that Douglas PUD provide effective upstream and downstream passage for lamprey, with an upstream passage standard of 80 percent survival, which is the standard in the *Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin* (Nez Perce, Umatilla, Yakama and Warm Springs Tribes, 2008).

Our Analysis

Douglas PUD conducted a series of pre-filing studies to evaluate the potential effects of the Wells Project on Pacific lamprey including three consecutive adult passage and behavior studies (LGL and Douglas PUD, 2008a; Robichaud et al., 2009; Johnson and Murauskas, 2010), a juvenile lamprey predation study (Douglas PUD and LGL, 2008), and a spawning assessment (Lê and Kreiter, 2008).

Douglas PUD's 2008 lamprey spawning assessment (Lê and Kreiter, 2008) found no Pacific lamprey or signs of Pacific lamprey spawning within the project area. This information indicates that the project is not an important spawning area for Pacific lamprey; therefore, the project would not adversely affect lamprey spawning.

Douglas PUD's three adult passage and behavior studies provided substantial insight into adult lamprey passage at Wells dam. Passage success through the ladder was shown to be 100 percent, fall back after exiting the ladders was not observed during the 3 years of study, and fishway passage times required only hours rather than days as observed at other downstream dams (Nass et al., 2005; Robichaud et al., 2009). These relatively high rates of in-ladder passage efficiency are likely due to the lack of sills in submerged orifices and the lack of diffuser gratings on the pool floors, offering a smooth wall-to-wall environment known to assist lamprey passage. Only 2 of the 73 pools within each fishway have a floor-oriented auxiliary water supply, both of which do not interfere with the orifice and only cover a portion of the pool floor. This allows for adequate attachment and resting surfaces as lamprey travel through the fishways using burst-and-attach movements.

Radio telemetry studies conducted during pre-filing indicate that in-ladder passage efficiency at the Wells Project is among the best in the Columbia River (Robichaud et al., 2009). Median project passage time was 32 hours total. This included 6.1 hours for the lower part of the fish ladder, 5.9 hours for the upper part of the fish ladder, and 20 hours at or in the fish trap. However, radio-telemetry data collected in 2007 and 2008 indicate that adult lamprey have difficulty negotiating water velocities produced by head differentials at the fish ladder entrances. The entrance efficiency of radio-tagged lamprey at Wells dam was 33 percent. These results suggest that, similar to observations at other Columbia River dams, the relatively poor lamprey entrance efficiencies likely result from approach velocities that are beyond the swimming capabilities of adult Pacific lamprey. In addition, head differentials at Wells dam fish ladder entrances are 25 to 36 percent greater than median values recorded at neighboring Rocky Reach and Rock Island dams. The head differentials were increased above the original 1.0-foot requirement to enhance attraction for adult salmon. The resulting entrance environment appears to be the greatest impediment to successful passage of adult lamprey at Wells dam (Robichaud et al., 2009). As noted in Robichaud et al. (2009), a reduction in head differential to reduce entrance velocities may be effective at enhancing adult lamprey passage at the project, specifically during

nighttime hours to capitalize on the nocturnal behavior of lamprey and avoid interference with salmon.

Once inside the Wells fish ladders, Pacific lamprey also appear to bypass the Wells dam adult counting windows. Radio telemetry studies conducted by Douglas PUD in 2007 and 2008 indicate that while the video-processing (counting system) is accurate when the fish pass in front of the counting window, approximately 75 percent of the lamprey do not pass through the field of view.

While we have no information to indicate that adult Pacific lamprey failing to enter the fish ladders and pass the project cannot successfully reproduce in areas downstream of the project, Pacific lamprey spawning sites generally occur in low gradient stream sections where gravel is deposited. Nest sites are typically found in tail-out areas of pools and in riffles. These types of habitat are likely rare within the inundated mainstem Columbia River and associated tributary reaches located immediately downstream of the Wells Project.

Conducting a fishway inspection and implementing up to four of the specific fishway improvement measures contained in the Pacific Lamprey Management Plan (i.e., entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools) could improve upstream passage for Pacific lamprey and improve access to lamprey spawning and rearing habitat upstream of the project. Implementing an evaluation program to determine the success of any of the four specific measures that are implemented would document whether the measures improve upstream lamprey passage.³⁷ Such an evaluation program could include measures to improve lamprey counting efficiency at the fish ladders. The Commission could also include a license condition that requires the Commission and NMFS to review the implementation and evaluation plans for any of the specific improvement measures that are proposed, prior to implementation. This would enable the Commission and NMFS to evaluate potential effects of the measures on Wells HCP Plan Species.

Continued implementation of the Wells HCP would continue to provide benefits to Pacific lamprey passing through the project and inhabiting tributaries to the Columbia River in the vicinity of the project. Beneficial measures include: (1) operation of the juvenile bypass system, which would provide a safe passage route for downstream migrating juveniles; (2) fish ladder salvage activities, which would protect trapped lamprey in the ladder; (3) annual lamprey counts, which would provide for continuous monitoring of adult lamprey populations migrating through the project area; (4) implementation of the tributary enhancement fund, which would provide habitat improvements in the Methow and Okanogan River basins; and (5) implementation of

³⁷ We acknowledge that it may not be necessary to implement all four measures to achieve safe, timely, and effective lamprey passage at Wells dam.

the northern pikeminnow predator control program, which would reduce potential mortality on downstream migrating juveniles.

The proposal to participate in Pacific lamprey work groups to support regional conservation efforts could help to identify investigative techniques that could be employed at the project to determine project effects.

Proposals to use the “most-current” technology that is commercially available to count upstream migrating lamprey and use alternative passage routes to count lamprey could potentially improve the accuracy of methods used to enumerate lamprey migrating upstream through the project. However, the plan does not identify the specific measures that would be implemented toward that end. Without specific measures, we cannot evaluate their benefits when compared to existing counting methods implemented at the project. However, as noted above, any specific measures that are proposed to improve the accuracy of lamprey counts could be proposed for Commission approval in conjunction with implementation plans for any of the four specific fishway improvements to improve lamprey passage.

Requiring Douglas PUD to meet the best passage rates found at other projects on the Columbia and Snake rivers, achieve an 80 percent passage standard (as recommended by the Umatilla Tribes), or comply with an as-yet unidentified passage standard that may be developed in the future by FWS or the Regional Lamprey Technical Working Group, would all depend on many factors outside of the influence of the project and may not be reasonable or feasible at the Wells Project.

The Pacific Lamprey Management Plan proposes that Douglas PUD develop an operations study plan and conduct an adult lamprey passage literature review to evaluate and implement potential as-yet unidentified operational measures to enhance lamprey passage. The proposed plan and literature review do not identify any specific measures that would be evaluated or implemented through these efforts. Without specific measures, we cannot evaluate the environmental effects. Moreover, it is unclear why this information would be needed or how it would be used in light of the fact that there are already four specific measures that were developed as a result of pre-filing studies, and up to four of the measures are proposed to be implemented to improve upstream lamprey passage at the project.

The effects of various dam passage routes (i.e., turbines, juvenile bypass, and larger spill events) on survival of downstream migrating juvenile Pacific lamprey are currently unknown. To evaluate the potential effects of the project on juvenile Pacific lamprey, the Pacific Lamprey Management Plan proposes that Douglas PUD conduct a study to examine the presence and relative abundance of juvenile Pacific lamprey in habitat affected by the project; conduct a juvenile lamprey downstream passage evaluation, if appropriate technology is developed during the license term to conduct such a study; conduct literature reviews at 5-year intervals to evaluate juvenile lamprey passage and survival through other Columbia and Snake River hydroelectric projects; and implement as-yet unidentified measures, studies, or operational modifications if the

results of a future juvenile lamprey passage evaluation indicate that Wells Project operations are adversely affecting Pacific lamprey populations.

Quantifying effects from downstream juvenile lamprey passage through the project is not technically feasible at this time, and there is no information in the record that demonstrates that the project is adversely affecting juvenile lamprey. It is possible that future implementation of as-yet unidentified measures could improve downstream juvenile lamprey passage survival; however, no specific measures are proposed at this time. Without specific measures, we cannot evaluate their benefits. Literature reviews conducted at 5-year intervals over the term of the license could potentially inform Douglas PUD of technological advancements to improve dam passage survival for juvenile lamprey or of methods to determine project effects on juvenile lamprey.

Determining juvenile Pacific lamprey presence/absence and relative abundance in the reservoir would potentially provide information to fisheries managers on lamprey use of the reservoir. However, it is unclear why this information would be needed or how it would be used. Douglas PUD already attempted to evaluate the effects of continued project operations on juvenile lamprey occurring in Wells reservoir. The potential effects of Wells reservoir predatory fish on juvenile lamprey were studied in 2008. The study indicated that predation on juvenile lamprey by predatory fish in the study area is not substantial and that a difference in predation rates on juvenile lamprey between the Wells forebay and tailrace was not detectable (Douglas PUD and LGL, 2008). Additionally, Douglas PUD conducted a review of the effects of reservoir fluctuations on Pacific lamprey (DTA, 2006a). Ammocoetes are the only Pacific lamprey life stage that use littoral habitat. The nature of infrequent reservoir fluctuations at the Wells Project likely limits the potential for stranding and associated impacts to the Pacific lamprey population. The project is operated within 4 feet of the normal maximum pool elevation 98 percent of the time. Therefore, project effects on Pacific lamprey due to reservoir operations are expected to be negligible, although a small proportion of less mobile ammocoete larvae may occasionally have a risk of stranding and entrapment (DTA, 2006a).

White Sturgeon Management Plan

The white sturgeon is an important cultural, recreational, and commercial resource in the Columbia River Basin. Prior to the building of dams on the Columbia River, white sturgeon populations likely responded to seasonal changes in food and habitat availability by ranging extensively between freshwater, estuarine, and marine environments. Construction of dams on the Columbia River has largely blocked the upstream movement of sturgeon, although downstream passage still occurs via spill, fishways, and project turbines. White sturgeon seldom ascend fish ladders at dams because passage facilities for upstream migrating fish were designed primarily for adult salmon and steelhead (USGS, 2008).

Over the past several decades, the abundance of white sturgeon within the mid- and upper Columbia River has declined dramatically because of numerous factors, including obstruction of migration by mainstem hydroelectric dams, altered stream flows, altered hydrologic regimes, altered water temperature regimes, reduced spawning habitat, and over harvest (van der Leeuw et al., 2006; Wydoski and Whitney, 2003). Variations in population characteristics also have been attributed to differences in exploitation rates and recruitment success, access to marine food resources, and suitability of hydrologic conditions and available habitats (Devore et al., 1995).

Douglas PUD and the Aquatic Settlement parties developed a White Sturgeon Management Plan to address the potential effects of the project on white sturgeon. The goal of the White Sturgeon Management Plan is to increase the white sturgeon population in Wells reservoir to a level that can be supported by the available habitat and characterized by a diverse age structure consisting of multiple cohorts (juveniles and adults). In addition, the White Sturgeon Management Plan is intended to support spawning, rearing and migration as identified by the aquatic life designated use under WAC 173-201A in the Washington State water quality standards.

During pre-filing, Aquatic Settlement parties determined that an assessment of Wells Project effects on white sturgeon was not practical given sturgeon life history characteristics and the limited number of fish estimated to exist in the project area. Therefore, the Aquatic Settlement parties concluded that resource measures related to white sturgeon should focus on population protection and enhancement by means of supplementation as an initial step to increase white sturgeon numbers in Wells reservoir. In addition to the initial supplementation activities, a monitoring and evaluation program would be implemented to assess natural recruitment, juvenile habitat use, emigration rates, Wells Project carrying capacity, and the potential for natural reproduction in order to inform the scope of a future, longer-term strategy. The objectives listed below were developed to meet the goals of the White Sturgeon Management Plan:

- Objective 1: Supplement the white sturgeon population in order to address Wells Project effects, including impediments to migration and associated bottlenecks in spawning and recruitment.
- Objective 2: Determine the effectiveness of supplementation activities through a monitoring and evaluation program.
- Objective 3: Determine the potential for natural reproduction in Wells reservoir in order to appropriately inform the scope of future supplementation activities.
- Objective 4: Adaptively manage the supplementation program as warranted by the monitoring results.
- Objective 5: Evaluate whether there is biological merit to providing safe and efficient adult upstream passage.

- Objective 6: Identify white sturgeon educational opportunities that coincide with White Sturgeon Management Plan activities.

To fulfill these objectives, Douglas PUD, in consultation with the Aquatic SWG, would implement a series of measures throughout the new license term during two phases. Phase I would be implemented during the first 10 years after license issuance and consist of supplementation, monitoring, and evaluation activities. Results of Phase I would then be used to inform the scope of measures to be continued during Phase II, which would be implemented for the remainder of the new license.

During Phase I, Douglas PUD would prepare and implement a broodstock collection and breeding plan, in consultation with the Aquatic SWG. Under this proposed plan, a white sturgeon supplementation program may include, but may not be limited to, the following implementation options:

- Build a new or retrofit an existing Douglas PUD-funded hatchery facility to accommodate white sturgeon broodstock, egg incubation, and juvenile rearing;
- Develop a mid-Columbia hatchery facility funded by the three PUDs (Douglas, Chelan, and Grant) to accommodate various phases of white sturgeon supplementation; broodstock, egg incubation, and juvenile rearing;
- Release juveniles directly into Wells reservoir that are produced and reared at a commercial facility (following an appropriate breeding plan); or
- Trap and haul juveniles or adults from the lower Columbia River and release them directly into Wells reservoir.

Within 2 years following issuance of a new license, Douglas PUD would release up to 5,000 yearling white sturgeon into Wells reservoir annually for four consecutive years (20,000 fish total). Additional years and numbers of juvenile sturgeon to be stocked during Phase I would be determined by the Aquatic SWG and would not exceed 15,000 juvenile sturgeon (total of 35,000 juvenile sturgeon during Phase I). All hatchery-reared juvenile sturgeon released into Wells reservoir would be marked with PIT tags and year-specific scute marks for monitoring purposes (described below).

To fulfill Objective 2, Douglas PUD would conduct a monitoring and evaluation program within Wells reservoir for the purpose of assessing the effectiveness of the proposed supplementation activities. Monitoring would include both an index monitoring program and a marked fish tracking program.

The 3-year index monitoring program would be designed to monitor juvenile and adult sturgeon in Wells reservoir to determine age-class structure, survival rates, abundance, density, condition factor, growth rates, and to identify distribution and habitat selection of juvenile sturgeon. The indexing methods would include using gillnets, set lines or other appropriate recapture methods for juveniles and adults.

Frequency of implementation of long-term index monitoring activities would be determined by the Aquatic SWG.

Beginning in year 3 of the new license and continuing for 3 years, Douglas PUD would conduct tracking surveys of the juvenile white sturgeon that were released with active tags (i.e., radio or sonic tags) as part of supplementation activities. The purpose of tracking active-tagged fish is to determine juvenile white sturgeon emigration rates out of Wells reservoir and habitat use within Wells reservoir. In years when environmental conditions are appropriate, Douglas PUD would also track sexually mature adult sturgeon that were captured and implanted with active tags for the purpose of identifying potential spawning locations and determining natural reproduction potential.

The information collected through the monitoring activities described above would provide insight into the population dynamics, habitat availability, and limiting factors that affect the natural population structure of white sturgeon within Wells reservoir. This information would inform supplementation, monitoring and evaluation activities during implementation of Phase II supplementation and monitoring activities in the White Sturgeon Management Plan for the duration of the new license term (after year 10).

During Phase II, the number and frequency of yearlings released annually would range from 0 to 5,000 fish. Specific stocking rates would be based on the results of the Phase I Monitoring and Evaluation Program and determination of carrying capacity and would be consistent with the goal and objectives of the White Sturgeon Management Plan. During Phase II, Douglas PUD would also:

1. compile information on other white sturgeon supplementation programs in the Columbia River Basin in order to assess whether the white sturgeon supplementation program being implemented at the project is: (a) consistent and comparable with the technology and methods being implemented by other supplementation programs in the region; (b) reasonable in cost and effective to implement at the project; and (c) consistent with the supplementation program goals and objectives; and
2. conduct long-term index monitoring beginning in year 12 of the new license and every 3 to 5 years thereafter for the duration of the new license. This program would be used to monitor age class structure, survival rates, abundance, condition factor, and growth rates; identify distribution and habitat selection of juvenile sturgeon; and support broodstock collection activities.

In year 11 of the new license (and every 10 years thereafter for the duration of the new license unless otherwise determined by the Aquatic SWG), Douglas PUD would evaluate the biological merit of providing upstream passage for adult white sturgeon. The assessment of biological merit would be determined by evaluating:

(1) information gathered from monitoring and evaluation activities and determining whether there is significant biological benefit and need for upstream passage;
(2) availability of reasonable and appropriate means to provide upstream passage; and
(3) consensus from all other operators of the mid-Columbia projects to implement adult upstream passage measures. If all three of these provisions are met, Douglas PUD, in consultation with the Aquatic SWG, would develop adult passage measures that are consistent with measures being implemented by other mid-Columbia project operators.

In addition to the above supplementation and monitoring measures, Douglas PUD, in consultation with the Aquatic SWG, would identify appropriate White Sturgeon Management Plan activities as opportunities for education to local public entities such as schools, cities, fishing and recreation groups, and other interested local groups. White Sturgeon Management Plan activities that may be appropriate for public participation include hatchery tours, release of hatchery juveniles, and tagging of juveniles prior to release.

Finally, Douglas PUD would prepare an annual report and provide a draft of the report to the Aquatic SWG for review.

Our Analysis

The effects of the project on white sturgeon and the size of the white sturgeon population that could be sustained in Wells reservoir are unknown. A study implemented by Douglas PUD in 2001-2003 indicated that the sturgeon population of Wells reservoir ranged from 13 to 217 individuals (Skalski and Townsend, 2005). The length of the fish captured and tagged ranged from 24 to 80 inches. Only 13 sturgeon were collected during the mark-recapture portions of the study. Of the 11 fish whose age could be determined, all were between 6 and 30 years of age, indicating that these fish recruited to Wells reservoir after Wells dam was completed in 1967, with the strongest year-class recruitment between the years 1972 to 1978 and again from 1988 to 1996.

While the presence of sub-adult and adult white sturgeon younger than the project suggests that successful rearing does take place within Wells reservoir, it is unknown whether the white sturgeon population currently residing in Wells reservoir is a result of natural recruitment within the project area or from immigration of juveniles originating outside of the project area. If spawning is occurring in Wells reservoir, it is likely occurring in the tailrace of Chief Joseph dam (Douglas PUD, 2006). White sturgeon rarely use the Wells dam fish ladders for upstream or downstream passage.

The current natural recruitment of sturgeon in the reservoir appears to be too low to maintain a healthy population. The White Sturgeon Management Plan's measures to increase numbers of juveniles through supplementation of up to 35,000 juvenile sturgeon during the first 10 years following license issuance, and annually supplement up to an additional 5,000 fish every year thereafter, should lead to an increase in reservoir populations as these juveniles mature. Construction of a mid-Columbia

hatchery facility that would be funded by the three PUDs (i.e., Douglas, Chelan, and Grant) would provide Douglas PUD with a dedicated source of white sturgeon broodstock and juveniles.

The monitoring and evaluation programs described in the plan would provide information that would contribute to the success of the supplementation program and help to evaluate what supplementation levels would be necessary to achieve the plan goals. The proposed tracking studies would provide information on potential emigration rates from the reservoir. Tracking may also provide information on habitat use and spawning areas in the reservoir, and may assist with the collection of broodstock for the supplementation program. PIT tagging and scute marking stocked fish would enable implementation of subsequent monitoring efforts to identify factors that influence the survival of the introduced fish. Obtaining updated information, when available, on other white sturgeon recovery programs (e.g., upper Columbia River, Kootenai River, mid-Columbia PUDs), could help to improve the monitoring and evaluation program and refine its implementation. A sustainable increase in white sturgeon reservoir populations could ultimately lead to the implementation of a harvest program on the enhanced population.

Evaluating the biological merit of providing upstream passage for adult white sturgeon, as proposed by Douglas PUD, could lead to implementation of additional fish passage measures that would potentially provide benefits to white sturgeon populations in the mid-Columbia River. However, the specific criteria that would trigger additional fish passage measures and the additional measures that would be implemented are as-yet undefined. Additionally, measures that would be implemented at other mid-Columbia projects may be unreasonable or infeasible when applied to the Wells Project.

The plan also proposes that Douglas PUD identify White Sturgeon Management Plan activities as opportunities for education to local public entities such as schools, cities, fishing and recreation groups, and other interested local groups. Such a program could provide information to the local residents and visitors about the enhanced sturgeon population in Wells reservoir. The measure, however, is very broad in scope and would be difficult to enforce.

Resident Fish Management Plan

Under the terms of the Aquatic Settlement, Douglas PUD proposes to implement the Resident Fish Management Plan. The goal of the plan is to protect and enhance native resident fish populations and habitat in the project during the term of the new license. Specifically, under the Resident Fish Management Plan, Douglas PUD would implement the following measures:

- Continue to conduct annual predator control activities for northern pikeminnow and avian predators as outlined in the Wells HCP.
- Continue to implement the Douglas PUD Land Use Policy, which requires approval of all land use activities that take place within the project boundary.

All permit activities such as construction of boat docks, piers, and landscaping within project boundary would be subject to review and approval by Douglas PUD only after the applicant has received all other required regulatory permits, in addition to consideration by the Wells HCP signatory parties and permit review by state and federal action agencies.

- Conduct a resident fish study to determine the relative abundance of the various resident fish species found within Wells reservoir. This assessment would occur in year 2 and every 10 years thereafter during the term of the new license. The study objectives would focus on: (1) identifying whether there have been major shifts in the resident fish populations resulting from the implementation of the white sturgeon, bull trout, Pacific lamprey, and aquatic nuisance species management plans, and (2) collecting information on resident predacious fish populations found within Wells reservoir.
- Implement appropriate measures to address any negative changes to native resident fish populations of social, economic, and cultural importance that are identified in the above study, and are not caused by and cannot be addressed through the implementation of other aquatic resource management plans or activities.
- Implement an assessment to identify potential effects, if any, on native resident fish if at any time during the new license term, future changes in Wells dam operations are proposed that require FERC approval and the Aquatic SWG concludes that either reservoir or tailrace habitat within the project boundary may be affected with regards to spawning, rearing, and migration (aquatic life designated uses). If the results of the assessment identify adverse effects to native resident fish species of social, economic and cultural importance, attributable to such changes in project operations, then Douglas PUD would consult with the Aquatic SWG to select and implement reasonable and appropriate measures to address such effects.
- Prepare an annual report and provide a draft of the report to the Aquatic SWG for review.

Our Analysis

Although implementation of Douglas PUD's annual northern pikeminnow, piscivorous bird, and piscivorous mammal harassment and control program is targeted at reducing predation on anadromous fish, it would also likely directly benefit the resident fish species residing in Wells reservoir. This reduction in predator abundance in combination with Douglas PUD's continued implementation of its Land Use Policy would likely minimize adverse effects on aquatic habitat and would help maintain populations of resident fish species in the project area.

The plan proposes to implement resident fish population assessments in year 2 of a new license and every 10 years thereafter. These assessments would monitor for

major deleterious shifts in resident fish populations resulting from implementation of other Aquatic Settlement resource management plans. While these assessments could provide information on trends in resident fish population abundance in Wells reservoir, we note that there are many factors outside of the influence of the project that could cause shifts in fish population abundance. Examples of these factors could include: drought, flooding, disease, and harvest. Monitoring all of these factors in an attempt to differentiate their effects from those attributable to implementation of the other Aquatic Settlement resource management plans would be a considerable effort and could lead to disagreement as to project-specific effects.

The plan also includes provisions to implement as-yet unidentified measures to address: (1) any negative changes to native resident fish populations; and (2) the potential effects on resident fish from any future changes in project operations. The plan does not identify the specific measures that would be implemented to address future effects. Without specific measures, we cannot determine the benefits of the measures or the relationship of the measures to project effects or purposes.

Northern Pikeminnow Predation

As described in section 3.3.1.1, subsection *Fisheries Resources*, the northern pikeminnow is a slow-growing, long-lived predator of juvenile salmonids and other native fish species. In summer, adult northern pikeminnow prefer shallow, low velocity areas in cool lakes or rivers. During the winter, they use deeper water and pools (Scott and Crossman, 1973). Northern pikeminnow pose the greatest predation threat to migrating juvenile anadromous salmonids in the Columbia River Basin because of their abundance and distribution.

Our Analysis

The Wells HCP contains a requirement that Douglas PUD implement a northern pikeminnow control program to reduce the level of predation on anadromous salmonids in the mid-Columbia River Basin. The northern pikeminnow removal program includes a northern pikeminnow bounty program, participation in fishing derbies and tournaments, and the use of longline fishing equipment. These efforts are designed to provide an immediate and substantial reduction in the predator populations present within the waters of the Wells Project.

Since efforts were first initiated in 1995, Douglas PUD's northern pikeminnow removal program has captured over 193,000 northern pikeminnow. In addition, the number of pikeminnow ascending the project ladders has declined over the years, and the catch rates have also declined. These results are consistent with the results of the predator removal programs in the lower Columbia River (Friesen and Ward, 1999). Continued harvest of northern pikeminnow from project waters would provide additional decreases in predator abundance, thereby continuing to benefit other regionally important and ESA-listed native fish species.

3.3.1.3 Cumulative Effects

Water Quality

Water temperature within the Columbia River is slightly influenced by the project, with the project's effect being to decrease the rate of heating or cooling depending on the difference between the water temperature and ambient climatic conditions. Upstream dams influence water temperatures entering Wells reservoir. In general, the river is cooler in the spring and early summer and warmer in the late summer and fall than would occur in the absence of the other dams. This is primarily an effect of the Grand Coulee and other upstream storage reservoirs in the United States and Canada.

Within the portions of the Methow and Okanogan rivers that are backwatered by Wells reservoir, cool water from the Columbia River that intrudes into the tributaries serves to reduce water temperatures in the backwatered reaches during the summer months, which likely reduces adverse cumulative effects from upstream water diversions and land management practices. In the fall when the water in the Columbia River cools more slowly than it does in the tributaries, intrusion of Columbia River water causes an adverse cumulative effect by slowing the rate at which water temperatures are reduced within the backwatered reaches of the Methow and Okanogan rivers.

The cumulative effects on TDG levels largely depend on flows through spillways and powerhouses. Generally, routing water through powerhouses does not elevate TDG levels, whereas routing water through spillways and their stilling basins can entrain air and thereby elevate TDG, depending on many different factors. Spills at upstream dams can result in elevated TDG levels in water reaching the project. The effects of the project depend on the TDG levels in water reaching the project and the extent and configuration of spills at the project. Monitoring conducted from 1998 to 2007 in the forebay and tailrace of the Wells Project and in the forebay of the Rocky Reach project indicates that the Wells Project contributed to an overall increase in TDG levels in most years, which sometimes extended downstream to the Rocky Reach project, contributing to a cumulative increase in TDG levels. Since 2007, the TDG model developed by Douglas PUD has been used to develop spill operational guidelines (playbooks) that are used to guide operations to limit TDG levels within the tailrace under a range of operating conditions. Continued refinement of spill operational guidelines through the development of annual GAPS, which are subject to review and approval by Washington DOE, should serve to limit the project's cumulative contribution to high TDG levels in the Columbia River.

Anadromous Salmonids

Salmon and steelhead in the Columbia River Basin have been negatively affected for more than a century by many factors, including urbanization, the introduction of exotic species, overfishing, development in the floodplains, diversions, dams, mining, farming, ranching, logging, hatcheries, predation, ocean conditions and the loss of habitat (NMFS, 2008). Ongoing threats identified by NMFS include hydrosystem operations, habitat degradation, hatchery and harvest management, and predation by birds and other species of fish.

Injury and mortality caused during dam and reservoir passage has the potential to cumulatively affect salmon and steelhead that migrate through the Wells Project area, which must pass eight other dams and reservoirs on the mid- and lower Columbia River on their migration to and from the Pacific Ocean. Injury, delay, or mortality caused during passage at Wells dam and through Wells reservoir, including mortality caused by predation by birds and fish, have the potential to contribute to cumulative mortality in the migratory corridor for these species. In addition, increases in TDG caused during spills may contribute to a cumulative increase in gas supersaturation and injuries due to gas bubble trauma, especially for juvenile salmonids migrating during peak spill events.

The Wells HCP and new HGMPs guiding the operation of Douglas PUD's hatchery programs address a wide range of issues affecting salmon and steelhead populations at the project and in the basin. Implementation of the Wells HCP, in conjunction with other federal, tribal, state, and local salmonid recovery programs, is expected to increase wild fish populations in the Columbia River. Measures contained in the Wells HCP will continue to support hatcheries for salmon and steelhead recovery efforts on the Columbia River, improve passage efficiency, reduce predation, enhance habitat, and provide for increasing populations. The Wells HCP also provides for ongoing monitoring and evaluation, and includes the flexibility to adjust the program over the term of the new license, if needed, to ensure that the no net impact goal and survival standards are met over the 50-year term of the HCP. The Wells HCP and associated HGMPs reduce direct and indirect project-related effects on Plan Species, thereby reducing the cumulative effects on these species within the Columbia River Basin.

The cumulative contribution of the Wells Project to the incidence of high TDG levels is limited by the low frequency of forced spills at the dam and the relatively small spill volumes that are required to provide effective downstream passage of migrating juvenile salmonids. The juvenile bypass system at Wells dam requires lower spill volumes than have been required at other dams on the mid- and lower Columbia River to provide safe passage for downstream migrating fish. As a result, the project's contribution to cumulative effects on TDG levels is relatively minor in comparison to other dams on the mid- and lower Columbia River.

The Hanford Agreement, which replaced the 1988 Vernita Bar Settlement Agreement, protects and enhances fall Chinook salmon in the Hanford Reach during the

spawning, pre-hatch, post-hatch, and emergence periods. The agreement provides for minimum flows and regulation of flow fluctuations in the Hanford Reach to reduce the cumulative effects of hydropower operations on fall Chinook salmon eggs and fry. The Hanford Agreement also established reservoir operating procedures to be followed by Chelan PUD and Douglas PUD during the rearing period to assist Grant PUD in reducing the effects of flow fluctuations in the Hanford Reach on fall Chinook salmon, thereby reducing the cumulative effect on this species within the Columbia River Basin.

Pacific Lamprey

Pacific lamprey have experienced dramatic declines in abundance in the Columbia River Basin during the past four decades. In addition, concerns that lamprey are declining have resulted in a petition to list this species under the ESA. Potential causes of these declines may be associated with degraded habitats, poor ocean conditions, poor passage at hydropower dams, or reduced food availability (Close et al., 2002).

Adult lamprey use the fish ladder at the Wells Project for upstream passage to spawning grounds. Studies conducted as part of relicensing indicate that in-ladder passage efficiency at the Wells Project is among the best in the Columbia River (Robichaud et al., 2009). However, these studies also indicate that adult lamprey have difficulty negotiating the water velocities produced by head differentials at fishway entrances, which are maintained for salmon and steelhead passage. Juveniles migrate downstream to the ocean and pass through the juvenile bypass system, through the turbines, or in spill. Specific mortality rates for juvenile lamprey from Columbia River projects are not yet known. However, it is likely that there is a loss of juveniles due to mortality during passage through turbines at the project. Losses due to turbine mortality at multiple projects may have a cumulative effect on species abundance.

Measures contained in the Pacific Lamprey Management Plan would provide for improved upstream passage of Pacific lamprey at the Wells Project, increasing access to spawning and rearing habitat upstream of the project. The Pacific Lamprey Management Plan would also provide for ongoing monitoring and evaluation, and include the flexibility to adjust the program over the term of the new license as new information is gathered (including information of the downstream movement and survival of juvenile Pacific lamprey). Implementation of Douglas PUD's Pacific Lamprey Management Plan (as well as continued implementation of the Wells HCP measures related to juvenile salmonids bypass, habitat improvements, and fish ladder operations) would reduce cumulative adverse effects on Pacific lamprey population in the Columbia River Basin.

Bull Trout

Bull trout are listed as a threatened species under the ESA (see section 3.3.3.1). FWS has identified habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams and other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. They noted that dams (and natural barriers) may have isolated population segments resulting in a loss of genetic exchange among these segments. The FWS' Bull Trout Recovery Plan and project-specific Biological Opinions for the Columbia River projects have been developed to guide species recovery activities.

Through the implementation of strategies outlined in the Wells HCP and the 2004 Bull Trout Monitoring and Management Plan, successful passage of bull trout upstream and downstream past Wells dam has been demonstrated, and over the course of 8 years of monitoring, there have been no documented project-related adverse effects on adult or sub-adult bull trout from passage through the Wells Project. Measures contained in the Bull Trout Management Plan would likely improve passage for bull trout and potentially increase the population size in the mid-Columbia River Basin. The Bull Trout Management Plan would also provide for ongoing monitoring and evaluation, and includes the flexibility to adjust the program over the term of the new license as new information is gathered. Overall, it is anticipated that implementation of Douglas PUD's Bull Trout Management Plan and the 2004 Bull Trout Monitoring and Management Plan, combined with other recovery efforts being implemented in the region, would reduce adverse cumulative effects on bull trout particularly as they relate to upstream and downstream passage in the Columbia River Basin.

White Sturgeon

The status of white sturgeon populations varies within the Columbia River Basin. Although the population below Bonneville dam is relatively abundant and supports a popular recreational fishery, populations in the mid-and upper Columbia River have diminished to the point where no harvest is allowed. Columbia River white sturgeon are reported to have declined in numbers because of numerous factors, including obstruction of migration by mainstem hydroelectric dams, altered stream flows, altered hydrologic regimes, altered temperature regimes, reduced spawning habitat, and over harvest (van der Leeuw et al., 2006; Wydoski and Whitney, 2003). Variations in population characteristics also have been attributed to differences in exploitation rates and recruitment success, access to marine food resources, and suitability of hydrologic conditions and available habitats (Devore et al., 1995).

Similar to Priest Rapids, Rock Island and Rocky Reach, the Wells Project impacts white sturgeon by blocking upstream passage. However, the presence of juvenile white sturgeon suggests that successful rearing does take place within Wells reservoir. Recruitment is occurring although the abundance of individuals is low. It is unknown what population size Wells reservoir is capable of sustaining. Furthermore, the source of recruitment (immigration or spawning in Wells reservoir) is unclear and may be insufficient to maintain populations.

Measures included in the White Sturgeon Management Plan would likely increase the white sturgeon population in the Wells Project vicinity. The White Sturgeon Management Plan would also provide for ongoing monitoring and evaluation, and includes the flexibility to adjust the program over the term of the new license as new information is gathered. Overall, implementation of Douglas PUD's White Sturgeon Management Plan would reduce any potential cumulative adverse effects on white sturgeon.

3.3.2 Terrestrial Resources

3.3.2.1 Affected Environment

The study area for terrestrial resources encompasses lands within the project boundary that surround Wells reservoir and lands within the transmission line corridor between Wells dam and Rocky Reach dam. It includes the entire 116-acre Cassimer Bar Wildlife Management Area (which is managed by Douglas PUD in cooperation with the Colville Tribes) and portions of the Wells Wildlife Area that lie inside the project boundary.

The Wells Wildlife Area (funded by Douglas PUD and managed by Washington DFW to provide mitigation for the effects of original project construction on wildlife habitat) is located in Douglas and Okanogan counties and consists of six units (figure 6). Bridgeport Bar (502 acres), Okanogan (100 acres), and Washburn Island (261 acres) are located along the shoreline of Wells reservoir, and a portion of each unit lies within the project boundary. West Foster Creek (1,025 acres), Central Ferry (1,602 acres), and Indian Dan Canyon (4,716 acres) are upland units that are entirely outside the Wells Project boundary.

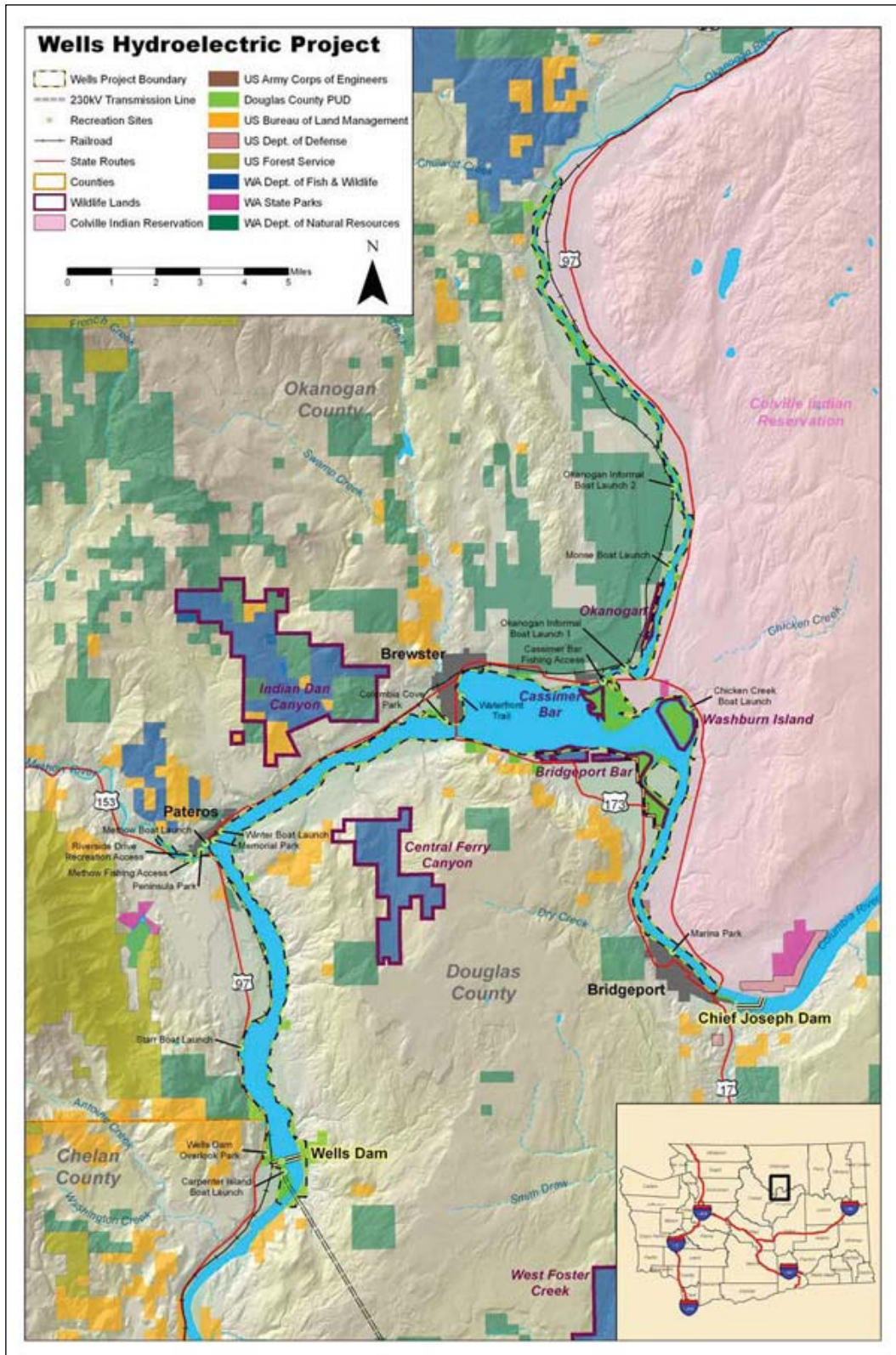


Figure 6. Location of the Wells Wildlife Area units (Source: Douglas PUD, 2010, as modified by staff).

Vegetation

In 2005, Douglas PUD conducted cover type mapping, a survey for RTE plants, and an invasive plant survey for the Wells Project reservoir lands (EDAW, 2006a). Cover types were mapped and field verified on 2,540 acres of land (excluding the 9,740-acre open-water portion of the reservoir), as shown in table 20. Surveys for rare plants and invasive plant species were conducted in May, June, and August 2005, coinciding with months when target species are most easily observed and identified.

Table 20. Acreage of cover types in the reservoir lands component of the Wells Project (Source: EDAW, 2006a).

Community Type	Acres	Percent of Reservoir Lands
Conifer	5	0.2
Shrub steppe	502	19.8
Open, grass	136	5.4
Open, weed	163	6.4
Rocky, upland	12	0.5
Riparian, tree	142	5.6
Riparian, shrub	314	12.4
Emergent wetland	287	11.4
Emergent wetland, pond	46	1.8
Littoral zone	61	2.4
Bare-disturbed-eroded	49	1.9
Agriculture	648	25.5
Developed	175	6.9

Much of the land in the immediate vicinity of the reservoir is, or at one time was, cultivated for a variety of crops including wheat, alfalfa, and orchards. Based on the 2005 cover type mapping effort, agricultural areas dominated by irrigated orchards occupy 26 percent of Wells reservoir lands.

The next most common cover type, shrub steppe, comprises about 20 percent of Wells reservoir lands. The dominant species in this cover type are big sagebrush, bitterbrush, and grey rabbitbrush. Buckwheat, biscuitroot, and bunchgrass species are abundant in the herbaceous layer. As in other areas of north-central Washington's shrub steppe habitat, cheatgrass is widespread.

Numerous riparian and wetland plant communities have become established adjacent to the reservoir since project construction in 1967 (EDAW, 2006a). These cover types are found primarily on the low-gradient shorelines of the reservoir near Cassimer Bar, the Bridgeport Bar unit of the Wells Wildlife Area, and along the Okanogan River. The largest individual wetlands are found on Cassimer Bar and in the Washburn Island Slough.

In riparian habitats, native tree species include black cottonwood, willows, alders, and a few small Rocky Mountain juniper. However, most riparian trees consist of non-native species, such as white cottonwood, eastern cottonwood, Russian olive, and silver maple. Riparian shrub habitat contains a mix of native and non-native species. In addition to willow, alder, and water birch, Woods rose is ubiquitous and is a co-dominant shrub in many stands.

The majority of wetland habitats associated with the Wells Project is palustrine emergent wetlands. Herbaceous vegetation is dominant in this wetland classification, but many of these wetlands support some riparian shrubs and trees, as well. Common native species include softstem bulrush, narrowleaf cattail, Canada goldenrod, and showy milkweed. Common non-native species are yellow flag, purple loosestrife, reed canarygrass, and Canada thistle.

Other project-area wetlands include moist, swale-like areas at Cassimer Bar and unique species assemblages found on islands in the Methow River. One wetland supports an extensive stand of little green sedge, as well as the only observations of inland sedge and golden sedge noted during study efforts.

As described in section 3.3.1.2 (table 11), aquatic plant surveys of the littoral zone documented the presence of nine aquatic species in Wells reservoir, growing at depths between 4 and 24 feet (Lê and Kreiter, 2006). Native plants, such as elodea and leafy pondweed, dominated 89 percent of the aquatic macrophyte beds that were sampled, while two invasive, non-native plants (Eurasian milfoil and curly leaf pondweed) dominated about 10 percent of the samples.

Other vegetation cover types within the project area are a mix of conifer and open grassy or weedy areas. Non-vegetated cover types include rocky areas; bare, disturbed or eroded areas; and developed areas, such as rip-rap, landscaping, recreation sites, roads, railroads, irrigation pump house structures, and industrial uses.

In 2008, Douglas PUD conducted rare plant and invasive plant surveys and cover type mapping study for an additional 1,117 acres of land within the transmission line corridor (Parametrix, 2009a).³⁸ Surveys were conducted in May, June, July, and September, coinciding with the time of year when target rare plants and invasive plant species are readily identified. As shown in table 21, active agriculture (primarily wheat) accounts for over half the acreage within the transmission line corridor. Shrub steppe is the most common native vegetation cover type, mapped in 30 percent of the corridor. The remaining areas are a mix of inactive agriculture, conifer and cleared conifer, grass, wetlands, riparian, talus, and other (e.g., developed, disturbed) community types that individually accounted for less than 1 percent of the transmission corridor (Parametrix, 2009a).

Table 21. Acreage of cover types in the transmission line component of the Wells Project (Source: Parametrix, 2009a).

Community Type	Acres in Transmission Line Corridor	Percent of Surveyed Area
Agricultural lands	583	52
Idle agricultural land	66	6
Grass	25	2
Conifer (closed and open canopy)	13	1
Cleared conifer	51	5
Other ^a	23	2
Riparian	12	1
Shrub steppe	340	30
Talus	3	<1
Emergent wetland	1	<1
Forested wetland	<1	<1
Total	1,117	100

^a Includes highways, gravel roads, orchards, and other non-vegetated or atypical cover types.

³⁸ The results presented in table 21 represent the community types that were mapped prior to the Badger Mountain Fire, which occurred a few months after completion of the cover type mapping effort, and affected some portions of the transmission line corridor.

Noxious Weeds

Douglas PUD conducted surveys for noxious weeds³⁹ on reservoir lands in 2005 (EDAW, 2006a) and on lands within the transmission line corridor in 2008 (Parametrix, 2009a). Noxious weeds observed during these surveys are listed in table 22.

Table 22. Noxious weeds documented in the Wells Project area
(Source: Parametrix, 2009a).

Weed Species	Weed Classification	Area of occurrence
Purple loosestrife (<i>Lythrum salicaria</i>)	B-Designate	Reservoir lands
Dalmatian toadflax (<i>Linaria dalmatica</i> ssp. <i>dalmatica</i>)	B-Designate (B along some segments of transmission line corridor, where control is not designated)	Reservoir lands, transmission line corridor
Leafy spurge (<i>Euphorbia esula</i>)	B-Designate	Reservoir lands
Perennial pepperweed (<i>Lepidium latifolium</i>)	B-Designate	Reservoir lands
Spotted knapweed (<i>Centaurea stoebe</i>)	B-Designate	Transmission line corridor
Russian knapweed (<i>Acroptilon repens</i>)	B	Reservoir lands
Diffuse knapweed (<i>Centaurea diffusa</i>)	B	Reservoir lands, transmission line corridor
Reed canarygrass (<i>Phalaris arundinacea</i>)	C	Reservoir lands

³⁹ The Washington Noxious Weed Control Board groups weeds into the following categories: Class A weeds are non-native species whose distribution in Washington State is still limited; eradication of all Class A weeds is required by state law. Class B weeds are non-native species whose distribution is limited to portions of Washington State. Because of differences in distribution, treatment of Class B weeds is designated only in certain areas. In regions where a Class B weed is not yet widespread, prevention of new infestations is required; in these areas, the weed is a “Class B Designate,” meaning it is designated for control. Class C weeds are widespread; treatment and management is not typically required but may be warranted for local management goals.

Weed Species	Weed Classification	Area of occurrence
Yellow flag iris (<i>Iris pseudacorus</i>)	C	Reservoir lands
Canada thistle (<i>Cirsium arvense</i>)	C	Transmission line corridor
Field bindweed (<i>Convolvulus arvensis</i>)	C	Transmission line corridor

Note: ssp. – subspecies

No Class A weeds were documented during survey efforts. Surveys of lands associated with Wells reservoir documented 99 occurrences of four Class B-Designate weed species: purple loosestrife, Dalmatian toadflax, leafy spurge, and perennial pepperweed. Two Class B weeds, Russian knapweed and diffuse knapweed, were common in upland or transitional upland/wetland habitats. Two Class C weeds, reed canarygrass and yellow flag, were noted as common in project wetlands and along Wells reservoir shorelines.

Surveys in the transmission corridor documented 48 occurrences of two Class B-Designate weed species (Dalmatian toadflax and spotted knapweed), and one other Class B weed species (diffuse knapweed). Each is widespread in pastures and rangeland in Douglas County. In addition, two Class C weeds, Canada thistle and field bindweed, were also documented in the transmission line corridor.

Noxious weeds are widespread in rangelands and predominantly agricultural lands through much of north-central Washington, regardless of property boundaries. For this reason, Douglas PUD has worked closely with the Okanogan County Weed Board and adjacent landowners to control weeds on Wells Project lands. Douglas PUD manages noxious weeds on reservoir lands and within the transmission line corridor using a combination of herbicides, mechanical removal methods, and biological controls, depending on the species and the site.

Special-Status Plants

Based on consultation with FWS, Washington DFW, and Washington NHP, Douglas PUD developed a list of special-status plant species⁴⁰ that could occur in the

⁴⁰ Special-status plants include those that are federally or state-listed as threatened or endangered, and those that are proposed or candidates for listing. Special-status plants also include those Washington NHP considers sensitive, or which are under status review. Review Group 1 species are those for which additional field work is needed before Washington NHP can assign a status, while Review Group 2 species are those with unresolved taxonomic questions.

project vicinity. A review of each species' range, distribution, and habitat requirements indicated that only one federally listed plant—Ute ladies'-tresses (*Spiranthes diluvialis*)—would potentially occur in the project area. We discuss Ute ladies'-tresses in section 3.3.3, *Threatened and Endangered Species*.

Douglas PUD conducted botanical surveys in 2005 (EDAW, 2006b) and 2008 (Parametrix, 2009a) to evaluate the presence of rare plants on project lands around the reservoir and within the transmission line corridor. These surveys documented the occurrence of three plants that are listed in Washington as threatened species—little bluestem (*Schizachyrium scoparium*), chaffweed (*Centunculus minimus* or *Anagallis minima*), and Thompson's clover (*Trifolium thompsonii*). At the time the surveys were conducted, chaffweed was under review by the Washington NHP (EDAW, 2006b; Parametrix, 2009a); its status is currently classified as sensitive (Washington NHP, 2011).⁴¹

Surveyors also documented the presence of northern sweetgrass (*Hierochloa odorata*), a review species for which additional study is needed before Washington NHP can determine its status; and brittle prickly-pear (*Opuntia fragilis*), a review species that has recently been removed from the list of plants tracked by the Washington NHP because it is more widespread than once thought (Washington NHP, 2009).

Little Bluestem—Surveys documented five occurrences comprising one population of little bluestem in the reservoir study area. Typically more common in Idaho and farther east, the population observed along Wells reservoir is only the fourth documented record of this species in Washington.

The little bluestem occurrences were mapped along 1,500 feet of shoreline. The granitic, coarse sandy substrate supports transitional riparian vegetation between wet shoreline emergent wetland and shrub steppe-dominated uplands. The topographic position of most occurrences averages about 10 to 15 feet from the shoreline and 2 to 5 feet in elevation above the mean water surface. Associated species include Rocky Mountain juniper, Siberian elm, white sweet clover, Gray's biscuit root, Scribner's rosette grass, white sagebrush, and diffuse knapweed. The largest occurrence has several perennial bunchgrass associates, including needle-and-thread, sand dropseed, Fendler three-awn, prairie junegrass, and alkali bluegrass.

Chaffweed—Prior to surveys for the Wells Project, chaffweed was known from seven Washington counties, but its observation during the Wells reservoir study is the first record for Douglas County. Four occurrences of chaffweed were observed on frequently-inundated, low-gradient mud-gravel banks with little competing vegetation. Some of the plants observed in August had open capsules, suggesting the production of

⁴¹ The draft EIS, issued on April 8, 2011, described the state status of chaffweed as threatened. Since that time, the species has since be re-classified as sensitive (Washington NHP, 2011).

mature seed. The cover and density of chaffweed in all four sites was low, consisting of only a few scattered plants. Associated plant species also occurred at low density and cover. Associated species included mudwort, water pygmyweed, bay forget-me-not, popcornflower, clammy hedgehyssop, spikerush, and toad rush (EDAW, 2006a).

Northern Sweetgrass—Northern sweetgrass, also commonly referred to as vanilla grass, is a Review Group 1 species known from 16 Washington counties, primarily in the central and eastern parts of the state. Its occurrence along the Wells reservoir shoreline during this study is the first record for Douglas County (Washington NHP, 2005).

Sand-silt-gravel banks that are frequently inundated and also support emergent wetland vegetation are common and abundant along Wells reservoir. Surveyors found two northern sweetgrass occurrences in these habitats, growing at the upper elevation end of low-gradient banks. These sites were inundated by about 6 inches of water during high pool. At one site, the associated species provided about 80 percent cover and included Baltic rush, coyote willow, yellow flag, woolly sedge, and fowl mannagrass. The other site is located near the little bluestem population, and supports primarily Baltic rush and woolly sedge with scattered northern sweetgrass.

Thompson's Clover—Thompson's clover is endemic to a narrow range, occurring only within about 2.5 miles of the Columbia River between the Wenatchee and Entiat rivers (Washington NHP, 1999). One occurrence of Thompson's clover was documented during relicensing studies, consisting of about 11 acres within the transmission corridor. Because the occurrence continues beyond the transmission corridor boundary, its full extent exceeds 11 acres. The population consists of several hundred to thousands of plants, representing a prominent component of the herbaceous layer.

In early summer 2008, wildfire burned all vegetation in and around this occurrence. However, Thompson's clover is known to be a fire-adapted species (Scherer et al., 1997). During an informal site visit in May 2009, Douglas PUD natural resources personnel observed large numbers of live Thompson's clover plants.

Wildlife

Douglas PUD conducted bird, small mammal, amphibian, and reptile surveys of the Wells Project area in 2005 (EDAW, 2006b) and 2008 (Parametrix, 2009a). Additional surveys by Parametrix (2009a) included transmission corridor raptor and corvid nesting surveys, surveys for Columbian sharp-tailed grouse and greater sage-grouse, and surveys for evidence of avian collisions with the transmission line and associated structures. In general, wildlife surveys were conducted between March and October. Specific surveys were timed to coincide with breeding and fall migration periods (avian surveys), or months when target species are most readily identified or captured (e.g., amphibian surveys). In total, survey efforts confirmed the presence of 204 wildlife species in the project area, including 161 birds, 5 amphibians, 9 reptiles, and 29 mammals.

Birds

Washington DFW considers Wells reservoir one of the most important waterfowl wintering areas in eastern Washington (Monda, M., Washington DFW, personal communication, to B. Patterson, as cited in EDAW, 2006b). Common winter residents include American coot, greater and lesser scaup, American widgeon, ring-necked duck, and mallard. Other wintering waterfowl include gadwall, northern shoveler, bufflehead, Barrow's goldeneye, ruddy duck, common merganser, and hooded merganser. Common loons, pied-billed grebes, eared grebes, and western/Clark's grebe are all present on the reservoir throughout the year.

Aquatic vegetation growing in the reservoir provides food for waterfowl during the spring and fall migration and sustains them through the winter. Corn, wheat, and other grains grown on the Wells Wildlife Area provide food for dabbling ducks and Canada geese.

Several species of waterfowl (such as mergansers), wading birds (e.g., herons), shorebirds (e.g., gulls) and raptors (e.g., osprey) that use aquatic habitats in the project area rely primarily on a diet of fish, rather than vegetation. These piscivorous species contribute to substantial losses of fish from the hatchery rearing facilities associated with the Wells Project. Douglas PUD implements a piscivorous wildlife control program that currently focuses on non-lethal hazing methods (e.g., vehicles and pyrotechnics) and passive measures (such as pond covers, bird wires, and overhead netting) to minimize losses. Douglas PUD conducted a study between November 2007 and April 2008 (Douglas PUD, 2008) to evaluate the effectiveness of these measures and identify alternatives that might further reduce predation. Overall, the study indicated that 27,767 fish were consumed by piscivorous birds foraging in the dirt rearing ponds at Wells Hatchery during the study period.

Shrub steppe habitat and agricultural fields in the project area are used by species dependent on shrubby and grassy open habitats for foraging, resting, and nesting. The California quail was the most abundant species in this habitat type during the breeding season. Other shrub steppe associated nesting species include Brewer's blackbird and western meadowlark. In addition, shrub steppe habitat near the reservoir was used by many species, including swallows and wetland and riparian nesting species, as secondary foraging habitat during the breeding season.

Raptors are also common in shrub steppe habitat. They typically nest on elevated natural or manmade structures and use surrounding open upland areas for foraging. Douglas PUD and Washington DFW conducted joint surveys to evaluate the possibility that the project area serves as a migration corridor for raptors. During these surveys, biologists documented northern harrier, Cooper's hawk, red-tailed hawk, golden eagle, merlin, and prairie falcon (Parametrix, 2009a). Thirteen birds were observed crossing over or under the transmission lines and an additional 13 were seen perching on towers. During surveys to evaluate raptor and corvid use of the transmission line corridor,

biologists observed eleven nests of raptors and corvids within or adjacent to the transmission line corridor, including four on the transmission towers (Parametrix, 2009a).

Riparian plant communities within the project area provide important habitat for migratory and nesting birds. Overall, 27 percent of all birds detected during the breeding season in the Wells Project were in riparian habitats, more than any other habitat type (EDAW, 2006b), and about 13 percent were detected in riparian habitats during the fall. Some of the most common species in both spring and fall surveys were European starlings, American robins, house finches, and song sparrows.

Mammals

The shrub steppe and agricultural habitat in the Wells Project area and surrounding area supports several species of mice, voles, and shrews, as well as larger mammals, such as mule deer, coyote, cottontail rabbits, marmots, gophers, squirrels, and skunks. Cougar, bobcat, black bear and moose are occasionally present.

Many of the species that use shrub steppe and agricultural lands are also present in riparian areas and wetlands. Mule deer may rely heavily on riparian habitat during harsh winter conditions, particularly when heavy snow accumulates in the higher elevations.

The most common aquatic furbearers in the project area are beaver and muskrat. Mink and otter are also present, but much less common.

Reptiles and Amphibians

Snakes and lizards make use of a wide variety of habitats, from wetlands and riparian areas to agricultural lands, shrub steppe, and developed lands. Several reptiles are known to occur within the project boundary. Common species include the gopher snake, racer, western terrestrial and common garter snake, western rattlesnake, sagebrush lizard, pygmy short-horned lizard, and western skink.

Four amphibian species were documented in the project area during surveys in 2005.⁴² These species (Pacific treefrog, Great Basin spadefoot toad, long-toed salamander, and the non-native bullfrog) all require aquatic habitat for reproduction. The bullfrog is almost entirely aquatic throughout its life cycle, although it may pass through uplands during dispersal, while the Pacific treefrog, Great Basin spadefoot, and long-toed salamander are largely terrestrial and can often be found far from water (Leonard et al., 1993). Evidence of amphibian breeding was found in ponds isolated from Wells reservoir, but not in wetlands connected to Wells reservoir.

⁴² A fifth amphibian species (the carcass of a tiger salamander) was observed during botanical resource surveys within the transmission line corridor.

Special-Status Wildlife

Based on a review of species' range, distribution, and habitat requirements and agency consultation, Douglas PUD found that as many as 45 special-status wildlife species⁴³ could occur on Wells reservoir lands, and 17 could occur in the transmission line corridor. As discussed in section 3.3.3, *Threatened and Endangered Species*, the review indicated that no federally listed wildlife species would be likely to occur. Of the species with state designations, five were detected during survey efforts: American white pelican, bald eagle, golden eagle, common loon, and sage thrasher (table 23).

Table 23. Special-status wildlife species detected at the Wells Project (Source: EDAW, 2006b; Parametrix, 2009a).

Common Name	Species Name	State Designation
American white pelican	<i>Pelecanus erythrorhynchos</i>	Endangered
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive
Golden eagle	<i>Aquila chrysaetos</i>	Candidate
Common loon	<i>Gavia immer</i>	Sensitive
Sage thrasher	<i>Oreoscoptes montanus</i>	Candidate

Sharp-tailed grouse and greater sage-grouse (both state-listed as threatened species) are known to have historically occurred in the project vicinity (Hays et al., 1998a, 1998b). These species were specifically targeted during 2008 surveys, but were not detected (EDAW, 2006b; Parametrix, 2009a).

American White Pelican—American white pelicans are colonial nesters, breeding primarily in the western and central U.S. and Canada, and wintering along the southern coast of the U.S. and in Mexico (NatureServe, 2008). American white pelicans breed mainly on isolated islands in freshwater lakes and forage on inland marshes and shallows of lakes and rivers (Knopf and Evans, 2004). During the spring and fall migration, pelican are known to make frequent stops at aquatic foraging and loafing areas similar to those used during breeding season (Knopf and Evans, 2004).

A non-breeding aggregation of sub-adult white pelicans spends summer and fall on the Columbia River in Douglas, Okanogan, and Chelan, counties. White pelicans arrived on Wells reservoir for the first time in 1989 (Hallet, 1990). Their numbers have fluctuated over the years with a high count of 204 in 1990 and a low count of 41 in 1992; 155 pelicans were counted on Wells reservoir in 2004 (EDAW, 2006b). White pelicans

⁴³ Special-status wildlife species include those that are federally or state-listed as threatened or endangered, species that are proposed or candidates for listing, and those Washington DFW considers sensitive.

usually arrive in June and remain until October. There does not appear to be suitable nesting habitat within the Wells Project area, and the nearest known breeding population of pelicans is located in Canada, nearly 100 miles north of the project (EDAW, 2006b).

Bald Eagle—Bald eagles winter in the Wells Project area in relatively large numbers. Based on annual reports for the Wells Wildlife Area, the maximum number observed during a single day on Wells reservoir was 68, observed in January 1998. Bald eagles wintering in the Wells Project area feed primarily on American coots, which comprise 64 percent of winter diets (Fielder, 1982). Wintering eagles also feed on big game carrion, waterfowl, fish, and game birds. Three bald eagle communal roosts are found adjacent to Wells reservoir.

There are three active bald eagle nests in the vicinity of the Wells Project, including two that are outside the project boundary, near Azwell and Bridgeport Bar. A third nest is located within the project boundary and was discovered in 2004 in a small ponderosa pine tree near Bridgeport. Two young were fledged from this nest in 2004; the site was used again in 2005, but nesting success since 2004 is unknown. Bald eagles raising young in the vicinity of Wells reservoir have an abundant supply of fish for a primary prey base.

Under the requirements of the 1982 Wildlife Mitigation Agreement relating to the 2-foot pool raise (discussed in section 2.1.3, *Existing Project Operations*), Douglas PUD constructed 25 perch poles in areas used by bald eagles. The perch poles have been maintained and replaced when needed. Some poles have been removed in areas where the poles are not being used by eagles but instead by piscivorous birds such as cormorants.

Douglas PUD also actively protects large riparian trees along the Wells reservoir shoreline from beaver damage and damage caused by adjoining property owners. Cottonwood saplings and cuttings have been planted on Wells reservoir lands to provide future perches for bald eagles. In addition, Douglas PUD purchased 33 acres of mixed conifer habitat outside of the Wells Project near Brewster, and has set it aside to protect the communal roost there from future development.

Golden Eagle—The golden eagle inhabits a wide range of latitudes throughout the northern hemisphere and uses a variety of habitats ranging from arctic to desert (NatureServe, 2008). Golden eagles are most common in the western U.S. and are found near open spaces that provide hunting habitat and often near cliffs that supply nesting sites (Kochert et al., 2002). Golden eagles typically nest in mountainous canyon land, rim rock terrain of open desert and grassland areas, and forage in open habitats, such as grasslands or shrub steppe vegetation (Watson and Whalen, 2004). Documented declines in this species are attributed primarily to the loss of traditional shrub steppe foraging habitat and direct mortality from humans. Humans cause more than 70 percent of recorded deaths, directly or indirectly (Franson et al., 1995, as cited in Kochert et al., 2002). Accidental trauma (collisions with vehicles, power lines, or other structures) is

the leading cause of death (27 percent), followed by electrocution (25 percent), gunshot (15 percent), and poisoning (6 percent).

Single occurrences of golden eagles were documented in both the reservoir and transmission line studies (EDAW, 2006b; Parametrix, 2009a). Although only documented at the site during the spring/summer, golden eagles are known to occur year round throughout Washington (Kochert et al., 2002).

Common Loon—Common loons breed on relatively undisturbed clear, oligotrophic lakes greater than 49 acres in size that are surrounded by forest and have rocky shorelines with deep inlets and bays and numerous islands (Mcintyre and Barr, 1997; Richardson et al., 2000). During early winter, loons are also found at numerous inland localities, including large lakes, rivers, and reservoirs. Common loons nest at ground level within 5 feet of water; typically along shorelines, or on small islands or floating bog mats (Mcintyre and Barr, 1997). Common loon nest sites have been documented on lakes and reservoirs in Ferry, Douglas, Okanogan, and Chelan counties in eastern Washington and Whatcom and King counties in western Washington, but none have been reported in the Wells Project vicinity (Richardson et al., 2000).

Common loons are known to occur year round in the Wells Project area. Loons were observed on all lacustrine and riverine waterbodies of the project and were documented during both spring and fall survey events, but were most abundant during the fall, when 62 detections occurred.

Sage Thrasher—Sage thrashers are typically found in shrub steppe habitat that is dominated by big sagebrush (Reynolds et al., 1999; Vander Haegen, 2004). However, while considered a sagebrush obligate species, sage thrashers have been documented in bitterbrush habitat in Washington (Smith et al., 1997, as cited in Reynolds et al., 1999). Based on data from several sites in the Columbia Basin and north Great Basin in Washington, sage thrasher abundance is positively correlated with woody cover and bare ground and negatively correlated with grass cover (Rotenberry and Wiens, 1980, as cited in Reynolds et al., 1999).

Seventeen observations of sage thrashers (15 of which were singing male birds, presumably occupying breeding territories) were recorded both within and adjacent to the transmission line corridor. Sage thrashers were observed in shrub steppe habitat during both the spring and fall along the project transmission line corridor during 2008 field surveys. Sage thrashers were not documented during 2005 surveys of the Wells Project lands surrounding the reservoir.

3.3.2.2 Environmental Effects

Wildlife and Botanical Management Plan

Participants in scoping identified several project-related activities that could adversely affect terrestrial resources, including: project O&M, reservoir fluctuations, and

recreation. To address this broad range of issues, Douglas PUD consulted with the Terrestrial RWG⁴⁴ to develop a Wildlife and Botanical Management Plan. The goal of the Wildlife and Botanical Management Plan is to protect, maintain, and enhance wildlife and habitat on project lands commensurate with ongoing effects of operating the Wells Project. The Wildlife and Botanical Management Plan is intended to guide wildlife management activities and to protect RTE plants and wildlife on project lands during the term of the new license.

The plan includes measures specifically targeting management of noxious weeds, protection of special-status plants and wildlife, and enhancement of wildlife habitat, as discussed below. FWS and Washington DFW support these proposals and have included the measures in their 10(j) recommendations.

Under the plan, Douglas PUD would meet with the resource agencies and tribes, when requested, to discuss the plan. Any changes to the plan would be made in writing and by unanimous consent by all parties, and would be submitted to FERC for review and approval. In commenting on the Ready for Environmental Analysis (REA) notice, Washington DOE requested to be added to the list of entities consulted regarding plan modifications.

Wildlife Mitigation Agreement

As described in section 2.1.4, *Existing Environmental Measures*, Douglas PUD entered into a Wildlife Mitigation Agreement with Washington DFW in 1974 to provide mitigation for the effects of original project construction and operation on terrestrial resources. Douglas PUD transferred lands to Washington DFW and provided one-time, lump-sum funding for establishment of the Wells Wildlife Area to a Special Wildlife Fund. Since 1994, Douglas PUD has provided supplemental funding for management of the Wells Wildlife Area. While Washington DFW originally managed the Wells Wildlife Area to develop habitat for game species and release of game species, such as ring-necked pheasants (which has since been discontinued), it is currently managed for protection of both game and non-game species and their habitats, while also providing for hunting and wildlife-related recreation. Douglas PUD and Washington DFW have entered into an off-license settlement agreement that will continue to provide mitigation within the Wells Wildlife Area for operational effects of the Wells Project on wildlife and wildlife habitat. Although not a proposed measure under any new license that may be issued, implementation of this agreement complements the goals and objectives of the Wildlife and Botanical Management Plan discussed above.

⁴⁴ The following entities are members of the Terrestrial RWG: FWS, BLM, Washington DFW, Colville Tribes, and Douglas PUD.

Noxious Weeds

Noxious weeds are a serious threat to special-status plants, native plant communities, and wildlife habitat values throughout the western U.S. and around the world, because of their ability to out-compete and displace native plants and other organisms that depend on them, alter ecosystem functions, hybridize with native species, and promote other invaders (Tu et al., 2001). As mentioned in section 3.3.2.1, botanical resource surveys in the Wells Project area documented five Class B-designates, two Class B species, and four Class C weeds on reservoir lands and within the transmission line corridor. Several of these species, such as Dalmatian toadflax and diffuse knapweed, are widespread in upland habitats, and one species (purple loosestrife) was observed at 68 sites around the reservoir. Because of their aggressive growth and lack of natural enemies, noxious weeds can be very difficult to control.

Under current conditions, Douglas PUD complies with state and county rules and regulations for weed management, controls Class A and Class B-designate weeds, and maintains required records. Noxious weed occurrences are treated using chemical, mechanical, and biological control methods. The Wildlife and Botanical Management Plan would formalize the measures Douglas PUD currently implements. Under the Wildlife and Botanical Management Plan, Douglas PUD would:

- annually check the state and county weed lists for changes, and comply with current legal requirements;
- annually control Class A and B-designate weed occurrences on project lands;
- survey for new terrestrial weed infestations every 5 years throughout the term of the new license;
- use weed maps to identify problem areas and update the maps as new weed populations are discovered;
- follow a step-wise plan for weed management by: (1) considering the species and site characteristics when determining control measures, (2) considering the land use at the site, (3) acquiring necessary environmental permits, (4) consulting the Washington State Department of Agriculture pesticide-sensitive individuals list for properties adjacent to the site, (5) determining the effectiveness of various control options, (6) applying selected control methods, (7) monitoring all application sites to determine the effectiveness of the weed control, and (8) replanting native vegetation at sites denuded by herbicide treatment; and
- implement BMPs to prevent new infestations, including use of certified straw, mulch, and seed; limit public vehicle traffic to designated roads on project lands; instruct PUD and contractors to inspect their vehicle undercarriage for weeds before driving on undeveloped project lands; minimize earth-disturbing

activities on undeveloped land; and manage healthy native vegetation and replant native vegetation disturbed by Douglas PUD's management activities.

Our Analysis

Human activities that involve clearing of existing vegetation and ground disturbance have the potential to promote the establishment of noxious weeds, because invasive plants can tolerate poor soil and moisture conditions. Where a seedbed is nearby, human activity can also serve as a vector for weed spread.

In the Wells Project area, vehicle traffic, foot traffic, or heavy equipment used for vegetation control and various maintenance activities can result in temporary soil disturbance that could contribute to weed establishment. Douglas PUD estimates that these maintenance activities typically disturb less than 1 acre in a given year.

Douglas PUD manages the transmission line corridor to be consistent with NERC requirements, removing all vegetation growing tall enough to cause an outage. Vegetation management is limited to the about 64 acres of the corridor that are forested; the remaining 1,053 acres of land within the corridor consist of low-growing cover types (shrub steppe, grass) that do not require clearing, trimming, or topping.

The only new ground-disturbance proposed in the final license application would involve facility improvements included in the Recreation Management Plan. Under the Recreation Management Plan, Douglas PUD proposes to: (1) expand Marina Park to include 10 additional recreational vehicle (RV) spaces, in addition to new restroom facilities, lift stations, landscaping, and access roads; (2) construct a formal tent camping facility in the vicinity of the Okanogan River, including restroom, picnic shelter and four overnight camping sites; and (3) improve an informal/rustic tent camping location on the west side of the Columbia River. These improvements are expected to affect about 3 acres. Construction activity would be sited in upland areas that are either currently disturbed or directly adjacent to currently disturbed lands.

We conclude that ongoing project O&M activities would not substantially increase the risk of introduction or spread of noxious weeds because the area of new ground disturbance each year would affect a very small percentage of lands within the project area. There would be no change in the area within the transmission line corridor that might be affected by vegetation management. Construction activities associated with the Recreation Management Plan would also affect a very small area. Most importantly, any areas that would be disturbed would be addressed by provisions of the proposed noxious weed measures.

Implementation of BMPs (e.g., replanting native vegetation disturbed by management activities, vehicle inspection to prevent weed seed transport) would minimize the risk of weed establishment. Regular surveys, along with up-to-date mapping, would ensure that new weed occurrences are detected early and can be treated before infestations are well established. Regular updating of state and county weed lists

would ensure that Douglas PUD is informed of any changes in weed status, or additions or deletions of species from the lists.

Where weeds do occur, Douglas PUD's step-wise approach to management would ensure that the methods selected for application are the most likely to achieve the desired results at each site, with the least risk of harm to native plants or pesticide-sensitive individuals. We conclude that Douglas PUD's implementation of the Wildlife and Botanical Management Plan would provide an effective means of monitoring and managing existing and future weed occurrences.

Special-Status Plants

Rare plants are an important element of Washington's biodiversity (Washington Biodiversity Council, 2007). Locally rare populations often show morphological and ecological divergence and can be genetically distinct from the main population of the species. These character traits help contribute to the long-term survival of a species. Even widespread taxa have been brought to near extinction in a short amount of time and peripheral plant populations can act as refugia for species.

Douglas PUD's botanical surveys documented the occurrence of four special-status species within the project boundary. Little bluestem, chaffweed, and northern sweetgrass grow at sites along the reservoir shoreline, while Thompson's clover is found within the transmission line corridor.

Under existing conditions, occurrences of special-status plants are maintained in Douglas PUD's geographic information system database to ensure that no operational or maintenance activities are planned where they occur. Douglas PUD's Land Use Plan requires permits for ground-disturbing activities, and the policy prohibits destruction or removal of vegetation or soil. In addition to these on-going programs and policies, Douglas PUD's Wildlife and Botanical Management Plan includes proposals to:

- beginning in year 5 of the new license and every 10 years thereafter, survey and revise site boundaries for populations of little bluestem and Thompson's clover within the project boundary;
- beginning in year 1 of the new license, establish 500-foot buffer zones surrounding populations of special-status plants that occur on project lands, where no new ground-disturbing activities would be allowed, and no land use permits would be issued;
- use the following methods, in descending order of preference, for any weed control needed within buffer zones: biological control, hand-pulling, and hand-wiping individual weeds with herbicide; and
- beginning in year 1 of the new license, control weeds within 500 feet of Thompson's clover occurrences within the transmission line right-of-way, using the following methods, in descending order of preference biological control, hand-pulling, and hand-wiping of the individual weeds with herbicide.

Our Analysis

Routine project maintenance, on-going human activity (including project-related recreation and land use on private lands within the project boundary) and construction of new recreational facilities could cause ground disturbance that would adversely affect special-status plants, if it is planned in areas occupied by such species. However, the potential for adverse impacts is low, because Douglas PUD maintains maps of rare plant locations and proposes to survey, revise site boundaries, and apply buffers to little bluestem and Thompson's clover occurrences at 10-year intervals, starting in year 5 of a new license. With these measures in place, we anticipate that adverse effects could be avoided.

The Wildlife and Botanical Management Plan does not specify a provision for regular updates to the list of special-status species, although it does specify such a provision for noxious weeds. Adding this element to the list of measures for protection of special-status plants, also, would ensure that Douglas PUD has the information needed to adequately protect rare plants, as conditions or their status changes. For example, since the botanical resource surveys were completed and the Wildlife and Botanical Management Plan was developed, the Washington NHP has elevated the status of chaffweed from "under review" (Review Group 1) to threatened.

Douglas PUD's proposal to manage noxious weeds that occur within 500 feet of Thompson's clover occurrences would prevent inadvertent adverse effects to this species, by first using biological controls, then hand-pulling, and then hand-wiping of individual weeds with herbicide, to prevent inadvertent effects, such as herbicide drift, that have the potential to damage rare plants as well as target weeds. Douglas PUD does not apply herbicides to control aquatic weeds, so there would be no risk of inadvertent damage to populations of chaffweed or northern sweetgrass that grow along the reservoir margin.

Improvements to recreational facilities described in the Wells Project Recreation Management Plan (e.g., a Marina Park expansion including 10 additional RV spaces) are not proposed near any currently known special-status plant occurrences. For this reason, we conclude that implementation of the Recreation Management Plan would not adversely affect special-status plants.

In addition to ground-disturbing O&M or construction activities, participants in scoping identified reservoir fluctuations as a possible concern for special-status plants. However, Douglas PUD's surveys found that little bluestem occurs about 2 to 5 feet above the normal pool level near the reservoir and Thompson's clover was documented in uplands within the transmission line corridor, so neither species would be affected by reservoir elevations. Chaffweed and northern sweetgrass occur in habitats that are frequently inundated and exposed by fluctuating reservoir levels. Existing vegetation patterns and species composition in the project area reflect recent operating conditions. The success of chaffweed and northern sweetgrass within inundated or project-affected areas suggests that daily fluctuations of 1 or 2 feet do not represent a detrimental project effect. Wider fluctuations (i.e., more than 4 feet) are rare; as shown in table 6,

fluctuations exceeding 4 feet occurred less than 1 percent of the time between 2001 and 2005. Because they are rare and generally of short duration, these wider fluctuations would also be unlikely to have detrimental effects.

Special-Status Wildlife

Participants in scoping indicated that three special-status wildlife species could be affected by project operation: the American white pelican, Columbian sharp-tailed grouse, and bald eagle.

As described in section 3.3.2.1, up to 200 non-breeding sub-adult white pelicans use Wells reservoir each year, usually arriving in June and remaining until October. The period of white pelican use coincides with peak levels of recreational activity. The reservoir is very popular for bank fishing, boat fishing, and speed/sport boating. These activities have the potential to disturb pelicans foraging in shallow water or loafing in deeper water.

Columbian sharp-tailed grouse are known from the project area historically, but have not been observed in the project area for the past 20 years. However, small, isolated populations occur in the project vicinity, and could use low-elevation habitat near the reservoir during the winter.

As of 2008, there were three active bald eagle nests near Wells reservoir, including one within the project boundary near Bridgeport. Large numbers of bald eagles winter in the project area, and there are three communal roosts adjacent to the reservoir. Douglas PUD owns and protects 33 acres surrounding the Brewster Roost. Douglas PUD protects large riparian trees from beavers and damage caused by adjoining property owners, and has planted cottonwood saplings and cutting to provide future perches for bald eagles. In addition, Douglas PUD maintains perch poles that were constructed to meet the requirements of the 1982 Wildlife Mitigation Agreement, although a few of the poles have been removed where they were being used by piscivorous species such as cormorants.

Douglas PUD worked with the Terrestrial RWG to identify several measures to protect special-status wildlife species. Under the Wildlife and Botanical Management Plan, Douglas PUD would:

- provide, inspect, and maintain educational signs at Douglas PUD boat launches and local visitor centers advising visitors to avoid white pelicans while boating, fishing and hunting;
- continue to water irrigation-dependent riparian trees, shrubs, and associated vegetation on project lands within the Bridgeport Bar Unit of the Wells Wildlife Area to maintain habitat for sharp-tailed grouse;
- beginning in year 1 of the new license, inspect raptor perch poles annually and repair or replace perch poles as warranted, except that perch poles near the

Starr boat launch would be removed to reduce avian predation on downstream migrating salmonids;

- perform monthly boat surveys from November through March to inventory wintering bald eagle numbers and identify large perch trees regularly used by bald eagles to determine whether they need immediate protection from beavers, or if they are likely to fall in the near future due to bank erosion;
- beginning in year 2 of the new license, protect bald eagle perches from beaver damage by wrapping the trunks with galvanized welded wire, inspecting the wire annually and repairing or replacing it, as needed;
- if site-specific issues arise regarding potential losses of large eagle perches due to bank erosion, consult with the Terrestrial RWG to determine if any reasonable measures are available to address the issue; and
- beginning in year 1 of the new license, ensure establishment and protection of sufficient smaller trees of appropriate age classes to provide for future abundance of potential perch trees at least equal to the baseline abundance documented in year 1 of the new license.

Our Analysis

In general, disturbance of waterbirds, such as American white pelicans, has the potential to increase their energy costs as a result of lost feeding time and the need for escape maneuvers. While effects would be most significant during breeding, migration, or overwintering periods, disturbance of non-breeding sub-adult pelicans during the summer would also be expected to reduce their overall fitness. Douglas PUD's proposal to install signage advising visitors to avoid white pelicans while boating, fishing, and hunting would benefit white pelicans by reducing the potential for disturbance, and support recovery of this species in Washington. A study of various types of disturbance to foraging and loafing waterbirds in Florida (Rodgers and Smith, 1997) indicated that a buffer zone of about 400 feet around pelicans on the water prevented the birds from flushing at the approach of motorboats.

As mentioned above, Columbian sharp-tailed grouse are not currently known to use the Wells Project area, but could use low-elevation riparian habitat around the reservoir during the winter. In the 1930s, the area that now includes the Bridgeport Unit of the Wells Wildlife Area in northern Douglas County is thought to have supported 500 to 600 sharp-tailed grouse during the winter (personal communication, M. Hallet, as cited in Stinson and Schroder, 2010). In Washington, critical winter habitats are riparian areas with deciduous trees and shrubs that provide cover and forage resources, such as berries, seeds, buds, and catkins. Some higher elevation shrub-steppe habitats that provide suitable nesting and brood-rearing habitat may remain unused because the area lacks adequate winter resources (Stinson and Schroeder, 2010). For this reason, improvement of wintering habitat could have year-round benefits. Although the Wells Project area is not included in any recovery units outlined in the draft recovery plan, it is

bordered by several units, and provision of water for irrigation-dependent riparian habitat on project lands could contribute to reaching recovery goals.

Bald eagles tend to choose large-diameter, canopy-dominant trees within clear view of the water for their nests. Large trees are also needed to provide sturdy perches for both breeding and wintering eagles. Under current conditions, as many as 68 bald eagles have been observed during winter counts in the Wells Project vicinity. The loss of large trees along the reservoir shoreline could reduce the capability of the habitat to support this wintering population.

The final license application does not describe the extent of beaver activity that could adversely affect large-diameter riparian trees in the project area. However, the PUD's proposal to use galvanized wire to wrap the trunks of trees that appear to be at risk of damage is a method that is recommended by Washington DFW (Washington DFW, 2004) and would likely serve as an effective means of protection.

The final license application does not quantify the number of trees likely to be lost to erosion during any new license period. Douglas PUD notes that during the initial scoping process, the Terrestrial RWG reviewed existing information and conducted a shoreline tour of the project to inspect areas of active erosion. The Terrestrial RWG determined that erosion effects were minor, and did not require further study or measures to mitigate environmental effects of erosion (Douglas PUD, 2006). A 2005 assessment of shoreline erosion found that 53 percent of the reservoir shoreline is stable with 12 percent of the areas exhibiting active erosion (DTA, 2006a). The study noted that project operations may have modified the rate and location of shoreline erosion, but indicated that other naturally-occurring factors, such as wave action, presence or absence of vegetation, and undermining of banks, also influence erosion.

Although project operations are not solely responsible for erosion, and the effects of erosion in general may be minor, Douglas PUD's proposal to retain potential perch trees that are at risk of toppling would be beneficial for bald eagles. Douglas PUD would work with the Terrestrial RWG to further evaluate such trees, and then identify and implement any measures that may be needed to stabilize or replace them.

In addition to contributing to shoreline erosion, reservoir fluctuations may preclude the establishment of trees, such as black cottonwood, that are often used as perches, or impair the replacement of such habitats over time. For this reason, Douglas PUD's proposal to ensure the establishment and protection of sufficient smaller trees of appropriate age classes would benefit bald eagles by providing for recruitment of suitable perch trees in the future.

Wildlife Habitat

The creation of Wells reservoir has allowed the development of wetland and riparian habitats that are otherwise uncommon in the semi-arid mid-Columbia region (DTA, 2006a, EDAW, 2006a). These habitats exhibit high wildlife and plant species diversity relative to uplands (EDAW, 2006b). Participants in scoping identified the

effects of project operations on these habitats and the species that rely on them—amphibians and waterfowl, in particular—as being of concern in the Wells Project area.

Low elevation riparian habitats near Wells reservoir also provide important winter cover and forage for mule deer, but the effect of the reservoir on mule deer movement and migration was identified as a terrestrial resource issue in SD2. Mule deer attempting to cross the Columbia River in daily movements to low elevation riparian habitat, or during seasonal migrations to high elevation summer range, could have more difficulty in swimming the wider reservoir than they would have encountered prior to project construction. Interference with movements or migration has the potential to reduce fitness, if it prevents deer from accessing suitable forage and cover, and may increase exposure to predation. However, the PAD (Douglas PUD, 2006) indicates that mule deer are a common and abundant game species in the region and within the Wells Project area, and the Terrestrial RWG did not request additional studies or include measures addressing mule deer as part of the Wildlife and Botanical Management Plan. Because establishment and operation of the Wells Wildlife Area addresses the effects of project construction on wildlife, including mule deer, we do not analyze it as a relicensing issue this final EIS.

Under existing conditions, Douglas PUD's Land Use Policy helps protect wildlife habitat within the Wells Project boundary by restricting development within riparian and wetland areas. Douglas PUD does not propose any changes in reservoir operation that would affect amphibian or waterfowl habitat use.

Douglas PUD does not currently implement any measures specifically aimed at amphibian habitat protection or improvement, and none are included in the Wildlife and Botanical Management Plan. Douglas PUD funds the cultivation of annual grain crop food sources for waterfowl in the Bridgeport Bar and Washburn Island Units of the Wells Wildlife Area, and as part of the Wildlife and Botanical Management Plan, Douglas PUD would:

- beginning in year 1 of the new license, plant at least 50 acres of annual grain crops within the Bridgeport Bar Unit of the Wells Wildlife Area within the project boundary to provide food for wintering Canada geese and dabbling ducks;
- beginning in year 1 of the new license, continue twice a month boat monitoring of project lands for unauthorized encroachment and any damage caused by recreational activities or adjacent land owners. Repair or replace wildlife habitat damage caused by unauthorized encroachment activities with in-kind habitat within 12 months;
- implement weed management annually at Cassimer Bar to control new occurrences of noxious weeds and reduce existing weed occurrences;
- manage access and replace any habitat damaged by recreation at Cassimer Bar;

- install and maintain perimeter fencing at Cassimer Bar to protect habitat from livestock trespass; and
- evaluate the dikes on Cassimer Bar, identify appropriate repair methods, obtain necessary permits, make repairs to enhance waterfowl and other aquatic habitats, and beginning in year 4 (as design work and permitting allow), and annually inspect and repair the dikes.

As mentioned above, FWS and Washington DFW support these measures and include them in their 10(j) recommendations. Washington DOE requests to be added to the list of entities that Douglas PUD would consult about any changes to the Wildlife and Botanical Management Plan.

Although not a proposed wildlife measure, Douglas PUD would continue to provide funding for O&M of the Wells Wildlife Area under its off-license settlement agreement with Washington DFW. Terrestrial components of the agreement include funding for O&M of the Wells Wildlife Area and habitat restoration after wildland fires on the Wells Wildlife Area; provisions for replacement of certain capital equipment used to meet the program goals; protection of special-status wildlife and botanical species; noxious weed management; and wetland habitat protection on all six units of the Wells Wildlife Area.

Our Analysis

Vegetation clearing and other project maintenance activities are not conducted in riparian or wetland habitats. Improvements to recreational facilities described in the Wells Recreation Management Plan (e.g., a Marina Park expansion including 10 additional RV spaces) are not proposed within any currently undisturbed riparian or wetland habitats. We conclude that on-going project O&M and proposed recreation measures would not affect habitat for amphibians or waterfowl, or affect their habitat use.

Wells reservoir itself does not appear to provide suitable habitat for amphibians. Field surveys in 2005 documented amphibian presence at 17 of 34 sampled sites in the project area (EDAW, 2006b), including five sites in the Bridgeport Bar Unit of the Wells Wildlife Area and three sites on Cassimer Bar. With one exception, evidence of breeding was observed only in wetlands that do not have surface water connections to Wells reservoir. These findings are generally consistent with amphibian survey results in three other Columbia River reservoirs (Rocky Reach, Wanapum, and Priest Rapids) (Duke, 2000; Framatome ANP DE&S, 2003). Habitat suitability in hydraulically connected sites, and in the reservoir itself, is likely limited by water level fluctuations and the presence of predatory bullfrogs (an invasive non-native species) and warmwater fish.

The egg masses of native amphibians that breed in lakes and ponds are generally laid in shallow, slow-moving or still water, or attached to vegetation high in the water column. For this reason, water level fluctuations of even a few inches may expose developing eggs to desiccation, freezing, or increased predation. Small, weakly swimming larvae may also be at risk of stranding as a result of water level fluctuations.

By contrast, bullfrog egg masses float at the surface. They are loosely anchored to emergent or floating aquatic vegetation, often in deeper water than used by native species, and thus may be less susceptible to daily fluctuation effects. Bullfrogs are voracious predators, eating anything they can catch, and are a growing threat to native amphibians across the western United States (Kraus, 2009).

Non-native fish species have also contributed to the decline of native amphibian populations in the west and throughout the world (Collins and Storer, 2003). The abundance of introduced warmwater fish such as bluegill, black crappie, and yellow perch in Wells reservoir, together with predatory bullfrogs, may have a substantial effect on habitat suitability for native amphibians. In Wells reservoir, colder water temperatures, sparse vegetative cover, and wave action would also limit habitat suitability.

Occupied amphibian sites on the Bridgeport Bar Unit islands, Cassimer Bar, and the Kirk Islands do not appear to be affected by daily water level fluctuations of 1 or 2 feet, but Douglas PUD has observed that fluctuations of more than 4 feet that occur infrequently (e.g., about 1 percent of the time between 1990 and 2005) are capable of dewatering them. Fluctuations of this magnitude have occurred in almost all months of the year (DTA, 2006a). The effects on native amphibian breeding success would depend on the timing of dewatering in relation to the timing of egg-laying, hatching, and metamorphosis in the species that are present at various sites.

Because three of the most important sites for breeding amphibians are associated with Cassimer Bar, Douglas PUD's proposed enhancement measures at Cassimer Bar may improve habitat for native amphibians, as well as waterfowl. Managing access and replacing any habitat damaged by recreation would reduce the potential loss of vegetation that represents one component of terrestrial amphibian habitat. Installing and maintaining perimeter fencing would also reduce damage to habitat and prevent direct mortality that could otherwise result from livestock trespass. Dike repairs would help to maintain appropriate water levels and temperatures to support amphibians and reduce the risk that predatory fish would access these habitats.

Douglas PUD's proposed enhancement measures within the Bridgeport Bar Unit of the Wells Wildlife Area may also benefit amphibians, as five important breeding sites for amphibians occur in this area. Although continuing to irrigate riparian trees, shrubs, and associated vegetation on project lands is intended primarily to improve winter habitat for sharp-tailed grouse, riparian areas are also essential to many amphibian species, outside the breeding season.

Several diverse wetlands along the Okanogan River also provide important amphibian habitat, especially where water fluctuations are influenced by beaver activity. Douglas PUD's Land Use Policy would protect the uplands that surround these wetlands.

In contrast to amphibians, Wells reservoir supports significant numbers of waterfowl, particularly during migrations and wintertime. Washington DFW fall/winter

survey data indicate that the number of waterfowl on a single day often exceeded 25,000 and the number of American coots usually exceeded 15,000. Surveys conducted by EDAW in autumn 2005 found that birds were particularly abundant near the mouth of the Okanogan River, but large rafts also occurred just upstream of Wells dam (EDAW, 2006b).

Under current conditions, major waterfowl foraging areas are believed to be associated with aquatic macrophyte beds. Differences in foraging behaviors among these species may influence susceptibility to fluctuation effects. Dabbling ducks feed without diving in shallow water or where aquatic macrophytes are near the surface. Geese are similar, but can feed in deeper water because of their larger size. Sea-ducks (“diving ducks”) and mergansers tend to feed in deeper water. Ideal foraging habitats for dabbling ducks are located where shallow, open water areas are in proximity to vegetative cover (emergent vegetation). Emergent and woody shoreline vegetation provide hiding cover from predators and shelter from adverse weather. During brood-rearing, access to hiding cover is particularly important. Open water habitats are important resting areas for both resident and migratory waterbirds.

Based on their foraging behaviors and habitat use, daily reservoir fluctuations may cause shifts in foraging habitats for adult dabbling ducks, Canada geese, and other waterbirds associated with shallow water (e.g., pied-billed grebes). In general, fluctuations cause shallow water habitat to shift away from the shoreline when water levels recede and back towards the shorelines as water levels rise. Although this shift in habitat location may increase waterfowl energetic costs (e.g., if there is significant lost feeding time), it also likely increases available forage. For example, waterfowl frequently congregate along the shoreline during lower reservoir elevations, likely feeding on newly exposed benthic macroinvertebrates and aquatic macrophytes. In addition, water fluctuations maintain emergent wetlands in parts of the Wells Project area, which serve as key waterfowl habitats.

Daily reservoir fluctuations are unlikely to affect waterfowl that use the reservoir for resting, or that forage in aquatic macrophyte beds. Aquatic macrophyte beds occur at depths between 4 and 24 feet, and daily fluctuations of 1 or 2 feet may allow regular access to food sources that are otherwise too deep to be reached.

Infrequent reservoir operations that result in fluctuations of over 4 feet are likely to cause greater displacement of waterfowl from preferred habitats, because the magnitude of these fluctuations dewater more extensive areas, including some aquatic macrophyte beds. This suggests that the potential energetic costs induced by infrequent reservoir operations are greater than smaller, daily fluctuations. However, infrequent reservoir operations also allow the use of forage areas not previously accessible, likely offsetting such energetic costs, and the overall result of these short-term, wider surface level fluctuations may not be distinctly different from other events (e.g., storms or boat traffic) that temporarily disrupt waterfowl foraging.

The cultivation of alternate food sources for waterfowl, funded by Douglas PUD in the Bridgeport Bar and Washburn Island units of the Wells Wildlife Area, is designed to offset any detrimental effects of the Wells Project. In addition, the Wildlife and Botanical Management Plan calls for Douglas PUD to plant at least 50 acres of annual grain crops within the Bridgeport Bar Unit of the Wells Wildlife Area within the project boundary, to provide food for wintering Canada geese and dabbling ducks.

Implementation of proposals for noxious weed management and habitat protection at Cassimer Bar would also benefit waterfowl by promoting native plant communities that provide forage and hiding cover for waterfowl. Douglas PUD's proposal to monitor project lands for unauthorized encroachment and any damage caused by recreational activities or adjacent land owners, and repair or replace damaged habitat, would also support waterfowl habitat. Installing and maintaining perimeter fencing at Cassimer Bar would protect habitat from livestock trespass that could otherwise destroy vegetation or nests, and repairing and maintaining the dikes would help to maintain appropriate water levels to support waterfowl habitat.

As mentioned above, the Wildlife and Botanical Management Plan provides for consultation with the resource management agencies and tribes regarding any changes to the plan, and Washington DOE has requested to be added to the list of entities that would be consulted. Washington DOE was not involved in development of the plan and does not have wildlife management responsibilities, but does have habitat protection responsibilities under the CWA. We conclude that these responsibilities could be met through the permitting process that Douglas PUD would be required to undertake for any plan modifications that would involve the CWA.

Activities that would be implemented under Douglas PUD's off-license settlement agreement with Washington DFW would complement the goals and objectives of the Wildlife and Botanical Management Plan. Each of these measures would have substantial benefits for wildlife in uplands, riparian areas, and wetlands in the Wells Project vicinity.

Piscivorous Wildlife Control Program

Many of the same bird species present at the hatchery, such as great blue herons, osprey, double-crested cormorants, and belted kingfishers, are known to be successful predators in hatchery ponds and raceways throughout the region (Schaeffer, 1992; Roby et al., 1998) and in other aquaculture settings throughout the United States (Glahn et al., 1999; Blackwell et al., 2000). Preventing predation on fish requires implementing actions that have the potential to cause a range of effects on the target species; depending on the methods used, impacts may be minor and temporary (e.g., disturbance of a few individuals) to substantial and long term (e.g., individual mortalities or loss of nesting colonies). All of the avian predators found at the Wells Hatchery are protected by the Migratory Bird Treaty Act, most are of interest to bird watchers, and two species—great blue heron and osprey—are considered state “monitor” species, meaning that Washington

DFW recognizes a need for special management or survey emphasis. For these reasons, the Terrestrial RWG agreed that Douglas PUD should evaluate existing predator control practices and evaluate alternatives that might inform future management decisions.

To reduce predation at the Wells and Methow fish hatcheries, Douglas PUD implements a predator control program that targets piscivorous birds and mammals to maintain the no net impact goal of the Wells HCP. Measures include use of vehicles and pyrotechnics for hazing, and passive protection, such as fencing and pond covers. Douglas PUD proposes to continue to implement a Piscivorous Wildlife Control Program.

Our Analysis

Left uncontrolled, piscivorous birds (and, to a much lesser extent, mammals) could have a detrimental effect on salmonid production at the Wells Hatchery. Douglas PUD studied bird and mammal hazing programs designed to minimize the loss of hatchery fish from the Wells Hatchery facilities from November 2007 through April 2008 (Douglas PUD, 2008). As described in section 3.3.2.1, an estimated 27,767 fish were consumed by birds foraging in the dirt rearing ponds at Wells Hatchery during the study period. Great blue herons accounted for 79.2 percent of the estimated fish consumption. Common mergansers, hooded mergansers, belted kingfishers and double-crested cormorants accounted for 6.3, 3.5, and 0.7 percent of the fish consumed, respectively. Hatchery personnel calculated the total fish loss in Pond 3 to be 12.4 percent, well within the 7 to 14 percent loss documented in past years. Estimated consumption of fish in Pond 3 accounts for only 26 percent of the total fish loss. However, estimated consumption of fish in Pond 4 was 4.5 times greater than the total loss calculated when fish were released from the pond, suggesting that Washington DFW loss estimates may be too low.

The study indicated that the effects of mammalian predators were negligible. Observations of one to four raccoons were recorded 15 times during focal observations, but none were observed catching fish. River otter were observed four times during evening focal observations and were documented capturing fish on two occasions. A nuisance wildlife control specialist contracted to trap furbearers at Wells Hatchery removed three raccoons during this study period.

Methods of controlling avian predation have changed over the years. Until the mid-1980s, Washington State hatchery policy encouraged hatchery employees to kill piscivorous birds feeding on fish reared in hatcheries, or employ hazing methods, to reduce fish mortality. More recently, Washington State hatchery staff has been administratively prevented from killing piscivorous birds on hatchery grounds. Techniques currently employed by contracted hazing staff at the Wells facilities include pedestrian hazing, pyrotechnic shotgun shells (cracker shells), exploding rockets, and propane cannons to reduce bird predation. In 1994, bird exclusion wires were installed over the hatchery rearing ponds. Bird exclusion wires are also installed at the Wells tailrace to limit access by piscivorous birds.

With the current combination of active and passive non-lethal control measures implemented at the Wells Project, the study team observed 6,839 birds using the Wells Hatchery during periods when hazing did not occur, versus 2,288 bird attempts to use the Wells Hatchery when hazing was occurring. These results suggest that non-lethal hazing with pyrotechnics and vehicle patrols (aversion-provoking stimuli) in conjunction with bird wire and fencing (habitat modification) is effective during daylight hours. However, observations conducted during non-hazing periods suggest that local populations of birds may have altered their daily patterns to use hatchery ponds when hazers and hatchery staff were not present. This was particularly true of great blue heron, which exhibited a much higher frequency of occurrence and relative abundance in the absence of hazing. Bird presence, however, does not necessarily equate to loss of fish. Although great blue herons are efficient visual predators capable of taking hatchery salmonids, they have a flexible, diverse diet including amphibians, birds, crustaceans, insects, mammals, reptiles, and fishes (Butler, 1992). Additional active hazing may continue to reduce bird presence and opportunities for foraging; however, more information is needed to determine levels of fish loss to predators.

The results of the study indicated that several specific modifications of the existing control program may be beneficial. These include:

- modifying the hazing schedule to include evening or nighttime hours to help protect fish from nocturnal predators;
- extending the hazing period until all fish are moved from the hatchery ponds;
- replacing the electric fencing around ponds at Wells Hatchery with woven field fence to prevent wading birds (e.g., great blue herons) from walking under the gull wire, and if constructed properly, prevent access by aquatic mammals, such as river otter;
- improving the methods used to quantify fish survival in the ponds and raceways to allow hatchery managers to better assess the impacts of predators; and
- decreasing the spacing between gull wires, if pond use by aerial predators increases or if birds are shown to be vectors of Ich protozoan disease (i.e., if rearing pond mortalities consistently exceed 5 percent); cause-specific mortality investigations (including screening birds for the disease to determine whether they are vectors) could be useful in identifying corrective measures.

We conclude that under existing conditions, predator control methods are effective in protecting fish during the daylight hours, without substantial adverse effects on predator populations. Improvement of the methods hatchery managers use to quantify fish survival under existing conditions would assist managers in determining whether the additional modifications listed above are necessary, and would warrant the cost of additional personnel, equipment and materials. If these modifications are implemented,

they would also likely result in minor, temporary adverse effects, such as disturbance and displacement, on predators.

Avian Protection Plan

Transmission line structures can benefit raptors by providing perch and/or nesting structures in areas where few natural perches or nest sites are available. These same structures can pose a threat to raptors and migratory birds through electrocution and collision. In addition, some studies suggest that because raptors and corvids use utility structures as hunting perches, transmission lines can improve their predation efficiency and reduce populations of prey species, such as grouse (Atamian et al., 2007), or prevent prey species from using habitat within transmission line corridors in response to a perceived threat of predation (Aspbury and Gibson, 2004).

Douglas PUD proposes to implement an Avian Protection Plan that includes measures to minimize the potential for avian interactions with the project transmission lines and monitor the occurrence of avian mortalities that may be associated with the transmission line. Specifically, Douglas PUD would:

- install bird flight diverters on the transmission line where it crosses the Columbia River, if new conductors, static wires, or aviation markers are being replaced, using a light-emitting design (if available) to improve visibility in low light conditions;
- maintain records of all avian mortalities detected within the transmission line right-of-way and report all mortalities caused by the transmission lines to FWS through the online fatality/injury reporting program;
- implement a nest management protocol to ensure that: (1) all nest management is performed in compliance with federal and state laws; (2) the Douglas PUD Wildlife Biologist is consulted, and FWS and Washington DFW permits are secured, as necessary, before any nest is removed; and (3) removal of active nests is avoided between February 1 and August 31 without prior approval from FWS and Washington DFW, and nests are removed only if they are located above a line phase and have caused or threaten to cause an outage, present a fire hazard or other safety hazard, or because the size and weight of the nest threaten tower stability;
- perform tree-clearing within the right-of-way between August 31 and January 31 (clearing of the conifer trees is anticipated to happen once every 10 years, beginning in 2018);
- train utility personnel to understand avian issues, providing them with background information, protocols, and procedures for reporting mortalities, implementing nest removal actions, disposing of carcasses, performing vegetation management, and complying with applicable regulations;

- meet with the resource management agencies or tribes, when requested, to discuss management of wildlife and botanical species on the transmission line corridor; and
- modify the Avian Protection Plan only with the agreement of FWS and Washington DFW, with changes to be reported to FERC for review and approval.

Our Analysis

The Wells Project transmission lines were constructed to meet National Electric Safety Code conductor clearances. The phase-to-ground separation and horizontal separation between phases exceeds Avian Power Line Interaction Committee (APLIC) recommendations for the largest bird species found in the project area (the bald eagle), and the use of suspension insulators contributes further to the safety margin (APLIC, 2006). For this reason, the risk of electrocution of any birds is extremely low, but Douglas PUD conducted two additional studies to further evaluate the potential for bird interactions with the transmission line.

In late September 2008, Douglas PUD and Washington DFW conducted joint surveys for migrating raptor concentrations to determine whether a raptor migration corridor exists in the vicinity of the transmission line corridor (Parametrix, 2009a). Over the course of 10 surveys, 37 observations of raptors were made. By comparison, late September 2008 surveys (16th to 30th) conducted at a site several miles west of Wells dam counted 662 migrating raptors, with peak passage rates in excess of eight raptors per hour (HawkWatch International, 2008). The much smaller number of raptors observed in the Wells Project area suggests that wind conditions in the project area may be less conducive for migration than in the Cascade foothills west of the Columbia River, and that for this reason, the project area is not used as a migration corridor.

Douglas PUD conducted additional surveys specifically to evaluate raptor and corvid use of the transmission line corridor, and to document any evidence of avian collisions or electrocutions of any species (Parametrix, 2009a). Biologists observed three bird carcasses (ringneck pheasant, gray partridge, and common nighthawk) during focused surveys. Three other carcasses (dusky grouse, juvenile great horned owl, and great blue heron) were found incidental to other survey efforts within the transmission line corridor. No evidence of electrocution (e.g., burns) or collision trauma (e.g., broken bones) was noted from any of these six carcasses, and most appeared to be the result of predation. Annual maintenance inspections conducted since 1968 have found no evidence of birds being electrocuted by the Wells Project transmission line.

To further assess the risk of bird interactions, the transmission line can be divided into three segments: the 6.8-mile segment that runs southeast from Wells dam to the Waterville Plateau near the Boulder Park area; the 31-mile segment running southwest from Boulder Park to Badger Mountain; and the 3.2-mile segment that travels southwest from Badger Mountain to the Columbia River near Rocky Reach dam (figure 3). We

conclude that the middle segment would present the lowest risk of collision risk for migrating birds, because of its alignment parallel, rather than bisecting, the north and south flight paths of birds migrating through Douglas County. This 31-mile segment also parallels the transmission right-of-way for two BPA 500-kV transmission lines and two 230-kV BPA transmission lines, which increases the visibility of the structures.

For the most part, the 6.8-mile and 3.2-mile segments of the transmission line follow the slope from the plateau down to the river. This alignment would not likely interfere with migration patterns, but raptors soaring and hunting along the slopes may be vulnerable.

We conclude that the only segment with a high risk of collision is the 2,400-foot river crossing about 0.5 mile downstream of Wells dam. Birds flying south along the Columbia River must fly above Wells dam, the gantry cranes, and substation bus work. The bus work is heavily constructed and very visible during the day, and red aircraft marker lights on the top of the structure make the bus work very visible at night. Birds flying south over the dam are high enough to clear the transmission crossing below the dam. However, birds flying north along the Columbia River must fly over the less visible transmission line crossing before encountering Wells dam. Light from the dam may help to make the line more visible under low light conditions.

The crossing is about 2,400 feet from tower to tower. Fifteen 36-inch round aircraft marker balls are spaced 600 feet apart on each of the four shield wires. The markers are uniformly staggered across the four shield wires to provide an apparent spacing of 150 feet between markers. Blinking, red aircraft warning lights are mounted on river crossing towers at the height of the shield wire. Gulls, terns, cormorants and other piscivorous birds have fed below Wells dam for years while avoiding gull wires (3/64-inch diameter) stretched across the tail water to reduce predation on salmonids. These piscivorous birds should be able to easily avoid the shield wire under all but low light conditions, but the crossing is potentially the most hazardous section of line for young resident birds learning to fly and raptors hunting in unfamiliar terrain, including young osprey and bald eagles searching for fish along the river. Great blue herons are easily flushed by human activity and could fly into the ground wire if disturbed near the river crossing.

The risk of collision at the river crossing is likely reduced by the combination of aerial marker balls and blinking red aircraft warning lights on the towers, based on APLIC (1994) reports that aerial marker balls on overhead lines reduce avian collisions by 40 to 54 percent. Bird flight diverters have the potential to reduce collisions by 65 to 74 percent in some settings, so Douglas PUD's proposal to install light-emitting diverters if new conductors, static wires, or aviation markers are replaced in the future would further reduce the risk.

In summary, Douglas PUD's studies did not indicate any evidence of electrocution or collision. We conclude that the risk of avian electrocution is extremely low, because of the transmission line and tower design features. With the exception of the river

crossing, the risk of collision is low, because the transmission line is not located along any major bird migration route. Existing markers at the Columbia River crossing help to mitigate the risk of collision, and the installation of bird diverters would further reduce the risk. We conclude that implementation of protocols for monitoring, recording, and reporting mortalities (including training of personnel in these protocols) would provide information that would be valuable in determining whether any additional mitigation measures are needed in the future, and would be consistent with current APLIC and FWS guidelines (APLIC and FWS, 2005) for avian protection planning. Implementation of protocols for nest removal and timing restrictions for clearing vegetation within the transmission line corridor would prevent unnecessary adverse effects on birds, and would be consistent with protections afforded under the Migratory Bird Treaty Act.

In addition to direct effects of electrocution and collision with the transmission line, participants in scoping indicated a concern that the presence of the transmission line could have indirect effects on species, such as grouse, that serve as a prey base for raptors and corvids. Douglas PUD conducted a literature search to evaluate these effects. One study indicated that collisions with power lines played a minor role in grouse mortality (Wolfe et al., 2007), while another (Beck et al., 2006) found that about 50 percent of mortalities were the result of human-related mortality that included collisions with distribution and transmission line structures. Two studies suggested indirect effects of predation, due to abandonment of leks, nest sites, and brood rearing areas in response to the perceived threat of predation (Atamian et al., 2007; Aspbury and Gibson, 2004). However, sage grouse and sharp-tailed grouse do not presently occur in the Wells Project area (EDAW, 2006b; Parametrix, 2009a). For this reason, no specific measures would be needed to mitigate effects of the transmission line on grouse.

Land Management Practices

Participants in scoping identified a concern about the effects of Douglas PUD's land management practices (weed control, erosion control) and permitting policies (installation of docks, water systems, fences, landscaping, and agricultural uses) on wildlife and wildlife habitats. Human activities occurring on Wells Project lands would have the potential to remove or alter wildlife habitat, if undeveloped lands are converted to human uses, and noise and traffic associated with human activities has the potential to cause wildlife disturbance.

Under current conditions, Douglas PUD complies with state and county requirements for weed control, and implements a comprehensive Land Use Policy. Douglas PUD's Land Use Policy provides for consideration of wildlife habitat in making land management decision. It also includes specific prohibitions on dumping and littering; construction, except by special permit; and destruction, defacement, or removal of any vegetation or soil. The policy specifies that permits will be issued only if the proposed use meets the requirements of the FERC license and considers protection of the environmental (and other) values of the land. Douglas PUD may use fencing or barriers to protect shoreline riparian and wetland habitat, and/or control public access to sensitive

wildlife habitat, but private individuals may not construct fences unless authorized by Douglas PUD. Under the Land Use Policy, Douglas PUD would ensure that any permits issued would be consistent with federal and state regulations that protect wildlife and wildlife habitat, and would consider agency and tribal comments before issuing a permit. In addition to these policies and procedures, Douglas PUD regularly monitors the use of project lands and waters.

Our Analysis

The Wildlife and Botanical Management Plan would formalize Douglas PUD's existing noxious weed control measures. These measures would support the native plant communities that provide forage and cover for wildlife through BMPs to prevent weed establishment and treatment of weed infestations. The noxious weed measures also call for Douglas PUD to revegetate any areas that are denuded as a result of weed treatment. With these measures in place, noxious weed management should benefit wildlife habitat, rather than adversely affecting it.

The Wildlife and Botanical Management Plan does not include specific measures for erosion control, but as mentioned above, the plan includes several measures that would mitigate for erosion. These include maintenance of bald eagle perch poles, protection of large shoreline trees that may serve as bald eagle perches, and shoreline plantings to ensure recruitment of large trees in the future. These measures would benefit bald eagles, in particular, but would also benefit a variety of other birds, mammals, amphibians, and reptiles that use riparian habitat.

The project area does not contain large, contiguous blocks of pristine habitat, but the existing mosaic of upland, riparian, wetland, and open water cover types supports more than 200 wildlife species (EDAW, 2006b) and 2008 (Parametrix, 2009a). In addition to protection of bald eagle perch trees, the Wildlife and Botanical Management Plan contains measures that focus on habitat improvements for several other key species (American white pelican, Columbian sharp-tailed grouse, amphibians, and waterfowl). The Land Use Policy would serve as an effective means of maintaining existing habitat quality for most wildlife species that occur in the project area. With these two measures in place, we conclude that Douglas PUD's land management practices are not likely to adversely affect wildlife habitat or wildlife.

3.3.3 Threatened and Endangered Species

3.3.3.1 Affected Environment

Through consultation with FWS and NMFS, Douglas PUD (2010, appendix E-7) identified 12 federally listed threatened or endangered species as potentially occurring within Douglas, Okanogan, and Chelan counties (table 24). Eight of the listed species (marbled murrelet, northern spotted owl, Canada lynx, grizzly bear, gray wolf, pygmy rabbit, Wenatchee checker-mallow, and showy stickseed) do not occur in the Wells Project area, because the project area lies outside their range or does not provide the

habitat types that would support them. Four species (bull trout, UCR spring-run Chinook salmon, UCR steelhead, and Ute ladies’-tresses) could occur or are known to occur in the project area. In the sections below, we focus our analysis of potential project effects on these species.

Table 24. Federally listed species potentially occurring in Douglas, Okanogan, and Chelan counties (Source: Douglas PUD, 2010, as modified by staff).

Listed Species	Listing Status	Potential to Occur in the Project Area	Critical Habitat within the Project Area?
Bull Trout	Threatened	Documented	Yes
UCR spring-run Chinook salmon	Endangered	Documented	Yes
UCR steelhead	Threatened	Documented	Yes
Marbled murrelet	Threatened	None; occurs primarily in moist old-growth or mature conifer forest west of the Cascades, not recorded over 70 miles from saltwater	No
Northern spotted owl	Threatened	None; occurs primarily in moist old-growth or mature conifer or mixed conifer forest with multi-layer canopy, rather than dry, inland ponderosa pine.	No
Canada lynx	Threatened	None; occurs in cold, moist forest at elevations higher than 4,000 feet, where snowshoe hare are abundant	No
Gray wolf	Endangered	None; occurs where forest cover is high, road densities are low, and big game prey are abundant	None designated
Grizzly bear	Threatened	None; occurs primarily in large contiguous blocks of undisturbed habitat, remote from development and human activity	No

Listed Species	Listing Status	Potential to Occur in the Project Area	Critical Habitat within the Project Area?
Pygmy rabbit	Endangered	None; project area contains some shrub-steppe habitat, but it is outside of the historical distribution, potentially occupied habitats, recovery emphasis areas, and the 6-mile buffer of the Columbia Basin pygmy rabbit historic range in Douglas County	None designated
Wenatchee Mountains checker-mallow	Endangered	None; endemic to the Wenatchee Mountains in Chelan County, where it is known from only five localities at elevations between 1,970 and 3,300 feet	No
Showy stickseed	Endangered	None; endemic to the Wenatchee Mountains at elevations between 1,600 and 2,500 feet; currently extant at only one location	None designated
Ute ladies'-tresses	Threatened	May occur, as suitable habitat is present	None designated

UCR Spring-Run Chinook Salmon

NMFS listed the UCR spring-run Chinook salmon ESU as endangered under the ESA on March 24, 1999 (64 Federal Register 14,308–14,328). The endangered status for UCR spring-run Chinook salmon was reaffirmed on June 28, 2005 (70 Federal Register 37,160–37,204).

Critical habitat for UCR spring-run Chinook was designated on September 2, 2005, effective January 2, 2006 (70 CFR 52630–52858). Within the Wells Project, critical habitat includes the mainstem Columbia River from the Wells tailrace to the confluence of the Columbia and Methow rivers, along with the accessible portions of the Methow River Basin. Although the Colville Tribes are working to restore spring-run Chinook salmon into the Okanogan River Basin, NMFS (2007) indicates that this population would be treated as an experimental population, which would not increase ESA obligations for landowners in the basin.

Recent trend data for the abundance of natural origin adult UCR spring-run Chinook salmon returning to the Wenatchee, Methow, and Entiat rivers are shown in figure 7. We address the species biology in section 3.3.1.1, subsection *Fisheries Resources*.

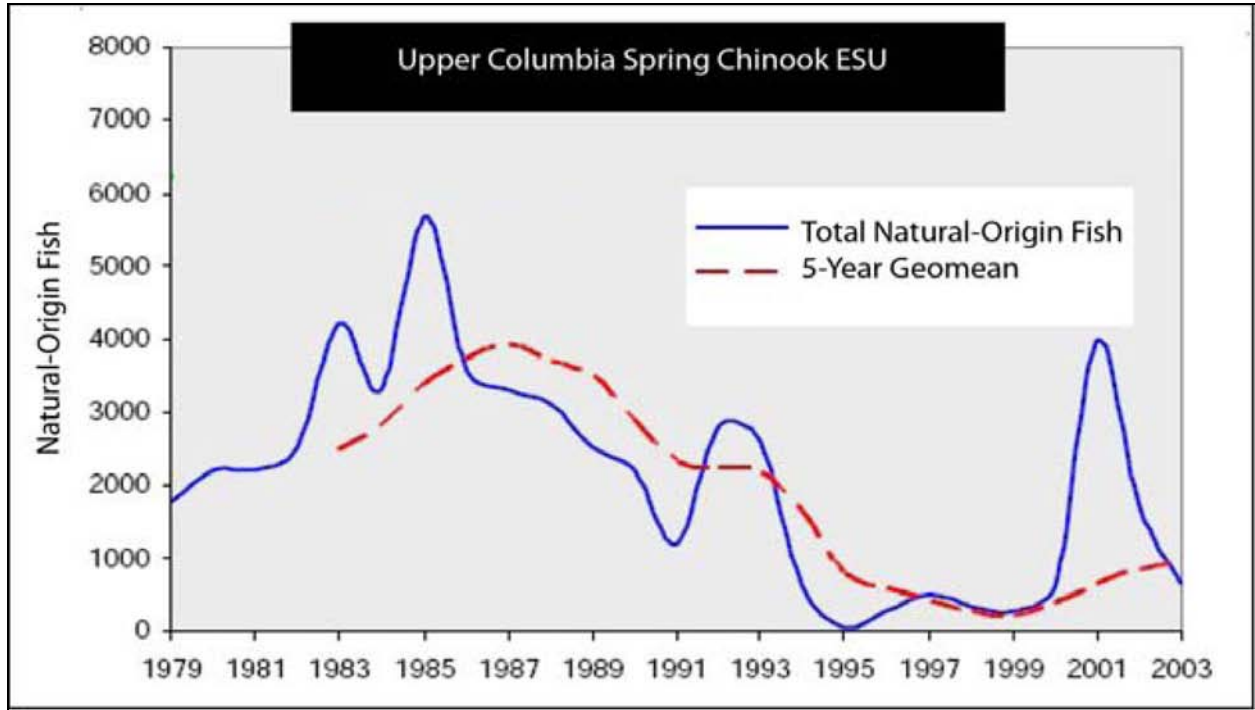


Figure 7. UCR spring-run Chinook abundance trends (Source: Corps et al., 2007).

UCR Steelhead

NMFS listed the UCR steelhead DPS as endangered on August 18, 1997 (62 Federal Register 43,937–43,954). Its status was upgraded to threatened on January 5, 2006 (71 Federal Register 834–862). This listing was reinstated to endangered status by a U.S. District Court decision in June 2007. In March 2009, the Ninth Circuit upheld NMFS decision to list UCR steelhead as threatened and not endangered, overturning the June 2007 District Court decision. On June 18, 2008 the district court revised its ruling, effectively re-instating the UCR steelhead to threatened status under the ESA (74 Federal Register 42,605–42,606).

Critical habitat for the UCR steelhead DPS was designated by NMFS on September 2, 2005 (70 Federal Register 52,630–52,858). Critical habitat in the Wells Project area includes: (1) the mainstem Columbia River from the Wells tailrace to the confluence of the Columbia and Okanogan rivers; (2) the accessible portions of the Methow River Basin; and (3) the accessible portions of the Okanogan River Basin, excluding the Colville Reservation and Salmon Creek.

Recent trend data for the abundance of natural origin adult UCR steelhead for the entire DPS is shown in figure 8. We address the species biology in section 3.3.1.1, subsection *Fisheries Resources*.

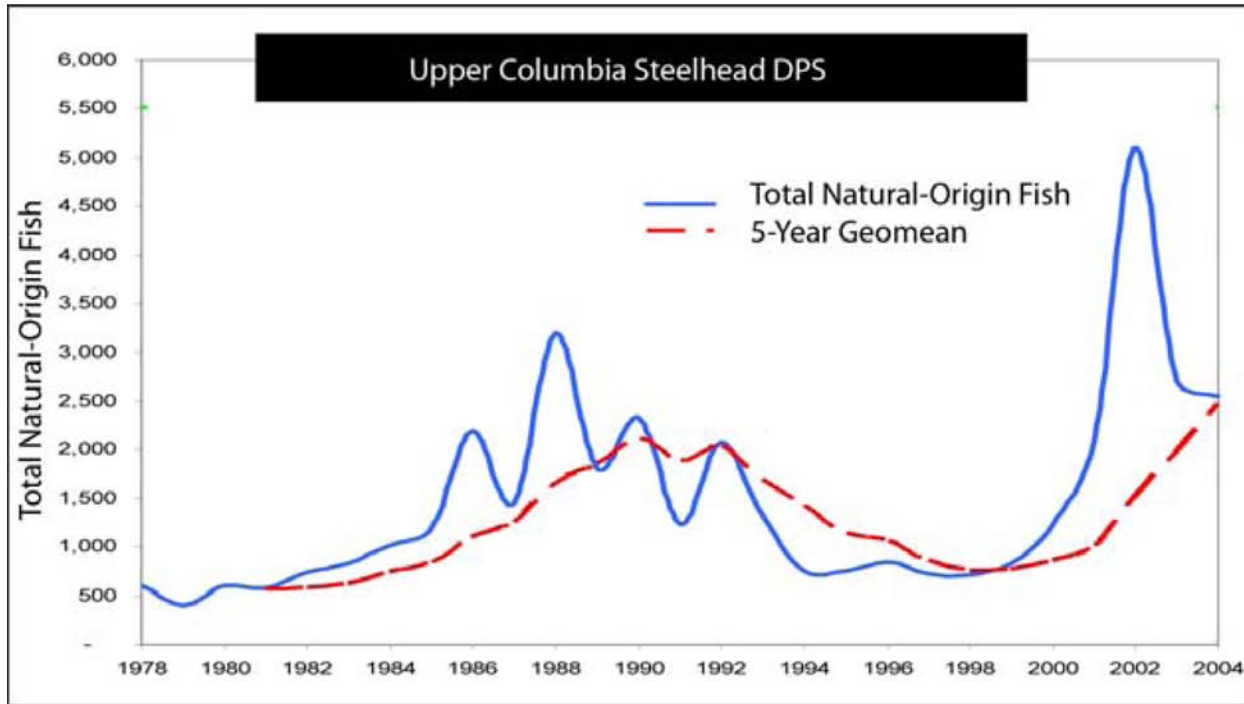


Figure 8. UCR steelhead abundance trends (Source: Corps et al., 2007).

Bull Trout

On June 10, 1998, FWS listed bull trout within the Columbia River Basin as threatened under the ESA (63 Federal Register 31,647–31,674). On September 30, 2010, FWS designated critical habitat for bull trout throughout their U.S. range (75 Federal Register 63,898–64,070). Within the Wells Project, final critical habitat includes 31 miles of the mainstem Columbia River downstream from Chief Joseph dam, and 1.5 miles of the Methow River.⁴⁵

Detailed information describing the life history, habitat requirements, and distribution of bull trout in the Wells Project area and the results of bull trout studies completed during project relicensing were previously described in sections 3.3.1.1, subsection *Fisheries Resources*.

⁴⁵ Designated critical habitat does not include the Okanogan River.

Ute Ladies'-tresses

FWS listed Ute ladies'-tresses as threatened throughout its range (Colorado, Idaho, Montana, Nebraska, Nevada, Utah, Washington, and Wyoming) on January 17, 1992 (57 Federal Register 2,048–2,054). In 1995, FWS finalized a recovery plan for this species (FWS, 1995). On October 15, 2004, FWS began a 5-year review process of the Ute ladies'-tresses status to consider delisting the species due to new information about the abundance and distribution of the species (69 Federal Register 60,605–60,607). At this time, there is no critical habitat designated for Ute ladies'-tresses (CPC, 2008; FWS, 2004).

Ute ladies'-tresses, a member of the orchid family (*Orchidaceae*), is a perennial with 7 to 32 inch stems arising from tuberous roots (FWS, 2004). The species puts out a spike of white flowers between August and September. Ute ladies'-tresses grows in silty loam alluvial soils associated with wetlands and floodplains of valley streams. There are known extant populations in eight states, including Washington (CPC, 2008).

Rare plant surveys found no populations of Ute ladies'-tresses in the project area, although potentially suitable habitat was documented at stabilized gravel bars on the Columbia River that are moist throughout the growing season and inundated early in the growing season (EDAW, 2006a, Parametrix, 2009a). Douglas PUD's review of the Washington NHP (2007) database did not indicate any populations in the project area, but included records of populations in the vicinity. The closest recorded population is 4.5 miles downstream of Wells dam.

3.3.3.2 Environmental Effects

Wells HCP Effects on UCR Spring-Run Chinook Salmon and UCR Steelhead

Our analysis of effects of continued implementation of the Wells HCP on anadromous salmonids, including the UCR Spring-run Chinook salmon ESU and UCR steelhead DPS, is presented in section 3.3.1.2, subsection *Wells Anadromous Fish Agreement and Habitat Conservation Plan*.

In the final EIS for the Wells HCP, NMFS concluded that, based on their analysis for ESA-listed UCR spring-run Chinook salmon and UCR steelhead, implementing the HCPs would substantially increase survival rates of UCR spring-run Chinook salmon and UCR steelhead through the project (NMFS, 2002). In its biological opinion for the Wells HCP, issued August 12, 2003, NMFS found that under the HCP, there will continue to be adverse effects on species considered under its biological opinion. These effects include continuing mortality of juveniles passing the project and are related to both the existence of the project and project operations, which NMFS concluded cannot be separated. NMFS also noted that the levels of juvenile and adult mortality associated with the Wells HCP represent an improvement over the project-caused mortality that occurred historically and contributed to the current species status. Although some short-term negative impacts may result from Wells HCP tributary enhancement projects, NMFS

(2003) concluded that these activities are also likely to benefit all Permit Species (i.e., spring-run and summer/fall-run Chinook salmon, sockeye salmon, and steelhead) by protecting or enhancing tributary habitat in which these fish spawn and rear.

After reviewing the current status of UCR spring-run Chinook salmon and UCR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, NMFS' biological opinion concluded that implementation of the Wells HCP for Wells is not likely to jeopardize the continued existence of UCR spring-run Chinook salmon or UCR steelhead trout (NMFS, 2003).

In its August 12, 2003, biological opinion, NMFS indicated that reinitiation of ESA consultation would be necessary if: (1) any action is modified in a way that causes an adverse effect on the species that is new or significantly different from those analyzed in connection with the Wells HCP; (2) new information or project monitoring reveals adverse effects of the action in a way not previously considered or that involves additional take not analyzed in connection with the original Wells HCP; or (3) a new species is listed or critical habitat is designated that may be affected by the action.

NMFS has already consulted on the Wells HCP effects to the UCR spring-run Chinook salmon ESU and UCR steelhead DPS, and we are not aware of any new information or project monitoring that would reveal adverse effects not previously considered.

We make our final determination of effect for Wells HCP effects on the UCR spring-run Chinook salmon ESU and UCR steelhead DPS in section 1.3.3.

Aquatic Settlement Effects on UCR Spring-Run Chinook Salmon and UCR Steelhead

Douglas PUD does not propose any changes in project operations that would affect the UCR spring-run Chinook salmon ESU or UCR steelhead trout DPS. Under the proposed action, Douglas PUD would implement the Aquatic Settlement, which includes six aquatic resource management plans developed to protect and enhance other aquatic resources at the project.

Our Analysis

The six aquatic resource management plans (components of the Aquatic Settlement) include protection and enhancement measures for Pacific lamprey, bull trout, white sturgeon, and other non-anadromous fish species, including measures to enhance water quality and control the spread and proliferation of aquatic nuisance species. Implementing the measures contained in the plans would generally enhance fish populations and aquatic habitat throughout the project area, and therefore, would likely cause minor beneficial effects to listed aquatic species. Any future potential modifications to fish passage facilities to improve upstream passage for Pacific lamprey, bull trout, or white sturgeon, or other measures or changes in project facilities or operations that are proposed through the Aquatic Settlement would be implemented after

consultation with NMFS and after obtaining prior Commission approval. These consultation and approval requirements would ensure that no adverse effects occur to listed species through future potential measures modifications to fish passage facilities that may be implemented pursuant to the Aquatic Settlement to enhance passage for bull trout, white sturgeon, or Pacific lamprey.

We make our final determination of effect for the UCR spring-run Chinook salmon ESU and UCR steelhead DPS in section 1.3.3.

Wells HCP and Aquatic Settlement Effects on UCR Spring-Run Chinook Salmon and UCR Steelhead Critical Habitat

Effective January 2, 2006, critical habitat was designated for UCR spring-run Chinook salmon and UCR steelhead (70 Federal Register 52,630–52,858). Because critical habitat for these species was designated after the Wells HCP was authorized, the effects of the Wells HCP on designated critical habitat were not previously considered.

Designated critical habitat for UCR spring-run Chinook and UCR steelhead that could be affected by the continued operation of the Wells Project includes the mainstem Columbia River from the Wells dam tailrace upstream to the confluence with the Okanogan River, the lower 15.5 miles of the Okanogan River, and the lower 1.5 miles of the Methow River. The PCE of these designated critical habitats is to serve as a freshwater migration corridor. Continued implementation of the Wells HCP would ensure that the survival rates of UCR spring-run Chinook salmon and UCR steelhead migrating through the project area are improved compared to the survival rates that occurred prior to the start of HCP implementation in 2004. Maintenance of these improved survival rates over the term of the Wells HCP would be ensured through periodic re-evaluation of survival rates and adaptive management provisions included in the HCP. As a result, we find that the condition of the freshwater migration corridor would be improved compared to conditions that existed prior to the Wells HCP, and that this improved condition would be maintained for the term of the HCP, which is in effect through June 2054.

The six aquatic resource management plans in the Aquatic Settlement include protection and enhancement measures for Pacific lamprey, bull trout, white sturgeon, and other non-anadromous fish species, including measures to enhance water quality and control the spread and proliferation of aquatic nuisance species. Implementing the measures contained in the plans would generally enhance fish populations and aquatic habitat throughout the project area, and therefore, would likely cause minor beneficial effects to listed aquatic species. Any future potential modifications to fish passage facilities to improve upstream passage for Pacific lamprey, bull trout, or white sturgeon, or other measures or changes in project facilities or operations that are proposed through the Aquatic Settlement would be implemented after consultation with NMFS and after obtaining prior Commission approval. NMFS and the Commission would be able to

evaluate the measures at that time and ensure that no adverse effects to migration habitat would occur.

We make our final determination of effect for UCR spring-run Chinook salmon and UCR steelhead designated critical habitat in section 1.3.3.

Consistency with the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan

NMFS completed a recovery plan for UCR spring-run Chinook salmon and UCR steelhead in 2007 (NMFS, 2007). Actions identified in the plan relevant to the effects of the Wells Project on UCR spring-run Chinook salmon and UCR steelhead include hatchery recovery actions, hydropower project recovery actions, and habitat recovery actions.

Hatchery Recovery Actions

Hatchery recovery actions relevant to the Wells Project would include:

- increasing the use of locally-derived broodstocks;
- employing mechanisms to manage hatchery returns on spawning grounds in balance with naturally-produced fish;
- reducing or eliminating the presence of out-of-basin stocks on spawning grounds;
- mitigating for losses associated with the Wells Project to supplement natural production and provide harvest opportunities; and
- modifying hatchery programs to minimize adverse impacts of hatchery fish on naturally produced fish while maintaining production levels identified in various agreements.

Our Analysis

Douglas PUD's hatcheries are operated under the conditions of Incidental Take Permits issued by NMFS for listed summer steelhead (Permit #1395), listed spring-run Chinook (Permit #1196) and non-listed anadromous fish (Permit #1347). Operation under the conditions of these Incidental Take Permits and the HGMPs that are currently under development for UCR spring-run Chinook salmon and steelhead would help ensure that the Wells HCP hatchery compensation plan is managed in a manner that is consistent with the hatchery recovery actions included in the recovery plan.

Hydropower Recovery Actions

Hydropower project recovery actions relevant to the Wells Project are to:

- implement or maintain actions to achieve no net impact on spring-run Chinook salmon and steelhead, including modifying operations if needed to achieve a combined juvenile/smolt and adult survival rate of 91 percent;
- continue and evaluate the effectiveness of bird harassment measures and northern pikeminnow reduction actions;
- assess survival rates for juvenile/smolt spring-run Chinook salmon and steelhead;
- evaluate the efficiency and operation of bypass systems or passage facilities and spill on migrating spring-run Chinook salmon and steelhead; and
- evaluate the effects of hydroelectric passage on reproductive success of spring-run Chinook salmon and steelhead.

Our Analysis

The recovery plan hydropower actions are already being implemented and evaluated according to the terms of the Wells HCP. Therefore, continued implementation of the Wells HCP as proposed by Douglas PUD would likely contribute the recovery and long term persistence of the UCR spring-run Chinook salmon and UCR steelhead.

Habitat Recovery Actions

Habitat recovery actions identified in the Methow Basin include 40 short-term restoration actions, 3 long-term actions, 7 administrative/institutional actions, and 10 research and monitoring actions. Habitat recovery actions in the Okanogan Basin include 24 short-term restoration actions, 3 long-term actions, 7 administrative/ institutional actions, and 13 research and monitoring actions. Restoration actions in both basins relevant to the Wells Project would include:

- improving fish passage and habitat connectivity by addressing passage barriers and screening diversions;
- increasing habitat diversity and quantity by restoring riparian habitat, improving streambank conditions and floodplain connectivity, reconnecting side channels, reducing sediment loads, adding large woody debris and instream structures, and increasing streamflows; and
- improving water temperatures by restoring riparian vegetation and increasing stream flows.

Our Analysis

Tributary enhancement measures and monitoring programs implemented through the Wells HCP Tributary Conservation Plan are consistent with the habitat restoration

actions described above, and would likely provide aquatic habitat benefits that would contribute to the recovery and long term persistence of the UCR spring-run Chinook salmon and UCR steelhead.

Essential Fish Habitat

The proposed action includes continued implementation of the Wells HCP and the Aquatic Settlement, which provides a comprehensive set of new measures to protect and enhance aquatic resources in the project area, including bull trout, Pacific lamprey, white sturgeon, resident fish, and water quality.

Our Analysis

In section 3.3.1.2, we evaluated the effects of continued implementation of the Wells HCP and the new measures included in the Aquatic Settlement on aquatic resources. Based on this analysis, we conclude that the environmental measures included in the proposed action would likely be beneficial to aquatic habitat in the project area, including designated EFH for Chinook and coho salmon in the mainstem Columbia, Okanogan, and Methow rivers.

We make our final determination of effect for Chinook and coho salmon EFH in section 1.3.7.

Bull Trout

Detailed information describing the project's effects on bull trout is described in section 3.3.1.2, subsection *Bull Trout Management Plan*.

The measures proposed in the Bull Trout Management Plan, included in the Aquatic Settlement, address the terms and conditions of the incidental take statement included in the FWS' May 13, 2004, *Biological Opinion and Conference Opinion for the License Amendments to incorporate the Rocky Reach, Rock Island, and Wells Anadromous Fish Agreements and Habitat Conservation Plans*. In the biological opinion, FWS indicated that reinitiation of ESA consultation would be necessary if: (1) the amount or extent of incidental take allowed by the biological opinion is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in the biological opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the biological opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action.

Our analysis in section 3.3.1.2, subsection *Bull Trout Management Plan*, indicates that there have been no documented adverse effects of the project on bull trout since the monitoring program required by FWS' 2004 biological opinion was implemented. Our analysis also indicates that the amount or extent of incidental take specified in FWS' 2004 biological opinion has not been exceeded. Additionally, we are not aware of any

new information that would identify effects on the Columbia River bull trout DPS that were not previously considered in the opinion.

We make our final determination of effect for the Columbia River bull trout DPS in section 1.3.3.

Wells HCP and Aquatic Settlement Effects on Bull Trout Critical Habitat

Bull trout designated critical habitat that could be affected by the continued operation of the Wells Project includes the mainstem Columbia River from the Wells dam tailrace upstream to Chief Joseph dam and the lower 1.5 miles of the Methow River. Habitat within these areas serves as foraging, overwintering, and migratory habitat for bull trout. Because critical habitat was designated for these species after the Wells HCP was authorized, the effects of the Wells HCP on designated critical habitat were not previously considered.

Continued implementation of the Wells HCP would ensure that the survival rates of upstream and downstream migrating Plan Species (spring-run and summer/fall-run Chinook salmon, sockeye salmon, coho salmon, and steelhead) are improved compared to the survival rates that occurred prior to the start of HCP implementation in 2004. The measures that are implemented to improve passage conditions for the Plan Species are likely to provide similar benefits to bull trout that migrate past Wells dam. Maintenance of the improved survival rates for Plan Species over the term of the Wells HCP would be ensured through periodic re-evaluation of survival rates and adaptive management provisions included in the Wells HCP. As a result, we find that the condition of the freshwater migration corridor would be improved compared to conditions that existed prior to the Wells HCP, and that this improved condition would be maintained for the term of the HCP, which is in effect through June 2054.

The six aquatic resource management plans in the Aquatic Settlement include protection and enhancement measures for Pacific lamprey, bull trout, white sturgeon, and other non-anadromous fish species, including measures to enhance water quality and control the spread and proliferation of aquatic nuisance species. Implementing the measures contained in the plans would generally enhance fish populations and aquatic habitat throughout the project area. Enhanced populations of fish species as a result of habitat improvements and hatchery supplementation would provide additional foraging opportunities for bull trout. Additionally, any future potential modifications to fish passage facilities to improve upstream passage for Pacific lamprey, bull trout, or white sturgeon would be implemented after consultation with FWS and after obtaining prior Commission approval. FWS and the Commission would be able to evaluate the measures at that time and ensure that no adverse effects to bull trout foraging, overwintering, and migration habitat would occur.

Critical Habitat Primary Constituent Elements

In its August 5, 2011, filing, FWS identified nine PCEs for bull trout critical habitat in the project area. We analyze project effects on bull trout critical habitat PCEs in the Columbia and Methow rivers in table 25.

Table 25. Bull trout critical habitat primary constituent element analysis (Source: Douglas PUD 2011, as modified by staff)

Primary Constituent Element	Description of Conditions and Potential Effects within the Project Area
1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	The project does not significantly affect the amount of available water or the amount of subsurface connectivity of water in the Columbia or Methow rivers. The project is a run-of-river project where water can only be managed on a less than daily basis. Water storage is limited and fluctuations in stage are mild, ranging within the upper 4 feet over 95 percent of the operational record.
2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Radio-telemetry studies and direct observations have not documented any injury or mortality of bull trout during passage through the Wells Project. Studies also have demonstrated that the water found within the Wells Project generally meets water quality standards for all of the parameters measured. Notable exceptions include seasonal exceedances in water temperature and occasional exceedances of TDG water quality standards. Recent studies have resulted in altered spill practices that have reduced the addition of TDG from the Wells Project.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Results from the studies conducted in the Wells Project area indicate that Wells reservoir contains native-dominated aquatic plant, fish, and macroinvertebrate communities. Attainment of water quality standards is excellent, and nutrient levels of the reservoir are all within desirable limits to support healthy populations of salmonids and bull trout. Bull trout have been documented in the Wells Hatchery outfall where juvenile hatchery salmon are seasonally abundant. The juvenile hatchery fish provide a forage opportunity for bull trout.

Primary Constituent Element	Description of Conditions and Potential Effects within the Project Area
	<p>The lower 1.5 miles of the Methow River are primarily used as a migration corridor for bull trout seeking upstream habitat in the Methow or Twisp rivers. Healthy resident and anadromous fish populations in the lower Methow River suggest that ample resources are also available for bull trout passing through that section of river.</p>
<p>4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments with features, such as large wood, side channels, pools, undercut banks and unembedded substrates to provide a variety of depths, gradients, velocities, and structure.</p>	<p>Wells reservoir primarily serves as a migratory corridor for bull trout migrating to the Methow River. While in the reservoir, bull trout are exposed to a stable environment with minimal reservoir stage fluctuations and relatively abundant forage fish and macroinvertebrates. Accessible tributary habitat is nearby, providing more complex riverine features for spawning and rearing in upper river areas.</p> <p>The Methow River within the project area is a relatively deep, low gradient section of stream with intermittent shoreline vegetation and submerged aquatic macrophytes. While habitat structure is not diverse, it is characteristic of stream habitat near a reservoir confluence. The area is not used for bull trout spawning but provides a migratory corridor for bull trout. As a result, the characteristics of the habitat are sufficient for bull trout. Upstream of the project area, complex riverine habitat is available in the upper Methow River and the Twisp River.</p>
<p>5. Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range.</p>	<p>Bull trout have been observed in the reservoir when seasonal temperatures exceed 15°C throughout the mainstem Columbia River. Access to thermal refugia is available in Methow River tributary habitats. Telemetry studies have documented both the trend and success of bull trout migrating through the project to the upper Methow River in early summer, with only limited time spent in the mainstem when temperatures exceed 15°C.</p> <p>Studies have shown bull trout pass through the lower Methow River into upstream habitat outside of the</p>

Primary Constituent Element	Description of Conditions and Potential Effects within the Project Area
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival.	<p>project area where cooler water temperatures are found.</p> <p>Bull trout spawning and rearing occurs in the upper Methow River and the Twisp River. Passage through Wells dam does not limit access to these critical areas. Radio-tagged bull trout were documented successfully moving both upstream and downstream to tributary habitat where spawning and rearing are observed.</p>
7. A natural hydro graph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	<p>Over 90 percent of the base flow at Wells dam is provided by the releases of water from the Federal Columbia River Power System and in particular Grand Coulee and Chief Joseph dams. The project has little control to manipulate the discharge from the federal system to mimic a natural hydrograph. The project is operated as a run-of-river project where water can only be managed on less than a daily basis. Water storage is limited and fluctuations in stage are mild, ranging within the upper 4 feet over 95 percent of the operational record.</p> <p>Project operations do not alter the natural hydrograph of the Methow River above the lowest 1.5 river miles. The lower 1.5 miles of the Methow River are used primarily as a migratory corridor, and any effect of project operations on the hydrograph would not affect bull trout passage.</p>
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	<p>Water quality assessments have shown that the Wells reservoir has excellent water quality with the exception of high temperatures in the summer and early fall, when few bull trout are present in the reservoir. Elevated TDG levels can occur due to spill events; however, gas production dynamics research and annual monitoring and refinement of spill management has reduced TDG production. There have not been any documented injuries or mortalities to bull trout as a result of water quality. Water quantity in the Wells reservoir can fluctuate on a daily basis, creating mild</p>

Primary Constituent Element	Description of Conditions and Potential Effects within the Project Area
<p>9. Sufficiently low levels of predatory (e.g., lake trout, walleye, northern pike, and smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.</p>	<p>changes in reservoir stage. As a result, changes in water quantity are relatively mild. No stranding events of bull trout as a result of fluctuations of the reservoir elevation have been detected during bull trout stranding surveys or during other project monitoring activities.</p> <p>The Wells HCP predator control program is an active effort to control imbalances in predatory fish density in Wells reservoir. The program involves the use of longline fishing equipment with very small hooks baited with small dead crickets fished on the bottom of the river and has resulted in no bull trout captures while allowing the removal of 154,000 predatory pikeminnow over the past 10 years. Smallmouth bass and walleye are found in very low abundance within the reservoir. Studies indicate that walleye are unable to successfully reproduce in the Wells reservoir. Brook trout and brown trout have only occasionally been observed at the fish counting stations at Wells dam.</p> <p>A high density of predatory fish are not found in the project area of the Methow River. It is likely that the project's predator control program in Wells reservoir also influences the lower Methow River pikeminnow population that may move into and out of the reservoir.</p>

We make our final determination of effect for bull trout critical habitat in section 1.3.3.

Consistency with the Draft Bull Trout Recovery Plan

As required by the ESA, FWS has developed a plan, which when fully implemented, would lead to the recovery and ultimate delisting of bull trout in the Columbia River DPS (FWS, 2002). Within the Columbia River DPS, FWS has identified 22 recovery units.

Within the Upper Columbia Recovery Unit, FWS identified three core areas including the mainstem and tributaries of the Wenatchee, Entiat, and Methow rivers. Based on survey data and professional judgment, FWS also identified local populations of bull trout within each core area. Currently there are six local populations in the Wenatchee Core Area, two in the Entiat Core Area, and eight in the Methow Core Area.

The goal of the bull trout recovery plan is to ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed across the species' native range, so that the species can be delisted. To achieve this goal, objectives have been identified for bull trout in the Upper Columbia Recovery Unit (including those bull trout occurring in the Wells Project area) and include:

- maintaining current distribution of bull trout and restore distribution in previously occupied areas within the Upper Columbia Recovery Unit;
- maintaining stable or increasing trends in abundance of bull trout;
- restoring and maintaining suitable habitat conditions for all bull trout life history stages and strategies; and
- conserving genetic diversity and provide opportunity for genetic exchange.

By helping to address the four primary recovery goals in the Upper Columbia River Recovery Unit through continued implementation of the Wells HCP and the proposed Bull Trout Management Plan, the proposed action would benefit the Upper Columbia River Bull Trout Recovery Unit, and would improve the chance for the recovery of the Columbia River bull trout DPS.

Consistency with the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan

- As discussed in section 3.3.3.2, subsection *UCR Spring-run Chinook Salmon and UCR Steelhead*, NMFS completed a recovery plan for UCR spring-run Chinook salmon and UCR steelhead in 2007 (NMFS, 2007). This Plan also addresses bull trout, which are under the jurisdiction of FWS. The strategies and actions outlined in this plan are intended to serve as additional recommendations for the draft bull trout recovery plan (described above) (FWS, 2002). The specific goal for bull trout outlined in the recovery plan is to secure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed across the native range of the species.

Specific bull trout recovery objectives include:

- increasing the abundance of adult bull trout within each core population in the upper Columbia Basin to levels that are considered self sustaining;
- maintaining stable or increasing trends in abundance of adult bull trout within each core population in the upper Columbia River Basin; and
- maintaining the current distribution of bull trout in all local populations, restoring distribution to previously occupied areas where practical, maintaining and restoring the migratory form and connectivity within and among each core area, conserving genetic diversity, and providing for genetic exchange.

As noted above, this plan recommends a series of recovery actions for harvest, hatchery, hydro, and habitat that affect populations of spring-run Chinook, steelhead, and bull trout in the upper Columbia River Basin. While the majority of these actions are focused on the recovery of spring-run Chinook and steelhead, several of these would have direct or indirect effects on Columbia River bull trout, particularly those actions focused on improving fish passage (habitat connectivity), predator control, and tributary habitat restoration. The measures included in the Wells HCP and Bull Trout Management Plan as proposed by Douglas PUD are consistent with these recovery actions, and would likely contribute the recovery and long-term persistence of bull trout in the Columbia River Basin.

Ute Ladies'-Tresses

No populations of Ute ladies'-tresses have been found in the Wells Project area, although suitable habitat is present. Ongoing project maintenance activities and proposed construction of recreation facilities would have no effect on Ute ladies'-tresses, and Douglas PUD proposes no changes in operation that would increase or decrease the likelihood of their occurring in the Wells Project area. For these reasons, we conclude that the proposed action would not affect Ute ladies'-tresses.

ESA Reopener

NMFS and FWS request that the Commission retain by means of a specific ESA reopener provision and other appropriate reservations of authority sufficient discretionary involvement or control with respect to project construction, operation, maintenance and modification to ensure full compliance with the requirements of the ESA during the term of any new license issued for the Wells Project.

The Commission has a license reopener provision that could be used to require changes to project facilities upon Commission motion or as recommended by the appropriate federal and state fish and wildlife agencies after notice and opportunity for hearing. Such provisions are included as a standard license article of any currently issued licenses. This standard reopener provision retains sufficient authority for the Commission to implement any measures that may be needed to protect threatened or endangered species over the term of any new license.

3.3.4 Cultural Resources

3.3.4.1 Affected Environment

Section 106 of the National Historic Preservation Act

Section 106 of NHPA, as amended (section 106), requires the Commission to evaluate potential effects on properties listed or eligible for listing in the National Register prior to an undertaking. An undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency,

including, among other things, processes requiring a federal permit, license, or approval. In this case, the undertaking is the proposed issuance of a new license for the project. Potential effects associated with this undertaking include project-related effects associated with the day-to-day O&M of the project after issuance of a new license.

Historic properties are cultural resources listed or eligible for listing on the National Register. Historic properties represent things, structures, places, or archeological sites that can be either Native American or European-American in origin. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register. Cultural resources also have to have enough internal contextual integrity to be considered historic properties. For example, dilapidated structures or heavily disturbed archeological sites may not have enough contextual integrity to be considered eligible.

Section 106 also requires that the Commission seek concurrence with the Washington SHPO on any finding involving effects or no effects on historic properties, and allow the Advisory Council on Historic Preservation an opportunity to comment on any finding of effects on historic properties. If Native American properties have been identified, section 106 also requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties.

Area of Potential Effects

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by a proposed new license within the project's APE. The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. In this case, the APE for the project includes lands within the FERC project boundary as it is delineated in the current FERC license, plus lands outside the project boundary for which project operations may affect the character or use of historic properties and/or TCPs.

In its license application, Douglas PUD proposes that the APE include the lands within the project boundary and any lands outside the project boundary where cultural resources may be affected by project-related activities that are conducted in compliance with the FERC license. The Wells Project boundary extends from the tailrace of Wells dam (RM 514.7) upstream to the tailrace of Chief Joseph dam (RM 544.5). The boundary also extends to RM 15.5 on the Okanogan River and RM 1.5 on the Methow River. The Wells Project includes a 41-mile-long 230-kV transmission right-of-way, which is also considered part of the APE.

In July 2006, Douglas PUD submitted a letter to the Washington SHPO and the THPO requesting concurrence on the APE (letter from S. Kreiter, Natural Resources Relicensing Specialist, Douglas PUD, East Wenatchee, WA, to A. Brooks, Washington

DAHP, Olympia, WA, filed May 2010; letter from S. Kreiter, Natural Resources Relicensing Specialist, Douglas PUD, East Wenatchee, WA, to C. Pleasants, THPO, Colville Tribes, Nespelem, WA, filed May 2010). Both of these filings described the proposed APE. In its July 24, 2006, response, the Washington SHPO concurred with the APE (letter from R. Whitlam, State Archaeologist, Washington DAHP, Olympia, WA, to S. Kreiter, Natural Resources Relicensing Specialist, Douglas PUD, East Wenatchee, WA, filed May 2010). On October 25, 2006, the Colville Tribes' THPO also concurred with the Douglas PUD's definition of the APE (letter from C. Pleasants, THPO, Colville Tribes, Nespelem, WA, to S. Kreiter, Natural Resources Relicensing Specialist, Douglas PUD, East Wenatchee, WA, filed May 2010).

Culture Historic Context

The following cultural context text is adapted from Hartmann (2010) and from the Wells Project relicensing web site.⁴⁶

Wells Aboriginal Occupations

The project area is located within the ethnographic traditional territory of the Sinkayuse or Moses Columbia, and the Sinkaietk or Southern Okanogan. These Salish-speaking peoples would have used the full range of natural resources available in the region—fishing for salmon and other fish, gathering roots and berries, and hunting for small and large game. The particular items hunted and gathered would have varied according to the season. Settlement patterns in the region included habitation of permanent, often subterranean houses during the winter in the lower valleys near rivers to avoid severe weather conditions. Summers were spent in temporary lodges in open prairies or highlands, near hunting and gathering sources. The introduction of the horse around the 1800s facilitated gathering, hunting, and trading activities in a larger geographic area.

At the time of Euro-American contact, traditional territory of the Sinkayuse filled the Columbia Plateau south and east of the Columbia River, from the mouth of the Wenatchee River south to Priest Rapids and from the Columbia River east to the vicinity of present-day Creston. The Sinkaietk lived in the Okanogan River Valley from the confluence of the Columbia and Okanogan rivers to the confluence of the Okanogan and Similkameen rivers near the United States-Canada border. The Methow also had villages on the Okanogan River. Today, members of the Colville Tribes are acknowledged as having interests in the project area.

Historic Period

River valleys, canyons, and coulees provided natural travel corridors throughout the plateau. Fur traders followed Indian trails in their early forays into the project region

⁴⁶ Available at: <http://relicensing.douglaspud.org/background.htm>.

and continued to use the existing trail systems to travel between trading posts. One such route was the Cariboo Trail connecting Fort Nez Percés and Fort Okanogan, and extending northward along the east side of the Okanogan River into what is now Canada. In 1811, David Thompson explored the region for the North West Company, traveling down the Okanogan. Euro-American settlement in the area began with the establishment of Fort Okanogan by David Stuart and Alexander Ross of the American Pacific Fur Company, at the mouth of the Okanogan River, just east of the present-day city of Brewster. Fort Okanogan was established in 1811 on Cassimer Bar, on the left bank of the Okanogan River near its mouth. From 1814 to 1821, the North West Company operated the fort. The Hudson's Bay Company then took possession of the fort; it was abandoned by 1860.

Douglas PUD was organized in 1946. In the late 1950s and early 1960s, Douglas PUD worked to construct and license the Wells Project. The first generation occurred in 1967, but the project was not completed until 1969.

Prehistoric and Historic Archaeological Properties

The Wells Project has been subject to numerous cultural resource studies during the past 50 years. Early investigations consisted of large-scale surveys and the excavation of Fort Okanogan. Since the early 1960s, some investigations have been linked directly to the construction and operation of the Wells Project and can be characterized as survey, salvage excavation, and monitoring efforts throughout Wells reservoir. With the exception of Fort Okanogan, archaeological research in the project area has focused on pre-contact sites.

As part of the Wells Project relicensing effort, in November 2005, Douglas PUD formed a Cultural RWG to begin consultation under section 106 of NHPA. The Cultural RWG comprised representatives from the Colville Tribes' THPO, Washington SHPO, the Commission, BLM, BIA, and Douglas PUD. The Cultural RWG held 19 meetings during the Wells Project Integrated Licensing Process. During these meetings, the Cultural RWG defined the APE, identified issues, and agreed upon studies that needed to be undertaken to address these issues.

In 2006, Douglas PUD conducted a cultural resource data review to summarize information pertinent to each archeological study that had been conducted in the APE (Berger and Hartmann, 2006, as cited in Douglas PUD, 2010).

In 2007 and 2008, all of the known sites on the reservoir were revisited and portions of the APE were resurveyed, resulting in the update and identification of 211 archaeological sites. The results of these efforts were presented in a survey report titled *Results of the 2007–2008 Wells Reservoir Cultural Resources Field Reconnaissance and Intensive Archaeological Survey, Chelan, Douglas, and Okanogan Counties, WA* (Hamilton, 2008).

Of the 211 archaeological sites identified in the survey report, 199 are within the Wells Project reservoir area and 12 are along the 230-kV transmission line corridor. This

total includes 174 previously recorded sites and 37 newly identified sites, three of which are isolated finds. Seventy sites are fully inundated by the reservoir at normal pool level, and 141 sites are either partially inundated or not inundated. Site types consisted of precontact, historic, and sites containing both historic and precontact components.

Recommendations of National Register eligibility or the need to collect additional information to evaluate a particular site were also provided in the report. Almost all of the sites were either recommended as eligible (55 percent) or required additional research (33 percent) to determine eligibility. Sites currently listed in the National Register, including 23 sites listed as part of the Lake Pateros Archaeological District, remain eligible. Many of the sites are inundated and were inaccessible for study. The inundated sites include 40 that were recommended as eligible, 4 that are currently listed, 22 that are in need of additional study, and 1 that was recommended as ineligible for listing.

Table 26 provides a summary of all prehistoric and historic resources identified within or adjacent to the project boundary APE to date.

Table 26. Archaeological and historic resources within or directly adjacent to the Wells Project APE (Source: Douglas PUD, 2010, as modified by staff).

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45CH276	Historic debris scatter/concentration and historic structure	Ineligible	Not inundated
45CH277	Precontact camp	Needs further research	Not inundated
45CH402	Precontact camp	Eligible	Partially inundated
45DO060	Precontact camp	Eligible	Fully inundated
45DO061	Precontact shell midden	Eligible	Fully inundated
45DO062	Precontact shell midden, precontact camp	Eligible	Not inundated
45DO063	Precontact shell midden	Needs further research	Fully inundated
45DO064	Precontact camp	Needs further research	Fully inundated
45DO065	Precontact camp	Needs further research	Fully inundated
45DO066	Precontact camp	Eligible	Partially inundated
45DO067	Precontact talus pit	Needs further research	Fully inundated
45DO068	Precontact house pit/depression and precontact talus pit	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45DO070	Precontact camp	Eligible	Fully inundated
45DO071	Precontact camp	Eligible	Partially inundated
45DO072	Precontact camp	Eligible	Fully inundated
45DO073	Precontact shell midden, precontact feature	Needs further research	Unknown/may be removed or covered by quarrying activities
45DO074	Precontact shell	Eligible	Unknown/inundated
45DO075	Historic and precontact components: historic object, precontact shell midden, precontact camp	Needs further research	Partially inundated
45DO076	Historic and precontact components: historic debris scatter/concentration and precontact camp	Eligible	Partially inundated
45DO077	Precontact shell midden	Eligible	Fully inundated
45DO078	Precontact shell midden	Eligible	Fully inundated
45DO079	Precontact petroglyph	Eligible	Fully inundated
45DO291	Historic debris scatter/concentration	Needs further research	Not inundated
45DO292	Precontact village	Included in Lake Pateros Archaeological District	Partially inundated
45DO293	Precontact lithic material, precontact cairn	Eligible	Fully inundated
45DO371	Precontact lithic material	Needs further research	Fully inundated
45DO372	Precontact village	Included in Lake Pateros Archaeological District	Partially inundated
45DO373	Precontact camp	Eligible	Fully inundated
45DO375	Precontact lithic material, precontact talus pit burial	Included in Lake Pateros Archaeological District	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45DO376	Precontact camp	Eligible	Not inundated
45DO377	Historic and precontact components: historic debris scatter/ concentration and precontact camp	Eligible	Partially inundated
45DO378	Precontact camp	Included in Lake Pateros Archaeological District	Not inundated
45DO379	Precontact camp	Eligible	Fully inundated
45DO380	Historic and precontact components: historic homestead and precontact isolate	Eligible	Not inundated
45DO381	Historic homestead	Eligible	Not inundated
45DO382	Precontact camp	Eligible	Not inundated
45DO383	Precontact camp	Eligible	Partially inundated
45DO384	Precontact shell midden	Eligible	Partially inundated
45DO385	Precontact camp	Eligible	Partially inundated
45DO386	Precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45DO387	Precontact camp	Eligible	Partially inundated
45DO388	Precontact shell midden	Needs further research	Fully inundated
45DO389	Precontact shell midden	Needs further research	Fully inundated
45DO390	Precontact shell midden	Needs further research	Fully inundated
45DO391	Precontact camp	Eligible	Partially inundated
45DO392	Precontact camp	Needs further research	Fully inundated
54DO467	Precontact lithic material	Ineligible	Fully inundated
45DO468	Precontact lithic material	Eligible	Partially inundated
45DO469	Precontact shell midden	Eligible	Fully inundated
45DO470	Precontact lithic material	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45DO472	Precontact lithic material (not in the APE)	Eligible	Not inundated (not in the APE)
45DO485	Historic and precontact components: historic homestead and precontact lithic material	Eligible	Not inundated
45DO486	Historic debris scatter/ concentration	Ineligible	Not inundated
45DO515	Historic and precontact components: historic debris scatter/ concentration and precontact lithic material	Eligible	Partially inundated
45DO789	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO790	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO791	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO792	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO793	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO794	Historic debris scatter/ concentration and precontact lithic material	Undetermined	Not inundated
45DO795	Historic debris scatter/ concentration	Undetermined	Not inundated
45DO796	Precontact lithic material and historic debris scatter/concentration	Undetermined	Not inundated
45DO797	Historic objects	Ineligible	Not inundated
45DO798	Precontact talus pit	Undetermined	Not inundated
45DO799	Precontact isolate	Ineligible	Not inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45DO804	Historic homestead	Undetermined	Not inundated
45DO805	Historic objects	Ineligible	Not inundated
45OK030	Precontact shell midden	Eligible	Fully inundated
45OK031	Precontact house pit/ depression and precontact shell midden	Eligible	Fully inundated
45OK044	Precontact burial	Eligible	Fully inundated
45OK048	Precontact house pit/ depression	Eligible	Partially inundated
45OK049	Precontact house pit/ depression	Included in Lake Pateros Archaeological District	Not inundated
45OK050	Precontact shell midden and precontact lithic material	Eligible	Partially inundated
45OK051	Precontact camp	Needs further research	Not inundated
45OK052	Precontact village and precontact burial	Eligible	Fully inundated
45OK053	Precontact burial, precontact camp, precontact lithic materials	Included in Lake Pateros Archaeological District	Not inundated
45OK054	Precontact camp	Eligible	Partially inundated
45OK055	Precontact camp	Included in Lake Pateros Archaeological District	Not inundated
45OK056	Precontact lithic material	Eligible	Fully inundated
45OK057	Precontact pictograph and precontact camp	Eligible	Partially inundated
45OK058	Precontact village	Eligible	Fully inundated
45OK059	Precontact shell midden	Eligible	Fully inundated
45OK060	Precontact camp	Needs further research	Fully inundated
45OK062	Precontact pictograph	Eligible	Fully inundated
45OK063	Precontact camp and precontact cairn	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK064	Historic and precontact components: historic fort and precontact camp (contact era)	Eligible	Fully inundated
45OK065	Historic and precontact components: historic cemetery/burial, historic fort, precontact lithic material	Eligible	Partially inundated
45OK066	Precontact burial and precontact house pit/depression	Eligible	Fully inundated
45OK067	Precontact camp	Needs further research	Fully inundated
45OK068	Precontact camp	Eligible	Fully inundated
45OK069	Precontact burial and precontact house pit/depression	Included in Lake Pateros Archaeological District	Fully inundated
45OK070	Precontact shell midden	Needs further research	Fully inundated
45OK071	Precontact feature	Needs further research	Fully inundated
45OK072	Precontact house pit/depression	Eligible	Fully inundated
45OK074	Precontact shell midden and precontact camp	Eligible	Partially inundated
45OK075	Precontact camp	Needs further research	Partially inundated
45OK076	Precontact pictograph and precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45OK077	Precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45OK078	Precontact house pit/depression and precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45OK079	Precontact feature	Eligible	Fully inundated
45OK080	Precontact camp	Eligible	Not inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK081	Precontact camp	Eligible	Fully inundated
45OK084	Precontact feature	Eligible	Fully inundated
45OK085	Precontact shell midden	Needs further research	Fully inundated
45OK086	Precontact camp	Eligible	Partially inundated
45OK087	Precontact shell midden	Needs further research	Fully inundated
45OK088	Precontact shell midden	Needs further research	Fully inundated
45OK091	Precontact village and precontact burial	Eligible	Fully inundated
45OK092	Precontact camp	Included in Lake Pateros Archaeological District	Fully inundated
45OK093	Precontact burial	Eligible	Not inundated
45OK094	Precontact camp	Eligible	Partially inundated
45OK095	Precontact lithic material	Eligible	Fully inundated
45OK096	Precontact shell midden	Eligible	Fully inundated
45OK097	Precontact camp	Eligible	Not inundated
45OK098	Precontact camp	Eligible	Not inundated
45OK099	Precontact camp and precontact shell midden	Eligible	Not inundated
45OK100	Precontact shell midden and precontact lithic material	Eligible	Not inundated
45OK104	Precontact camp	Needs further research	Fully inundated
45OK105	Precontact shell midden	Eligible	Fully inundated
45OK106	Precontact shell midden	Included in Lake Pateros Archaeological District	Not inundated
45OK108	Precontact shell midden	Eligible	Fully inundated
45OK109	Precontact house pit/ depression	Eligible	Fully inundated
45OK110	Precontact shell midden	Eligible	Not inundated
45OK111	Precontact camp	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK112	Precontact burial and precontact camp	Eligible	Partially inundated
45OK113	Precontact house pit/ depression	Eligible	Partially inundated
45OK114	Precontact cairn	Needs further research	Not inundated
45OK115	Precontact burial	Eligible	Partially inundated
45OK116	Precontact lithic material and precontact cairn	Included in Lake Pateros Archaeological District	Not inundated
45OK117	Precontact camp	Included in Lake Pateros Archaeological District	Not inundated
45OK118	Precontact camp	Eligible	Fully inundated
45OK119	Precontact burial	Eligible	Not inundated
45OK120	Precontact house pit/ depression	Needs further research	Not inundated
45OK121	Precontact camp	Eligible	Not inundated
45OK125	Precontact camp	Eligible	Not inundated
45OK126	Precontact camp	Needs further research	Partially inundated
45OK128	Precontact camp	Eligible	Not inundated
45OK130	Historic and precontact components: historic debris scatter/ concentration and precontact lithic material	Eligible	Not inundated
45OK131	Precontact camp (not in the APE)	Needs further research	Not inundated (not in the APE)
45OK132	Precontact camp	Eligible	Not inundated
45OK133	Precontact house pit/ depression and precontact camp	Eligible	Not inundated
45OK134	Precontact house pit/ depression and precontact camp	Eligible	Not inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK135	Precontact village (contact era)	Eligible	Partially inundated
45OK136	Precontact house pit/ depression (contact era)	Eligible	Partially inundated
45OK137	Precontact camp (contact era)	Eligible	Partially inundated
45OK138	Precontact house pit/ depression (not in the APE)	Needs further research	Not inundated (not in the APE)
45OK139	Historic and precontact components: historic debris and precontact camp house pit	Eligible	Fully inundated
45OK371	Precontact camp	Eligible	Fully inundated
45OK372	Historic mining properties	Ineligible/Destroyed	Not inundated
45OK373	Precontact camp	Eligible	Partially inundated
45OK374	Historic homestead	Needs further research	Partially inundated
45OK375	Precontact camp	Eligible	Partially inundated
45OK376	Precontact shell midden	Eligible	Fully inundated
45OK377	Precontact camp	Eligible	Fully inundated
45OK378	Precontact camp	Needs further research	Fully inundated
45OK379	Precontact lithic material	Needs further research	Fully inundated
45OK380	Precontact camp	Needs further research	Fully inundated
45OK381	Precontact camp	Needs further research	Fully inundated
45OK382	Precontact camp	Eligible	Fully inundated
45OK383	Precontact shell midden and precontact house pit/ depression	Included in Lake Pateros Archaeological District	Fully inundated
45OK419	Precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45OK420	Precontact camp	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK421	Precontact camp	Eligible	Partially inundated
45OK422	Precontact shell midden	Included in Lake Pateros Archaeological District	Partially inundated
45OK423	Precontact camp	Needs further research	Not inundated
45OK424	Precontact camp	Included in Lake Pateros Archaeological District	Fully inundated
45OK425	Precontact camp	Included in Lake Pateros Archaeological District	Not inundated
45OK426	Precontact camp	Included in Lake Pateros Archaeological District	Partially inundated
45OK427	Historic structure unknown	Needs further research	Not inundated
45OK428	Precontact camp	Eligible	Partially inundated
45OK431	Precontact camp and precontact cairn	Included in Lake Pateros Archaeological District	Not inundated
45OK432	Precontact lithic material	Eligible	Not inundated
45OK433	Precontact camp	Eligible	Not inundated
45OK434	Historic debris scatter/ concentration and historic structure unknown	Needs further research	Not inundated
45OK435	Precontact camp	Eligible	Fully inundated
45OK436	Precontact camp	Eligible	Fully inundated
45OK437	Precontact camp	Needs further research	Partially inundated
45OK438	Historic debris scatter/ concentration	Eligible	Partially inundated
45OK439	Precontact camp	Needs further research	Fully inundated
45OK487	Precontact cairn	Needs further research	Not inundated
45OK488	Precontact camp	Ineligible/Destroyed	Not inundated
45OK518	Precontact camp	Eligible	Partially inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK519	Precontact house pit/ depression and precontact camp	Eligible	Partially inundated
45OK520	Precontact camp	Eligible	Partially inundated
45OK521	Precontact shell midden	Eligible	Partially inundated
45OK527	Precontact camp	Eligible	Partially inundated
45OK834	Precontact camp	Eligible	Fully inundated
45OK1385	Precontact isolate	Ineligible	
45OK1388	Historic structure unknown	Undetermined	Not inundated
45OK1389	Historic residential structure	Undetermined	Not inundated
45OK1390	Precontact camp	Undetermined	Not inundated
45OK1391	Historic objects	Ineligible	Not inundated
45OK1392	Precontact camp	Undetermined	Partially inundated
45OK1393	Precontact camp	Undetermined	Not inundated
45OK1394	Precontact cairn	Undetermined	Fully inundated
45OK1395	Precontact camp	Undetermined	Partially inundated
45OK1396	Historic structure, historic debris scatter/ concentration	Undetermined	Not inundated
45OK1397	Historic objects	Ineligible	Not inundated
45OK1398	Precontact shell midden	Undetermined	Partially inundated
45OK1399	Precontact feature	Undetermined	Partially inundated
45OK1400	Precontact lithic material	Undetermined	Partially inundated
45OK1401	Precontact camp	Undetermined	Partially inundated
45OK1402	Historic objects	Ineligible	Not inundated
45OK1403	Historic objects	Ineligible	Not inundated
45OK1404	Precontact cairn	Undetermined	Fully inundated
45OK1408	Historic homestead	Undetermined	Not inundated

Primary Number	Description	National Register Eligibility and Rationale	Accessibility/ Inundation
45OK1418	Historic maritime property	Undetermined	Not inundated
45OK1419	Historic homestead	Undetermined	Not inundated
45OK1420	Historic and precontact components: historic mining property, historic debris scatter/ concentration, historic structure, precontact feature	Undetermined	Partially inundated
45OK1421	Precontact feature	Undetermined	Partially inundated

The Wells Project hydroelectric structures are not yet old enough to be considered historic properties eligible for listing on the National Register.

Traditional Cultural Properties

TCPs are cultural resources that are eligible for inclusion in the National Register because of their association with cultural practices or beliefs of a living community that are rooted in that community’s history; they are important in maintaining the continuing cultural identity of the community. Douglas PUD contracted with the Colville Tribes’ History/Archaeology Program to conduct a TCP study for the Wells Project. The purpose of the TCP study was to identify locations within the APE that are associated with the cultural practices or beliefs of the Colville Tribes, and the results were presented in *Traditional Cultural Property Study Component of the Wells Hydroelectric Project* (Finley et al., 2008), which was filed with the Commission on December 5, 2008. Due to sensitivity of TCP locations, the results of the study are confidential.

3.3.4.2 Environmental Effects

Effects on cultural resources within the APE can result from project-related activities such as reservoir operations, modifications to project facilities, or other project-related ground-disturbing activities. Effects can also result from other forces such as wind and water erosion, vandalism, and private and commercial development. The type and level of effects on cultural resources can vary widely, depending upon the setting, size, and visibility of the resource, as well as whether there is public knowledge about the location of the resource.

In its license application, Douglas PUD explains that the most common effect on cultural resources identified during the 2007–2008 site inventory is erosion; however, Douglas PUD states that most of the shorelines along within the project APE appear to be

stable and that any ongoing erosion appears to be progressing relatively slowly. Additionally, Douglas PUD states that most of the shoreline is moderately protected by riparian vegetation and natural cobble armoring at the toe of eroding faces. Douglas PUD also states that the elevation of Wells reservoir elevation is relatively stable and slower velocities may reduce the erosional influences of natural run-off in the project area and discharge from the upstream Chief Joseph Project. Other less frequent effects identified in the site inventory include inundation/saturation, agricultural activities, and recreation activities.

With the exception of a select group of 29 sites that have been periodically monitored under the current license, current project-related effects on cultural resources have not been yet confirmed by long-term systematic evaluations.

Douglas PUD and the Cultural RWG have prepared an HPMP (Hartmann, 2010) to address identified and potential project-related effects on cultural resources documented within the APE. The purpose of the HPMP is to provide guidelines to Douglas PUD for managing historic properties affected by the O&M of the Wells Project and complying with NHPA during the new license term. The HPMP includes provisions for: (1) coordination and consultation with the Washington SHPO, THPO, Commission staff, and other parties as appropriate; (2) education and interpretation; (3) inadvertent discoveries of cultural materials and/or human remains; (4) emergency situations; (5) management standards for treatment of cultural resources; (6) curation and data management; and (7) periodic updates to accommodate for environmental and regulatory changes. Additionally, the HPMP requires the implementation of an archaeological monitoring plan that would assist in the identification of project effects. The results of monitoring would be used to develop appropriate site-specific management measures as necessary.

Construction of the Wells Project was completed in 1964, and although the hydroelectric system and its individual components do not yet qualify for inclusion on the National Register as historic properties, they may meet eligibility requirements within the next 4 years (by 2014). In its HPMP, Douglas PUD proposes to evaluate the project facilities for historic architectural and engineering significance in 2017.

Douglas PUD proposes to implement the HPMP upon new license issuance and in consultation with the Washington SHPO, THPO, and other interested parties.

In its comments on the draft EIS, Douglas PUD stated that there is no justification for the Commission to require it to cease land-disturbing activities and consult with the appropriate federal land management agencies, in the event that paleontological resources are discovered on federal lands. Douglas PUD asserts that paleontological remains are not cultural resources and that such a measure should not be included in the HPMP. It further asserts that the Commission has no authority under FPA to compel it to protect paleontological resources in any such event.

In their comments on the draft EIS, the Colville Tribes state that the project affects their traditional cultural practices and request funding to preserve and enhance their cultural activities (letter from M. Finley, Colville Tribes, Nespelem, WA, to K. Bose, Secretary, Commission, Washington, DC, filed May 2011).

Our Analysis

We have reconsidered our position and conclude that Douglas PUD's argument involving the treating of paleontological resources on federal lands has merit. Thus, we will not require Douglas PUD to notify federal land managers upon the discovery of paleontological resources on federal lands.

Douglas PUD contracted with the Colville Tribes' History/Archaeology Program to conduct a TCP study for the Wells Project. The purpose of the TCP study was to identify locations within the APE that are associated with the cultural practices or beliefs of the Colville Tribes, and the results were presented in *Traditional Cultural Property Study Component of the Wells Hydroelectric Project* (Finley et al., 2008), which was filed with the Commission on December 5, 2008. The May 2010 HPMP states that Douglas PUD would consult with the THPO and the Washington SHPO to identify potential effects of project activities on TCPs and develop appropriate protection measures. The details of those measures would be determined during those consultations. This would include any agreement between Douglas PUD and the Colville Tribes for the funding of preservation programs, should such funding be considered appropriate by the consulting parties. We conclude that this consultation would lead to the adequate resolution of adverse effects on TCPs in accordance with section 106.

Implementation of the measures identified in the HPMP would ensure that historic properties, including TCPs, identified within the APE are protected from project-related effects over any new license term.

Pursuant to NHPA and to protect historic properties, we would craft and execute a PA to implement the HPMP as a condition of any new license for this project. The PA would be executed between the Commission, Advisory Council on Historic Preservation (if it chooses to participate), Washington SHPO, and THPO, with Douglas PUD, BIA, and BLM invited to sign the PA as concurring parties.

3.3.5 Recreation and Land Use

3.3.5.1 Affected Environment

The Wells Project provides many recreational facilities that provide opportunities for boating, fishing, hunting, bird watching, hiking, and camping. More than 100 miles of the reservoir shoreline in the Wells Project area are publicly accessible. These publically accessible lands include the shoreline around isolated ponds, the largest of which is Washburn Pond.

Regional Recreation Opportunities

Recreation resources in the region are managed by several entities and provide a variety of outdoor-oriented recreation opportunities; however, no federal- or state-designated recreation areas occur within the Wells Project boundary. Several of the primary regional recreation resources are under federal or state management, such as the Okanogan-Wenatchee National Forest. The Okanogan-Wenatchee National Forest, which is located to the north, west, and south of the project, provides overnight and day-use opportunities, including both land- and water-based activities. The Lake Roosevelt and Lake Chelan recreation areas also provide several water-based recreation opportunities in the region. Additionally, U.S. Highway 97, south of the city of Pateros, is a National Scenic Byway.

In addition to federally managed recreation areas in the region, three state parks and public facilities are located in the vicinity of the project. These state parks include: (1) Alta Lake State Park, which is located 4 miles southwest of Pateros; (2) Bridgeport State Park, which is located 3 miles northeast of Bridgeport; and (3) Fort Okanogan State Park, which overlooks Wells reservoir at the mouth of the Okanogan River. The state parks provide a wide variety of land- and water-based activities, including camping, picnicking, fishing, interpretive displays, and sightseeing at scenic viewpoints. In addition to winter sport activities, Lake Chelan provides opportunities for boating, swimming, camping, hiking, golfing, and fishing.

Local governments in the region surrounding the project also provide important recreation opportunities for area residents and visitors. Other recreation resources also provide similar experiences and opportunities to those found in the Wells Project area; however, many of these resources are focused on activities available in more urban areas (e.g., city parks, ball fields, community centers, and trails) and land-based activities.

The Greater Columbia Water Trail will be a 500+-mile trail network in the Columbia River watershed from the Canadian border through the Hanford Reach. The Trail's diverse features include dramatic geological formations, mountain views, remote tree-lined shorelines, sandy beaches, wildlife and farm animals, orchards, salmon runs, and historic sites (Washington Water Trails Association, 2011).

Project Recreation Facilities

Douglas PUD has developed 17 formal recreation facilities along the Wells reservoir and tailrace; in Pateros, Brewster, and Bridgeport, Washington; and along the lower reaches of the Methow and Okanogan rivers (figure 9). The project recreation facilities along Wells reservoir are located within the existing project boundary, and Douglas PUD proposes to make minor revisions to the project boundary to include all lands associated with the recreation facilities in Pateros, Brewster, and Bridgeport. Douglas PUD has also entered into agreements with the cities that define the responsibilities of each party for the O&M of the facilities within each city's jurisdiction for the length of the license.

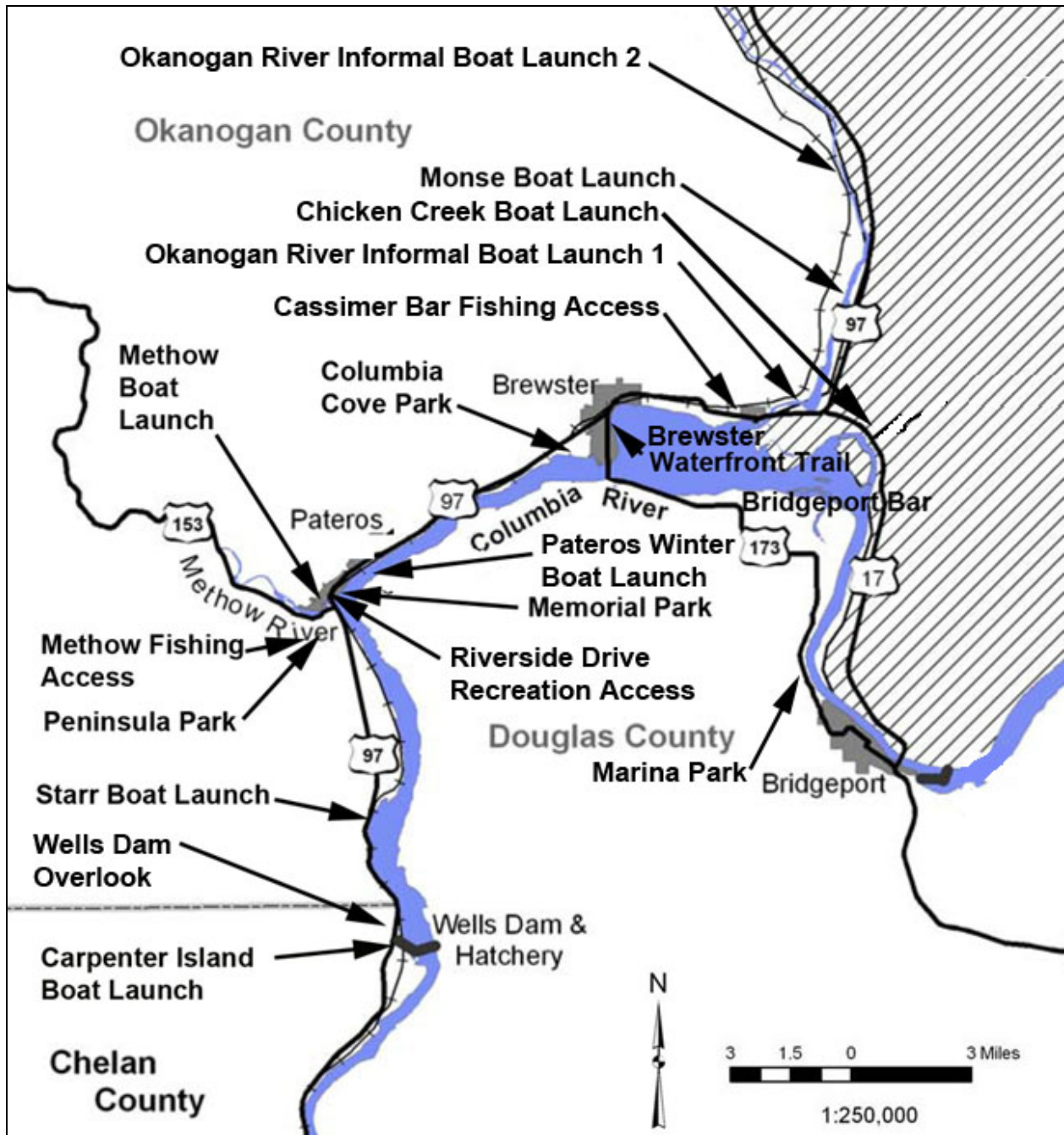


Figure 9. Location of Wells Hydroelectric Project recreation facilities (Source: Douglas PUD, 2010, as modified by staff).

The following project recreation facilities are located within Pateros.

- Peninsula Park includes a gazebo, paved walking path, covered picnic shelter, swimming beach, restroom facilities, playground equipment, swimming lagoon, vehicle parking, and lawn area.
- Memorial Park includes three covered picnic shelters, fishing and ski docks, vehicle parking, interpretive displays, playground equipment, concrete water access ramp, and restroom facilities.
- Pateros waterfront trail includes a trail, park benches, and lighting. The trail begins at the east end of Memorial Park near Pateros City Hall and meanders through the park, under the Highway 97 Bridge, terminating at the Methow boat launch.
- Pateros winter boat launch includes a concrete boat launch, dock, and parking area, and provides year-round access to Wells reservoir, including during the winter when the Methow boat launch is closed due to ice on the Methow River.
- Methow boat launch includes a concrete boat launch, dock, parking, basketball hoops, and restrooms.
- Riverside Drive recreation access provides shoreline access to the Methow River for fishing, kayaking, and canoeing.

The following project recreation facilities are located within Brewster:

- Columbia Cove Park includes a boat launch, boat docks, three picnic shelters, swimming beach, restroom facilities, playground equipment, lawn area, and vehicle parking.
- Brewster waterfront trail provides shoreline access via a compacted gravel trail that extends about 0.5 mile along the city waterfront, and connects the city streets at either end by ramps and at three intermediate locations by stairs.

The following project recreation facility is located within Bridgeport:

- Marina Park includes a fish cleaning station, covered picnic shelters, gazebo, playground equipment, swimming lagoon with beach and dock, lawn area, restrooms, vehicle parking, asphalt pathway, a boat launch, boat dock, and an RV campground with 18 full hookups and 4 tent sites.

The following project recreation facilities are located along Wells reservoir and tailrace:

- Wells dam overlook, located off Highway 97 overlooking Wells dam from the west, includes vehicle and day-use RV parking, restrooms, a picnic shelter, a Native American pictograph exhibit, a Wells Project information kiosk, and an original Wells Project turbine runner.

- Carpenter Island boat launch, located on the right bank of the Wells tailrace immediately downstream of the Wells Project near RM 515.5, is used primarily for fishing access and includes portable toilets and a single launch lane with access provided via Azwell Road.
- Starr boat launch, located on the right bank of Wells reservoir near RM 518 and accessible via Highway 97, includes a gravel parking area, concrete boat launch, and vault toilet.
- Methow fishing access, located along Highway 153 about half a mile from Highway 97 at the confluence of the Columbia and Methow rivers, includes a gravel car-top boat launch, gravel parking, and two vault toilets.
- Chicken Creek boat launch, located near RM 537 at Washburn Island where Chicken Creek flows into the Washburn Island Slough, includes a concrete plank boat launch, gravel parking lot, and vault toilet. The boat launch provides access to the Washburn Island Slough but not Wells reservoir.
- Monse Bridge boat launch, located on the right bank of the Okanogan River at RM 4.7, includes a concrete plank boat launch ramp, gravel parking, and a vault toilet.
- Cassimer Bar fishing access, located on the left bank of the Okanogan River near the mouth of the Okanogan River close to Highway 97, includes shoreline access, gravel parking, and a vault toilet.
- Okanogan River informal boat launch and fishing site 1, located on the right bank of the Okanogan River at RM 2.5 with public access available via Monse River Road off Highway 97, includes a boat launch that is primarily used by anglers and waterfowl hunters, and provides shoreline fishing access.
- Okanogan River informal boat launch and fishing site 2, located on the right bank of the Okanogan River at RM 6.7 with public access available via Monse River Road, includes a boat launch that is primarily used by anglers and waterfowl hunters, and provides shoreline fishing access.

Recreational Use of the Project

Douglas PUD conducted a visitor use assessment in 2005 to identify recreation use and preferences related to the Wells Project (DTA, 2006b). Based on the results of visitor surveys, activity spot counts, and interviews with visitors, the assessment identified fishing, boating, swimming, hiking, picnicking, and camping to be the most common activities reported by visitors to the project area. Visitors reported fishing as the most common reason for visiting the Wells Project area. In addition to those activities mentioned, other popular activities include jet skiing and relaxing.

The majority of visitation to project recreation facilities occurred during the peak season, particularly at Bridgeport Marina Park, which received 4,324 to 5,750 recreation

days (RDs) or nearly 30 percent of the total annual Wells Project visitation. The city of Brewster's Columbia Cove Park received the next highest visitation with 3,518 to 6,462 RDs during the peak season (DTA, 2008). Overall, visitation was highest on weekends and holidays and varied based on the type of activity. The total annual use for all recreation sites at the Wells Project ranged from 19,000 to 45,000 RDs with more than half of the visitation occurring during the peak season ranging from 16,000 to 30,000 RDs (DTA, 2008).

Recreational Needs Assessment of the Project Area

The Washington State Interagency Committee for Outdoor Recreation (Washington IAC) is responsible for assisting federal, state, and local agencies in planning, acquiring, and developing recreational resources. The Washington IAC published the Washington State Comprehensive Outdoor Recreation Plan (SCORP) 2002–2007 in October 2002 (Washington IAC, 2002). The SCORP contains information related to a participant survey, *An Assessment of Outdoor Recreation in Washington State*, to inform decision-makers about issues and opportunities associated with outdoor recreation. Results from the assessment indicate that there is a need for additional lands and facilities to support almost all outdoor recreational categories, including additional provisions for walking, sightseeing, and bicycling. The assessment anticipates growth in nature photography, especially wildlife photography, and a decline in hunting and fishing.

In 2007, Douglas PUD conducted a recreational needs analysis (DTA, 2008) to identify current and potential future recreation needs at the Wells Project over the course of a new license term. Results from the study indicated that maintenance of facilities was good overall but identified a need to upgrade restrooms and access sites in the future to meet barrier-free access standards and improve access for non-motorized boats. Future recreational measures identified included adding more signage in Spanish, barrier-free access improvements, near-shore tent camping for water trail users, and more trails to view wildlife and providing education about the Wells Project (DTA, 2008).

Douglas PUD found that visitors are generally satisfied with the recreational sites in the project area. During onsite interviews, visitors were asked what they would like to see changed around the Wells Project. Those who responded suggested improving or adding facilities, such as picnic areas, restrooms, and boat launches. Visitors were also asked to rate the site they were visiting on a scale of 1 to 10, with 10 indicating the highest satisfaction rating. Respondents rated their experience at the Wells Project highly, with an average rating of nearly 9 points; 95 percent of all respondents rated their experience a 7 or higher. Visitors enjoyed the fishing opportunities, wildlife and scenery, access, and minimal crowding levels. When asked about their recreation experience, respondents generally agreed their trips were enjoyable, the areas were in good condition, there were enough patrols, and there were a variety of facilities from which to choose (DTA, 2008).

Also in 2007, Douglas PUD conducted a public access study to evaluate whether Wells Project recreation facilities (e.g., boat launches and swimming areas) could be used under various reservoir operating conditions (Jacobs Engineering, 2008). Study results indicate that public access to, and use of, Wells reservoir can be affected by reservoir fluctuations, especially below elevation 777 feet msl. Since Wells dam forebay is above elevation 777 feet msl about 98 percent of the time, the occurrence of events that limit access due to reservoir fluctuations are limited in frequency and duration during normal project operations.

The public access study also concluded that the buildup of sediment can reduce public access to Wells reservoir, particularly in locations subject to upstream bedload movement within the inundated tributaries. Aquatic plants can also be a seasonal impediment to public access, including limiting the use of shoreline areas and several boat launches during the later parts of summer.

Land Ownership and Use

The project is located in the Columbia River Valley, an important agricultural area and regional transportation corridor. The project is located in Douglas, Okanogan, and Chelan counties in Washington. The mid-channel of the Columbia River is the dividing line between Douglas County and Okanogan and Chelan counties. Lands within the project boundary located in Chelan County consist of a relatively small area west of Wells dam extending 1 mile upstream and downstream of the dam. Douglas PUD owns about 2,649 acres of the 2,664 acres of land adjacent to Wells reservoir within the project boundary. Total acreages within the project boundary include 15 acres of federal lands, 79 acres of state lands, and 1,046 acres of privately owned lands. Shoreline residential and/or non-agricultural commercial uses within the project boundary are allowed only by special permit.

The project's 230-kV transmission line originates at Wells dam, extends a short distance downstream on the Chelan County side of the tailrace, then crosses the tailrace to Douglas County, and the remainder of its 41-mile length is within a 235-foot-wide right-of-way. Nearly all of the transmission line right-of-way lands are privately owned.

The majority of land outside of the project boundary is privately owned and used for agriculture, rangeland, and residences. Agricultural uses include pasture and hay lands, orchards, nurseries, and annual crops. Natural meadow areas and the dry shrub-steppe areas are largely used as rangeland. Residential areas are found primarily around the incorporated cities of Bridgeport, Brewster, and Pateros.

Land Use Policy

In 1993, Douglas PUD developed a detailed Land Use Policy (Douglas PUD, 2010, appendix E-13) to guide land management decisions and activities associated with lands that Douglas PUD owns, including project lands. The Land Use Policy, which was

amended in December 2007 to incorporate administrative rules governing boat docks and piers, was updated again in February 2010.

The Land Use Policy was adopted to ensure the compatibility of public and commercial use of project land with project operation and compliance with the FERC license articles and federal and state laws. The Land Use Policy is designed to ensure that public access and recreation within the project area take place in a safe and environmentally sound manner. In addition, the policy provides guidance for resolving conflicts with adjacent land owners if the policy is violated.

The Land Use Policy includes a permitting process for proposed private or commercial uses of land within the project boundary, as described below:

- Landowners are required to submit an application for a land use permit, including a detailed project plan, to Douglas PUD prior to submitting applications for federal, state, local, and tribal permits.
- Douglas PUD's environmental staff conducts an environmental review of the application to evaluate consistency with Douglas PUD's Land Use Policy. If approved by Douglas PUD, an applicant must then acquire all other necessary permits from the appropriate regulatory agencies. The applicant must also arrange for a professional archaeological review of the site, if appropriate. Douglas PUD will request comments on the application from federal, state, and tribal fish and wildlife agencies, including Washington DFW, FWS, NMFS, the Colville Tribes, and the Yakama Nation.
- As specified in section 6 of the Wells HCP, when making land use or related permit decisions on project lands that affect reservoir habitat, Douglas PUD will consider the cumulative effects of the proposed activity and consistency with the Wells HCP, requirements of the FERC license, and other applicable laws and regulations. Douglas PUD may conduct surveys of fish, botanical, and wildlife resources to assess potential impacts of the proposed land use.

After obtaining all necessary environmental permits from the reviewing regulatory agencies, Douglas PUD staff review the permits for consistency with the Land Use Policy and, if deemed appropriate, provide a recommendation to Douglas PUD's Board of Commissioners for approval.

3.3.5.2 Environmental Effects

Recreation Management Plan

To address recreational needs at the project, Douglas PUD proposes to implement a Recreation Management Plan (Douglas PUD, 2010, appendix E-5). Specific elements of the plan, such as site improvements and recreational use monitoring, are addressed below. Washington DFW and FWS both recommend implementation of the Recreation Management Plan.

Our Analysis

Currently, Douglas PUD manages recreation facilities through an existing Recreation Action Plan. The proposed Recreation Management Plan would replace the Recreation Action Plan and would serve to guide management of recreational resources and provide a framework for Douglas PUD's implementation of the site improvements and management measures included in the plan, as discussed in more detail below.

Implementation of a Recreation Management Plan would also further the Washington's SCORP goals of encouraging outdoor recreation and recognizing its importance by providing management for implementation of the proposed site improvements, defining maintenance responsibilities, and providing recreation monitoring of use and needs through the term of the license.

Recreational Facility Improvements

As part of the Recreation Management Plan, Douglas PUD proposes to implement a Recreational Facility Improvement Program that defines its responsibilities for new project recreation developments and improvements to existing facilities. As part of this program, Douglas PUD proposes to:

- construct interpretive displays at Wells dam overlook on Douglas PUD-owned lands within the project boundary;
- expand Marina Park to the north along the river and within the project boundary, including adding 10 RV spaces, plus accommodations associated with these additional RV spaces (e.g., restroom facilities, RV dump stations, landscaping, and access roads);
- construct a formal tent camping facility within the project boundary, including restrooms, a picnic shelter, and four designated tent pads. In addition, designate and provide basic improvements for an informal/rustic tent camping location on the west side of the river in the vicinity of Wells dam and implement several measures to improve access for non-motorized boaters, including installing Greater Columbia Water Trail signs and providing information on portaging around Wells dam;
- extend the Chicken Creek boat launch; and
- at high-use boat launches in Pateros, Brewster, and Bridgeport, provide maps of the reservoir to indicate areas of the reservoir in which boaters may encounter shallow water.

Douglas PUD proposes to promote the recreation facilities by making available printed and web-based material showing day-use sites, boat launches, wildlife viewing areas, campsites, and trails. Douglas PUD also proposes to modify the project boundary to include all lands associated with the 17 project recreation facilities.

In a letter filed on March 29, 2007, Friends of Fort Okanogan recommend that Douglas PUD provide funds for increasing the size of the Fort Okanogan Interpretative Center, enhancing exhibits, and educational/re-enactment programs.

Our Analysis

On July 1, 2008, the Commission approved an update to the Recreation Action Plan that addressed the request by the Friends of Fort Okanogan for assistance. The plan provided for financial and technical assistance to the Friends of Fort Okanogan for media materials, such as brochures, to promote the upcoming 2011 Fort Okanogan Bicentennial.

The proposed facility improvements would help ensure that public access and recreation needs are met for the term of the new license, enhance the aesthetic quality and the physical condition of project-related recreational facilities, and reduce recreation-related adverse effects on environmental resources. The proposed installation of interpretive displays and the distribution of printed or web-based materials would facilitate public use of project recreation facilities.

Marina Park received the greatest number of visits of all the recreations sites and was often filled to capacity during the peak recreation season (DTA, 2008). The proposed expansion of Marina Park would help accommodate the high level of recreational use at this site. Further, construction of additional camping features would expand the range of facilities available to visitors, as well as help to meet recreational demand.

Douglas PUD's recreation needs analysis (DTA, 2008) identified a need to improve access for non-motorized boat users and identified potential opportunities for coordination with the Greater Columbia Water Trail Coalition so that non-motorized boat-in camping facilities would be consistent with other sections of the Columbia River Water Trail. Douglas PUD's proposal to construct a formal boat-in tent camping facility with improved access for non-motorized boaters and install signs about the Greater Columbia Water Trail would accommodate such needs.

The recreation needs analysis (DTA, 2008) also reported that visitors had lower satisfaction with the adequacy of boat ramps, specifically when water levels are low. Douglas PUD does not propose to change the operation of the Wells Project; therefore, effects of reservoir level fluctuations on access to and use of public boat launches, private docks, and other recreation facilities would remain unchanged. Under current operations, the reservoir is maintained above elevation 777 (within 4 feet of the full pool elevation) 98 percent of the time, so conditions with limited access due to reservoir elevations are relatively infrequent.

Lower pond levels on Washburn Pond are often observed in the fall season, and public access can be restricted. Therefore, extension of the Chicken Creek boat launch would improve access by allowing the ramp to be useable at lower water levels. The boat ramp would have to be closed for the protection of public safety during extension of the

ramp, which would temporarily reduce public access to this section of the project reservoir.

Douglas PUD's proposal to provide maps at high use boat ramps in Pateros, Brewster, and Bridgeport that indicate shallow areas in the reservoir would help boaters navigate around these areas, improving both access and public safety and recreational satisfaction.

Recreation Facility Operation and Maintenance

As part of the Recreation Management Plan, Douglas PUD proposes to continue to provide for the O&M of all of the Wells Project recreation facilities. The facilities to be maintained would include, but be not limited to, parking areas, lawns, restrooms, lights, water, power, sewer/septic, playground equipment, shelters, and playfields.

Our Analysis

The proposed O&M program would provide guidelines for continued operation and daily and annual maintenance activities for each recreation site through the term of the new license. Such a program would provide specific information about the maintenance needs, activities, and responsibilities for each recreation site, thereby maintaining the quality of recreation resources and ensuring continued public access to each recreation site into the future.

Douglas PUD's agreements with the cities of Pateros, Brewster, and Bridgeport define O&M responsibilities of the recreation facilities within their jurisdiction. Through these agreements, the cities agreed to support Douglas PUD's application for a new license for the Wells Project, thus ensuring continued O&M of these recreation facilities for the term of the new license.

Wildlife Viewing and Trail Development

Douglas PUD proposes to conduct a feasibility study to evaluate the opportunities and constraints of constructing additional trails within the project boundary and in or near the cities of Brewster, Bridgeport, and Pateros. Douglas PUD also proposes to prepare conceptual designs and cost estimates for the most feasible routes, along with recommendations for trail improvements.

After the feasibility study is complete, Douglas PUD proposes to evaluate the results and identify appropriate measures for meeting local trail development needs in conjunction with the Form 80 review. If feasible measures are identified, and after the approval of appropriate agencies, Douglas PUD proposes to develop up to 5 miles of non-motorized trails prior to the 2021 Form 80 monitoring cycle.

To address wildlife viewing, Douglas PUD proposes to: (1) develop a plan for enhancing wildlife viewing areas including measures such as interpretive signs, wildlife viewing guides, and web-based information about wildlife programs, and (2) implement approved measures prior to the 2021 Form 80 monitoring cycle.

Our Analysis

The Washington SCORP identified a growing interest in hiking, walking, and sightseeing. Providing additional trails could help satisfy some of the demand for these activities. Douglas PUD's proposed feasibility study would evaluate opportunities and constraints of adding trails and serve as the framework for updating and improving trails on project lands. If the study finds that additional trails could be constructed, Douglas PUD would establish a process for developing the trails to accommodate increased demand.

Douglas PUD's proposal to develop a plan for enhancing wildlife viewing would enhance recreational opportunities while taking appropriate measures to minimize effects on the surrounding wildlife habitat, thereby helping to meet increased demand for wildlife viewing trails as identified by the 2008 recreation needs analysis and the Washington SCORP.

Recreation Resources Monitoring and Evaluation Program

As part of the Recreation Management Plan, Douglas proposes to implement a monitoring and evaluation program to determine when changes are required at project recreation facilities to ensure adequate recreation access. The monitoring program would include:

1. collecting recreation data as needed to complete the FERC Form 80 requirement, which must be completed every 6 years;
2. determining recreation facility condition through periodic onsite inspections of each facility;
3. convening the Recreation RWG every 6 years, after Form 80 submittal, to discuss current Recreation Management Plan activities and whether the Recreation Management Plan is helping to ensure that the recreation needs are being met at the project;
4. conducting a comprehensive recreation study every 20 years to assess recreation use and needs, similar to the 2006 recreation visitor use assessment (DTA, 2006b) and the 2008 recreational needs analysis (DTA, 2008); and
5. updating, as necessary, the Recreation Management Plan to accommodate changing recreation needs and priorities; the revised plan would be submitted to the Commission for approval before implementation.

Our Analysis

The proposed monitoring and evaluation program would establish a procedure for evaluating and updating the Recreation Management Plan. This would benefit recreational resources by addressing any unforeseen recreational needs or facility maintenance that may arise over the term of the new license.

Convening the Recreation RWG every 6 years after filing of the Form 80 would allow stakeholders to review whether the facilities are meeting current recreation needs at the project. This would allow an opportunity to evaluate the need for any modifications or maintenance work required to accommodate changes in recreation needs or in the condition of recreational facilities.

Project Boundary

Douglas PUD proposes to expand the project boundary to address past survey errors and include all project-related recreation facilities within the cities of Bridgeport, Pateros, and Brewster.

Our Analysis

According to 18 CFR 4.51(h), land included within a project's boundary must enclose those lands necessary for the O&M of the project and for other project purposes, such as recreation, shoreline control, or protection of environmental resources. The proposed revised project boundary includes the lands necessary for the development of the proposed recreation facility improvements, which would ensure that the Commission has the ability to enforce proposed measures, shoreline control measures, environmental protection measures, and O&M measures, as well as to maintain adequate public access throughout the term of a new license.

Land Use Policy

Douglas PUD proposes to continue implementation of the existing Land Use Policy. In comments filed during the scoping process conducted in 2007, the city of Brewster and Mr. Mark Miller (resident) state that Douglas PUD's Land Use Policy is restrictive and appears to constrict the city's economic growth, and Ms. Betty Wagoner raises concerns about any effects of the Land Use Policy on the continued use of her permitted dock and water access.

Our Analysis

Continued implementation of Douglas PUD's Land Use Policy would provide for the management and approval of land uses within the project boundary. Project lands would remain available for public recreational uses, and private uses would continue to be permitted on project lands. Any land use issues would be addressed through the Land Use Policy for the term of the new license.

As proposed, Douglas PUD's Land Use Policy would require formal approval of all land use activities that take place within the project boundary. Douglas PUD would review and consider for approval applications to permit activities, such as construction of boat docks, piers, and landscaping, after an applicant has acquired all required regulatory permits. Also, Douglas PUD is required by section 5 of the Wells HCP to notify and consider comments from the HCP signatory parties when land use permitting decisions could affect aquatic habitat.

Douglas PUD's Land Use Policy would ensure that any proposed private or commercial uses of project lands are in compliance with the FERC license and other federal and state regulations, including protection of fish and wildlife habitat; protection of critical habitat for ESA-listed species; protection of significant historic, cultural, and natural features; and compliance with existing settlement agreements. We see no evidence that Douglas PUD's Land Use Policy constricts the city of Brewster's economic growth. Douglas PUD assisted in funding and developing recreational facilities and proposes a suite of measures to protect and enhance fish and wildlife resources that provide fishing and hunting opportunities, which provide economic benefits such as taxes, employment, and enhanced recreation and tourism.

Private uses would continue to be allowed on project lands under Douglas PUD's Land Use Policy. Therefore, Ms. Wagoner would be able to continue to use her permitted dock and access.

3.3.6 Aesthetic Resources

3.3.6.1 Affected Environment

The Wells Project is located along a rural, scenic reach of the Columbia River and the lower reaches of the Okanogan and Methow rivers. Visual elements of the project include the 29.5-mile-long Wells reservoir, 4,460-foot-long Wells dam and surrounding complex, 41 miles of transmission lines, several shoreline recreation sites, and six wildlife management areas. Wells reservoir is a dominant visual element that contrasts with surrounding hills and mountains, semi-arid shrub steppe land, and fruit orchards.

In general, the views of the Wells Project area are scenic with the water of the Columbia River in the foreground and fruit orchards and shrub steppe vegetated hills and mountains in the background. Outside of winter months, the intermingling of green, irrigated areas of vegetation with brown, non-irrigated areas provides a visual contrast of a desert and oasis condition. During the winter months, snow frequently covers much of the Wells Project vegetation.

Residential and commercial development is not allowed within the Wells Project boundary, thus the riparian zone along Wells reservoir is generally well established with areas of mature riparian and wetland habitats, sandy beaches and cobble shorelines, and undisturbed shrub-steppe vegetation. Generally, lands within the Wells Project boundary blend naturally into the surrounding landscape.

Wells dam consists of a west embankment (2,300 feet long), a central concrete structure (1,130 feet long), and an east embankment (1,030 feet long). The central concrete structure, referred to as the hydrocombine, includes the generating units, spillways, juvenile fish bypass system, switchyard, and adult fish ladders. The facilities are predominately grey in color, with some yellow-painted structures, such as the gantry cranes atop the hydrocombine.

The two 230-kV transmission lines run 41 miles from the switchyard on top of the dam to the Douglas switchyard located near Rocky Reach dam. The lines run parallel to each other on 45- to 85-foot steel towers along a common 235-foot-wide right-of-way. The Wells Project transmission line corridor covers about 1,117 acres. The transmission corridor is largely rural, with dominant vegetation comprised of wheat fields and shrub steppe (Parametrix, 2009a).

3.3.6.2 Environmental Effects

Douglas PUD does not propose to construct any new generation facilities or to alter the project operation or project appearance. However, Douglas PUD proposes to modify and upgrade hatchery facilities, install new visitor interpretive displays, improve existing recreation facilities, and construct additional facilities.

Our Analysis

Effects on aesthetics associated with Douglas PUD's proposal to construct interpretive displays at Wells dam overlook and provide maps at high-use boat ramps around the project would only occur during the time of construction or installation, and would occur on lands previously developed for recreation, further minimizing any effects on aesthetics.

Expansion of Marina Park, extension of the Chicken Creek boat launch, and upgrades to the fish hatcheries would also cause short-term effects on aesthetic resources. Land-disturbing activities associated with the improvement activities would introduce heavy equipment, dust, and noise to the area, temporarily affecting the aesthetic appeal of the area. In the long term, aesthetic resources would not be affected because improvements would occur on lands previously disturbed and developed for recreation.

The proposed construction of a formal tent camping facility and improvements for a rustic tent camping location on the west side of the Columbia River would occur on lands that are currently disturbed, or are adjacent to previously disturbed lands. Construction would cause temporary disturbance to the aesthetics of these areas; however, no long-term effects on aesthetics are expected.

Douglas PUD's proposed Recreation Management Plan would define O&M responsibilities, which would preserve the aesthetic quality of the area by ensuring that facilities do not fall to disrepair and/or become outdated. The Recreation Management Plan would maintain or improve the aesthetic condition of recreation sites through the term of any new license.

3.3.7 Socioeconomics

3.3.7.1 Affected Environment

Regional Population and Economy

North-central Washington is a distinctively rural environment. Population densities are low, and no large metropolitan areas are located in the region. Wenatchee is the largest urban community. The Seattle-Tacoma coastal area is more than 125 miles to the west, and Spokane lies 150 miles to the east.

The 2000 Census showed that the Douglas County population was 32,603; Okanogan County was 39,564; and Chelan County was 66,616. These three project-area counties contain largely small, rural communities and unincorporated areas. The communities within the immediate project vicinity, including Bridgeport in Douglas County and Brewster and Pateros in Okanogan County, all have demographics consistent with that of their counties and neighboring rural communities. With the exception of the more urban region around Wenatchee and East Wenatchee, and the community of Coulee Dam, the counties and most communities have experienced slow to modest population growth during the past 40 years.

Irrigated agriculture is the foundation of the economy of the north-central Washington region, including Douglas, Okanogan, and Chelan counties. The area's prime sandy loam soil, climate conditions, and abundant supply of irrigation water produces substantial crops of wheat, barley, and livestock feed. The low elevation areas have generally been developed as orchards, which produce substantial crops of apples, pears, and sweet cherries. The three county regions of Douglas, Okanogan, and Chelan produce about 50 percent of the apple crop in Washington State, and the plateau region of Douglas County contains wheat and other grain crops. Okanogan County also produces a significant number of livestock.

Per capita incomes reflect the significant role of agriculture in the regional economy, given that agricultural commodity prices can be highly volatile. Irrigated agriculture relies on the availability of low-cost and stable electricity rates to help control production costs. Per capita and median incomes are below state levels, but consistent with neighboring communities; employment trends are also similar. Douglas, Okanogan, and Chelan counties have consistently lower per capita and median household incomes and higher unemployment rates than Washington State. However, for the period 1990–2000, per capita income growth was higher in Douglas (42 percent), Okanogan (44 percent), and Chelan (46 percent) counties when compared to the state average (29 percent).

Many fields, including manufacturing, construction, wholesale and retail trade, and other service sectors are supported largely by the agricultural industry that exists in these counties. Significant employment opportunities include the service industry, retail and wholesale trade, and the education and medical professions (table 27).

Table 27. Employment by industry in the project area from 2000 Census (Source: Douglas PUD, 2010, as modified by staff).

Industry Area	Employment		
	Douglas County	Okanogan County	Chelan County
Total by county:	4,326	5,981	15,454
Top four business sectors:			
Education, health, and social services	919	1,379	3,586
Retail trade	556	720	1,764
Agriculture	493	664	853
Accommodations and food service	187	542	1,321

The economies of Douglas, Okanogan, and Chelan counties are also supported by government, retail, trade, manufacturing, and service industries. Major private employers in the East Wenatchee and Wenatchee urban area include Stemilt Growers, ALCOA, Pacific Aerospace & Electronics, and Tree Top, Inc.

Although the regional economy is predominantly agricultural-based, recreation and recreation-based tourism contribute significant benefits. In 2005, a recreation visitor use survey was conducted at the Wells Project (DTA, 2006b). Visitors from Okanogan, King, Chelan, Snohomish, Douglas, Whatcom, and Spokane counties combined accounted for 75 percent of the overall users. The combined populations of Okanogan, King, Chelan, Snohomish, Douglas, Whatcom, and Spokane counties are expected to grow by roughly 10 percent by 2020 and about 63 percent by 2050. Statewide population expansion is a dominant factor that would have a considerable effect on future use levels at facilities within the project area. While several factors would influence future use, the use in the Wells Project area by 2050 is estimated to range from 29,272 to 68,292 RDs.⁴⁷ Fishing is expected to continue to be the primary driver for growth in recreation activity at Wells reservoir. Motor boating activities, non-motorized water recreation such as kayaking, and walking/hiking are also expected to increase in this region (DTA, 2008).

Project Relationship to Socioeconomic Resources

The project has considerable positive effects on the local economies in Douglas, Okanogan, and Chelan counties, as well as elsewhere throughout the region. Project

⁴⁷ Current use estimates ranged from 19,258 RDs to a high of 44,929 RDs (DTA, 2008).

benefits include: (1) providing low-cost renewable power for citizens and industries; (2) paying local and state taxes; (3) providing access to irrigation waters that support the area’s agricultural industry; (4) providing employment related to project O&M and fish and wildlife mitigation programs; (5) supporting state and local efforts to maintain and enhance the salmon, steelhead, and trout fisheries, which supports recreation and tourism in the region; (6) supporting state and local efforts to maintain and enhance riparian habitats used by fish and wildlife, which also supports recreation and tourism in the region; and (7) providing recreation opportunities in the region, notably in communities within the immediate project area.

The project provides clean, efficient, reliable, and cost-effective hydroelectric power and electric service to more than 18,000 local customer accounts in Douglas County. In addition to serving the surrounding communities, project output also serves the greater Pacific Northwest region. About 62 percent of project power is provided to Puget Sound Energy, Inc., Portland General Electric Company, PacifiCorp, and Avista Corp.

Recreation and tourism are important components of the state and project area economies. The three counties are vacation destinations for visitors from the greater Seattle area and British Columbia, Canada. These visitors are primarily interested in outdoor recreation, such as hiking, fishing, hunting, boating, camping, snowmobiling, and snow skiing (DTA, 2006b). Active outdoor recreation in Washington State contributes more than \$11.7 billion to the state’s yearly economy, supports 115,000 jobs, generates \$650 million in annual state tax revenue, and produces \$8.5 billion annually in retail sales and services (3.5 percent of the gross state product) (DTA, 2008).

Travel and tourism-related spending and tax revenue represent \$14.8 billion in spending, 149,800 jobs with \$4.2 billion in earnings, and \$972 million in tax revenues to the state’s economy. Table 28 shows this spending, jobs, and revenue broken down by county in the project area.

Table 28. Travel and tourism-related spending and revenue in project area (Source: Dean Runyan Associates, 2008, as cited in Douglas PUD, 2010).

County	Traveler Spending	Travel-Related Jobs (income/jobs)	Local and State Tax Revenue
Douglas	\$37.4 million	\$6.6 million for 310 jobs	\$2.6 million
Okanogan	\$135.5 million	\$38.6 million for 1,700 jobs	\$9 million
Chelan	\$340.1 million	\$108.8 million for 5,690 jobs	\$25.1 million

In addition, the project provides considerable tax revenues to the immediate project vicinity. In 2007, Douglas PUD’s state and city taxes totaled about \$1.2 million.

3.3.7.2 Environmental Effects

Douglas PUD made no proposals that pertain directly to socioeconomic resources within the project boundary. However, it proposes to implement significant environmental protection and recreation measures that would provide benefits to the socioeconomic conditions in the project vicinity.

In scoping comments, the cities of Pateros and Brewster, and Messrs. Ron Oules, Tom Benner, Mark Miller, and Steve Jenkins raised a concern that Douglas PUD has not compensated or assisted the communities of Pateros, Brewster, and Bridgeport after the project was originally constructed, resulting in a loss of land and associated tax base, including potential development that would support the economic recovery of the area.

Mr. Jenkins also stated that recreation and its associated tourist dollars are important to the city of Bridgeport, but costs associated with mitigation measures could impact the community's fair and reasonable power rates. The city of Brewster stated that Chief Joseph State Park would have provided an economic benefit to the area if its land was not sold and the associated profits transferred to a distant locale.

In response to comments on the scoping meetings, Douglas PUD provided a summary of its tax obligations and how its taxes are incorporated into Washington State's general fund to be dispersed to the counties and cities adjacent to the project reservoir. Furthermore, Douglas PUD noted the economic and electric benefits of the Wells Project to Okanogan County residents. Okanogan PUD receives, at cost, a percentage of the electricity generated at the Wells Project. Because of this output, Okanogan PUD is able to provide its customers with lower electric rates.

Our Analysis

The individual Recreation Agreements between the cities of Brewster, Pateros, and Bridgeport and Douglas PUD included in the final license application (exhibit E, appendix E-12) specify responsibilities for maintenance and capital improvements and provide compensation to the cities for costs associated with maintaining project-related recreation sites (see section 2.2.3, *Proposed Environmental Measures*). Douglas PUD's compensation under these agreements addresses the commenters' specific concerns about the economic impacts of the project, and assists the communities in mitigating for these costs. The Recreation Agreements also specify that the cities would not make any further requests.

Measures that Douglas PUD proposes for the protection and enhancement of fish, wildlife, recreation, and cultural resources also provide jobs and increase recreation opportunities and tourism, which has a positive economic impact in the project area. The cost of implementing such measures would, however, increase the annual cost of project power by \$1,952,600, which would have a negative effect on socioeconomic conditions by reducing the production cost advantage of the agricultural industries that are an important part of the regional economy. We expect that these beneficial and adverse

effects would be comparable, however, so the net effect on the local economy would be negligible.

The economic benefits of the proposed recreation facilities include employment, taxes, and enhanced recreation and tourism associated with the use of public access to Wells reservoir and project lands.

State taxes are deposited into general funds that are directed, in part, back to the county and city governments. In 2004, Douglas PUD paid a total of about \$1.7 million in taxes, not including sales taxes, to the state of Washington, some of which was dispersed to the counties and cities adjacent to the Wells reservoir, including money collected pursuant to the privilege tax.⁴⁸ In 2004, of Douglas PUD's total of \$904,575 in privilege taxes paid to the state of Washington, \$178,393 and \$115,570 was paid to Douglas and Okanogan counties, respectively. The state also allocated a portion to local schools; for example, in 2004, the state dispersed \$326,515 of the Douglas PUD privilege tax to local schools.

As a not-for-profit, municipal corporation, Douglas PUD uses revenues to pay down debt and provide the lowest possible electric rates to its customers. Douglas PUD's O&M of the project, coupled with taxes paid, low-cost energy generated, and enhancements to recreation, fisheries, and wildlife, have contributed significantly to the economic and social status of the immediate vicinity of the Wells Project and would continue to do so under the proposed action.

Based on available information and our analysis, we find that none of the project-related enhancements proposed or recommended by any party would have an adverse socioeconomic impact on the population within the project area.

3.9 NO-ACTION ALTERNATIVE

Under the no-action alternative as defined by the staff, the project would continue to operate as it is currently under the terms of its existing license, which includes continued implementation of the Wells HCP. There would be no significant change to the existing environmental setting or project operation. No new environmental measures would be implemented.

⁴⁸ Douglas PUD is subject to the privilege tax, which is “a tax for the act or privilege” of engaging in the generation, distribution, and sale of electric energy (Revised Code of Washington 54.28.20). Land and land rights costs contribute, in part, to how these tax receipts are distributed (Douglas PUD, 2006, appendix B, pp. 170–173).

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Wells Project's use of the Columbia River for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,⁴⁹ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using the likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EIS for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT

Table 29 summarizes the assumptions and economic information we use in our analysis. This information was provided by Douglas PUD in its license application, or estimated by staff. We find that the values provided by Douglas PUD are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal O&M cost; and Commission fees.

⁴⁹ See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 29. Parameters for the economic analysis of the Wells Project (Source: Douglas PUD, 2010).

Parameter	Value
Period of analysis (years)	30
Term of financing (years)	20
Net investment, \$ ^a	191,548,820
Future major capital cost, \$ ^b	264,734,600
Relicensing cost, \$ ^c	8,700,000
O&M, \$/year ^d	40,009,300
Annual Commission fees, \$ ^e	635,480
Energy value (\$/MWh) ^f	79.00
Capacity value (\$/MW-year) ^g	157
Interest rate, percent ^h	4.5
Discount rate, percent ⁱ	4.5

^a Net investment is the depreciated project investment allocated to power purposes, and has been depreciated to 2010 dollars. Source: PUD No. 1 of Douglas County Financial Report—Years Ended December 31, 2007 and 2008, page 21).

^b Future major capital costs include major plant rehabilitation to maintain present-day capability scheduled between 2011 and 2040 and are expressed as a present value.

^c Relicensing costs include the administrative and general salaries, office supplies and meeting expenses, and costs associated with the conduct of studies and development of settlements, management plans and license application to date.

^d Existing plant O&M includes O&M related to environmental measures associated with the current license.

^e Commission fees include administrative fees and fees for use of U.S. government lands.

^f Source: Douglas PUD, 2010, exhibit D, section 5.0.

^g Source: Staff, based on Energy Information Administration's Annual Energy Outlook.

^h Source: PUD No. 1 of Douglas County Financial Report—Years Ended December 31, 2007 and 2008, based on bond rates, page 22.

ⁱ Assumed by staff to be the same as interest rate.

As currently operated, the Wells Project has an installed capacity of 774.3 MW and generates an average of 4,077,400 MWh annually, based on the average for the 2003–2007 period under current operating conditions.

The capacity value of \$157/MW-year is based on the amortization and fixed O&M cost for a simple-cycle combustion turbine. Some of the measures that would require operational changes reduce the dependable capacity rating of the project. We discuss the effects of proposed operational changes on power benefits in section 4.2.2.

4.2 COMPARISON OF ALTERNATIVES

Table 30 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this final EIS: no action, Douglas PUD’s proposal, staff alternative, and staff alternative with mandatory conditions.

Table 30. Summary of the annual cost of alternative power and annual project cost for the alternatives for the Wells Hydroelectric Project (Source: staff).

	No Action	Douglas PUD’s Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Installed capacity (MW)	774.3	774.3	774.3	774.3
Annual generation (MWh)	4,077,400	4,077,400	4,077,400	4,077,400
Dependable capacity (MW)	715	715	715	715
Annual cost of alternative power (\$/MWh)	\$434,369,600 106.53	\$434,369,600 106.53	\$434,369,600 106.53	\$434,369,600 106.53
Annual project cost (\$/MWh)	\$70,353,290 17.25	\$72,305,890 17.73	\$71,995,700 17.66	\$72,142,750 17.69
Difference between the cost of alternative power and project cost (\$/MWh)	\$364,016,310 89.28	\$362,063,710 88.80	\$362,373,900 88.87	\$362,226,850 88.84

4.2.1 No-Action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project has an installed capacity of 774.3 MW, has a dependable capacity of 715 MW, and generates an average of 4,077,400 MWh of electricity annually. The average annual cost of alternative power would be \$434,369,600, or about \$106.53/MWh. The average annual project cost would be \$70,353,290, or about

\$17.25/MWh. Overall, the project would produce power at a cost that is \$364,016,310, or \$89.28/MWh, less than the cost of alternative power.

4.2.2 Douglas PUD's Proposal

Douglas PUD proposes to continue to operate the project as it currently does. The installed capacity would remain at 774.3 MW, the dependable capacity would remain at 715 MW, and the project would continue to generate an average of 4,077,400 MWh of electricity annually. The average annual cost of alternative power would be \$434,369,600, or about \$106.53/MWh. The average annual project cost would be \$72,305,890, or about \$17.73/MWh. Overall, the project would produce power at a cost that is \$362,063,710, or about \$88.80/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

Table 31 shows the staff recommended additions, deletions, and modifications to Douglas PUD's proposed environmental protection and enhancement measures and the estimated cost of each. The staff alternative would have the same capacity and energy attributes as Douglas PUD's proposal. Based on an installed capacity of 774.3 MW, a dependable capacity of 715 MWh, and an average annual generation of 4,077,400 MWh, the average annual cost of alternative power would be \$434,369,600, or about \$106.53/MWh. The average annual project cost would be \$71,995,700, or about \$17.66/MWh. Overall, the project would produce power at a cost that is \$362,373,900, or about \$88.87/MWh, less than the cost of alternative power.

4.2.4 Staff Alternative with Mandatory Conditions

Table 31 shows the staff and agency recommended additions, deletions, and modifications to Douglas PUD's proposed environmental protection and enhancement measures and the estimated cost of each. The staff alternative with mandatory conditions would have the same capacity and energy attributes as Douglas PUD's proposal, and would be similar to the staff alternative except that it would include section 18 fishway prescription measures that are not recommended by staff. Based on an installed capacity of 774.3 MW, a dependable capacity of 715 MWh, and an average annual generation of 4,077,400 MWh, the average annual cost of alternative power would be \$434,369,600, or about \$106.53/MWh. The average annual project cost would be \$72,142,750, or about \$17.69/MWh. Overall, the project would produce power at a cost that is \$362,226,850, or about \$88.84/MWh, less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 31 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a

measure to its cost. Measures that do not greatly affect the project economics (i.e., measures with minimal, unknown, or zero costs) are not presented in table 31 because they do not affect overall costs of the various alternatives. Measures implemented under the Wells HCP, which was previously required by the Commission per order 107 FERC § 61,283 (2004), are *not* listed in the table because they are included in the no-action alternative.

Table 31. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Wells Hydroelectric Project (Source: staff).

Enhancement/Mitigation Measures	Entities	Capital Cost^a (2011\$)	Annual Cost^a (2011\$)	Levelized Annual Cost (2011\$)
1. Implement the Water Quality Management Plan, except for measure no. 1a below.	Aquatic Settlement Signatories, ^b Staff	\$0	\$179,090 ^c	\$179,090
1a. Continue participation in the CSR-SRI and continue participation in the Water Quality Team and Adaptive Management Team meetings to address regional water quality issues.	Aquatic Settlement Signatories	\$0	\$12,400	\$12,400
2. Implement the Bull Trout Management Plan, except for measure nos. 2a through 2d below.	Aquatic Settlement Signatories, Interior section 18, Staff	\$0	\$60,890 ^c	\$60,890
2a. Adult bull trout passage and incidental take evaluations at off-project hatcheries and broodstock collection facilities.	Aquatic Settlement Signatories, Interior section 18	\$0	\$16,000	\$16,000
2b. Collect tissue samples and fund genetic analysis of sampled bull trout.	Aquatic Settlement Signatories	\$0	\$1,160	\$1,160
2c. Participate in regional information exchanges for bull trout research and monitoring studies.	Aquatic Settlement Signatories	\$0	\$2,850	\$2,850
2d. Develop detailed study plan to guide implementation of bull trout stranding evaluations and monitoring of incidental take.	Staff	\$10,000 ^d	\$0	\$640
3. Implement the Pacific Lamprey Management Plan, except for measure nos. 3a through 3e below.	Aquatic Settlement Signatories, Interior section 18, Staff	\$1,240,240	\$57,470 ^c	\$98,810

Enhancement/Mitigation Measures	Entities	Capital Cost^a (2011\$)	Annual Cost^a (2011\$)	Levelized Annual Cost (2011\$)
3a. Upstream passage operating criteria and literature review.	Aquatic Settlement Signatories, Interior section 18	\$0	\$7,030	\$7,030
3b. Juvenile passage survival literature review.	Aquatic Settlement Signatories	\$0	\$1,030	\$1,030
3c. Juvenile downstream passage and survival evaluation.	Aquatic Settlement Signatories, Interior section 18	\$0	\$124,020	\$124,020
3d. Juvenile lamprey habitat evaluation.	Aquatic Settlement Signatories	\$0	\$6,200	\$6,200
3e. Regional work group participation.	Aquatic Settlement Signatories	\$0	\$6,200	\$6,200
4. Implement the White Sturgeon Management Plan, except for measure nos. 4a through 4c below.	Aquatic Settlement Signatories, Staff	\$0	\$447,970 ^c	\$447,970
4a. Implementing alternative adult passage measures.	Aquatic Settlement Signatories	\$0	\$4,130	\$4,130
4b. Compile information on other white sturgeon supplementation programs in the Columbia River Basin to ensure that Douglas PUD's program is consistent with other supplementation programs in the basin.	Aquatic Settlement Signatories	\$0	\$49,610	\$49,610
4c. Identify appropriate White Sturgeon Management Plan activities as opportunities for education to local public entities, such as schools, cities, and fishing and recreation groups.	Aquatic Settlement Signatories	\$0	\$2,480	\$2,480

Enhancement/Mitigation Measures	Entities	Capital Cost^a (2011\$)	Annual Cost^a (2011\$)	Levelized Annual Cost (2011\$)
5. Implement the Resident Fish Management Plan.	Aquatic Settlement Signatories	\$0	\$71,520 ^c	\$71,520
6. Implement the Aquatic Nuisance Species Management Plan, except for measure no. 6a below.	Aquatic Settlement Signatories, Staff	\$0	\$51,890 ^c	\$51,890
6a. Participation in information exchanges and regional efforts to coordinate monitoring activities.	Aquatic Settlement Signatories	\$0	\$6,200	\$6,200
7. Develop a steelhead HGMP for the Wells Hatchery.	Douglas PUD, Staff	\$75,000	\$0	\$4,790
8. Implement the Wildlife and Botanical Management Plan.	Douglas PUD, FWS, Staff	\$37,210	\$138,310	\$139,550
9. Implement the Avian Protection Plan.	Douglas PUD, FWS, Staff	\$0	\$4,340	\$4,340
10. Implement the May 2010 Historic Property Management Plan.	Douglas PUD, Staff	\$0	\$177,570	\$177,570
11. Implement the Recreation Management Plan.	Douglas PUD, Staff	\$1,624,700	\$422,710	\$476,870

^a All costs provided by the Douglas PUD, unless otherwise noted. We used the 2012 dollars provided by Douglas PUD and did not de-escalate them to 2011.

^b The Aquatic Settlement Signatories are FWS, Washington DFW, Washington DOE, the Colville Tribes, the Yakama Nation, and BLM.

^c Cost includes \$17,780 for meeting facilitation and minutes and annual reporting.

^d Estimated by staff.

^e Staff's cost estimate is for development of the plan and does not include the cost of implementation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPARISON OF ALTERNATIVES

In this section, we compare the developmental and non-developmental effects of Douglas PUD's proposal, Douglas PUD's proposal as modified by staff (staff alternative), staff alternative with mandatory conditions, and the no-action alternative.

We estimate the annual net benefits of operating and maintaining the Wells Project under the four alternatives identified above. Our analysis shows that the annual net benefit would be \$362,063,710 for the proposed action; \$362,373,900 for the staff alternative; \$362,226,850 for the staff alternative with mandatory conditions, and \$364,016,310 for the no-action alternative. We estimate that the annual generation would be 4,077,400 MWh for all four alternatives.

We summarize the environmental effects of the different alternatives in table 32.

Table 32. Comparison of alternatives for the Wells Hydroelectric Project (Source: staff).

Resource/Issue	No-Action Alternative	Douglas PUD’s Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Generation	4,077,400 MWh	4,077,400 MWh	4,077,400 MWh	4,077,400 MWh
Water Quality	No new measures to monitor and protect water quality.	Implement the Water Quality Management Plan	Same as Douglas PUD’s proposal, except not including: participation in regional water quality efforts; approval of annual Wells HCP Project Fish Bypass/Spill Operations Plan by the Aquatic SWG; and implementation of as-yet unidentified measures. Additional minor administrative measures including filing plans, notifying, and obtaining Commission approval.	Same as staff alternative.
Anadromous Fish	Same as Douglas PUD’s proposal.	Continue to: implement the Wells HCP and HGMPs; operate fish passage facilities; and implement tributary enhancement measures, hatchery production, and predator control activities.	Same as Douglas PUD’s proposal.	Same as Douglas PUD’s proposal.

Resource/Issue	No-Action Alternative	Douglas PUD's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Bull Trout	No new measures to protect bull trout.	Implement the Bull Trout Management Plan.	<p>Same as Douglas PUD's proposal, except not including: collection of genetic information for management purposes; participation in regional bull trout information exchanges; monitoring of bull trout at off-project hatcheries or brood stock collection facilities; and implementation and approval of as-yet unidentified plans, measures, or modifications to project facilities or operations.</p> <p>Additional minor administrative measures including filing detailed study plan for monitoring incidental take and displaying project-specific information about bull trout protective measures.</p>	Same as staff alternative except that bull trout would be monitored at off-project brood stock collection facilities.

Resource/Issue	No-Action Alternative	Douglas PUD's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Pacific Lamprey	No new measures to benefit Pacific lamprey.	Implement the Pacific Lamprey Management Plan.	<p>Same as Douglas PUD's proposal, except not including: development of operations study plan; participation in regional lamprey coordination efforts; compliance with lamprey passage standards; performance of a juvenile lamprey abundance and habitat study; performance of downstream juvenile passage studies and literature review; and implementation and approval of as-yet unidentified studies, measures, or modifications to project facilities or operations.</p> <p>Additional minor administrative measures including filing of plans and schedule for Commission approval.</p>	Same as staff alternative, except includes developing an operations study plan, conducting a downstream juvenile passage study and literature review, and complying with lamprey passage standards.

Resource/Issue	No-Action Alternative	Douglas PUD's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
White Sturgeon	No new measures to improve the population of sturgeon in Wells reservoir.	Implement the White Sturgeon Management Plan.	<p>Same as Douglas PUD's proposal, except not including: contribution to a cost-sharing sturgeon hatchery; participation in regional sturgeon coordination efforts; review of other sturgeon supplementation programs; provision of non-specific sturgeon public education measures; and implementation and approval of as-yet unidentified sturgeon passage or juvenile stocking alternative measures.</p> <p>Additional minor administrative measure including filing a broodstock collection and breeding plan for Commission approval.</p>	Same as staff alternative.

Resource/Issue	No-Action Alternative	Douglas PUD's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Resident Fish	No new measures to protect and enhance native resident fish.	Implement the Resident Fish Management Plan.	Implementation of <i>only</i> the Wells HCP predator control program and the Douglas Land Use Policy (these are ongoing measures but are listed as components of the Resident Fish Management Plan).	Same as staff alternative.
Aquatic Nuisance Species	No new measures to limit the spread of aquatic invasive species.	Implement the Aquatic Nuisance Species Management Plan.	Same as Douglas PUD's proposal, except not including: participation in regional information exchanges and implementation of as-yet unidentified measures. Additional requirement to update the plan by providing the specific BMPs and containment methods that would be implemented to control aquatic nuisance species.	Same as staff alternative.
Terrestrial Resources	No new measures to protect plant and wildlife.	Implement the Wildlife and Botanical Management Plan.	Same as Douglas PUD's proposal with the additional meetings with the Terrestrial RWG, filing of progress reports, reviewing and updating of rare plant and sensitive species list.	Same as staff alternative.

Resource/Issue	No-Action Alternative	Douglas PUD's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Avian Protection	No new measures to minimize the project's effects on birds.	Implement the Avian Protection Plan.	Same as Douglas PUD's proposal.	Same as Douglas PUD's proposal.
Recreation Resources	Recreation facilities would not be maintained or expanded, if needed, to meet increases in recreation demand.	Implement the Recreation Management Plan.	Same as Douglas PUD's proposal.	Same as Douglas PUD's proposal.
Cultural Resources	No new measures to protect cultural resources or historic properties.	Implement the HPMP.	Same as Douglas PUD's proposal.	Same as Douglas PUD's proposal.

5.2 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When we review a hydropower project, we consider water quality, fish and wildlife, recreation, cultural, and other non-developmental values. In deciding whether, and under what conditions a hydropower project should be licensed, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. We weigh the costs and benefits of our recommended alternative against other proposed measures. This section contains the basis for, and a summary of, our recommendations for relicensing the Wells Project.

Based on our independent review and evaluation of the environmental and economic effects of the proposed action, the proposed action with additional staff-recommended measures, and the no-action alternative, we recommend the proposed action with some modifications (staff alternative) as the preferred alternative.

We recommend the staff alternative because: (1) issuance of a new license would allow Douglas PUD continue operating the project as a beneficial and dependable source of electrical energy; (2) the 774.3 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures would protect water quality and quantity, enhance fish and wildlife resources, protect cultural resources, and improve public use of the project's recreational facilities and resources.

Measures Proposed by Douglas PUD

Based on our analysis of Douglas PUD's proposal, as discussed in section 3, and the costs discussed in section 4, we conclude that the following environmental measures proposed by Douglas PUD would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project.

- Continue to implement the Wells HCP;
- Develop and implement a UCR steelhead HGMP for the project's Wells Hatchery;

- Implement the Aquatic Settlement⁵⁰ which includes the following proposed plans, as modified below: the Water Quality Management Plan, the Bull Trout Management Plan, the Pacific Lamprey Management Plan, the White Sturgeon Management Plan, and the Aquatic Nuisance Species Management Plan;
- Implement the proposed Wildlife and Botanical Management Plan (as modified below);
- Implement the proposed Avian Protection Plan;
- Implement the proposed HPMP;
- Implement the proposed Recreation Resources Management Plan; and
- Continue to implement the Douglas PUD Land Use Policy.

Modifications, Additions, and Deletions Recommended by Staff

In addition to the above, we recommend the following modifications, additions, or deletions to measures proposed by Douglas PUD:

Water Quality Management Plan

We recommend adopting the following provisions of the plan: monitoring TDG; transmitting TDG data to a web-accessible database; preparing an annual TDG report; providing an annual report of all spill and predicted TDG levels occurring outside of the fish passage season; annually developing and implementing a GAP; coordinating the annual Wells HCP Project Fish Bypass/Spill Operations Plan with the Aquatic SWG and the GAP, using best available information to minimize the production of TDG during periods of spill; monitoring water temperature and other water quality parameters to ensure compliance with state water quality criteria; making water quality data available to the EPA to assist in development of the Columbia River temperature TMDL; notifying the Aquatic SWG of instances of non-compliance with state water quality criteria; implementing the SPCC Plan and operating the project to minimize spill of hazardous substances; allowing Washington DOE staff access to the project; coordinating project operations with other mid-Columbia hydroelectric projects; preparing study plans including QAPPs to guide implementation of the water quality monitoring program; and preparing annual reports. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that

⁵⁰ As we have stated, the Aquatic Settlement also provides for consultation and coordination with a work group, the Aquatic SWG, to oversee implementation of the aquatic resource management plans along with an adaptive management process and a dispute resolution provision. The Commission encourages parties to undertake means to facilitate consultation and resolve disputes. While we have no objection to the licensee and other entities establishing work groups, the Commission only has jurisdiction over its licensees and cannot enforce provisions against parties other than the licensee.

these measures would help protect water quality and aquatic resources in the Wells reservoir and tailrace. We estimate that the levelized annual cost of these measures would be \$179,090 and conclude that the benefits of the measures would justify the cost.

In addition, we recommend that Douglas PUD file the annual TDG reports and reports on spill and predicted TDG levels occurring outside of the fish passage season with the Commission, as well as providing them to the Aquatic SWG. We also recommend that Douglas PUD file the GAP, the Wells HCP Project Fish Bypass/Spill Operations Plan and the QAPPs for Commission approval, prior to implementation. We also recommend that Douglas PUD notify the Commission, in addition to the Aquatic SWG, within 48 hours of any temporary modifications to approved operations or facilities that are necessary to protect water quality and aquatic resources in emergency situations. Finally, we note that Douglas PUD would need to file an application to amend the license if any long-term (non-emergency) measures are proposed to address non-compliance with any water quality criteria other than TDG (which would be addressed in the GAP). The inclusion of these filing, notification, and approval requirements in any license issued would assist the Commission in ensuring compliance with the terms of the license. We estimate the cost of filing these plans would be minimal and conclude that the benefits would justify the cost.

We do not recommend that Douglas PUD be required to implement as-yet unidentified measures to address non-compliance with state water quality standards or new criteria as a result of future development of a Columbia River temperature TMDL; nor do we recommend any potential as-yet unidentified measures such as site-specific criteria, a use attainability analysis, or a water quality offset. We have insufficient information about the benefits and costs of these future potential measures. Moreover, our analysis in section 3.3.1, *Aquatic Resources*, indicates that the project is currently meeting state water quality criteria. If any of these measures are proposed as in the future, Douglas PUD, in consultation with the settlement parties, could file an application to amend any license issued to incorporate the measures. Similarly, any measures to coordinate operations with other mid-Columbia hydroelectric projects would need to be carried out within the constraints of the operating requirements of any new license issued, and implementation of measures outside of these license requirements would require the filing of an application to amend the license.

We do not recommend the plan provision that would require approval of the Wells HCP Project Fish Bypass/Spill Operations Plan by the Aquatic SWG. Because this annual plan is subject to the operational criteria and approval requirements established in the Wells HCP, requiring additional approval by the Aquatic SWG would result in overlapping authorities with the Wells HCP Coordinating Committee that could create conflicts with the approval process. We therefore conclude that we have no justification for recommending additional approval by the Aquatic SWG.

We also do not recommend the proposed plan measure that would require Douglas PUD to participate in the CSR-SRI or to participate in the TMDL's Water Quality Team

and Adaptive Management Team meetings. We find that participation in these working groups would be inherent during implementation of other aspects of the Water Quality Management Plan; however, a license requirement for such participation would be too broad in scope, would not be an enforceable license condition, and would not be worth the \$12,400 cost. We note, however, that Douglas PUD would be welcome to voluntarily participate in these working groups.

Bull Trout Management Plan

We recommend adopting the following provisions of the plan: (1) providing upstream and downstream passage for bull trout through existing fish passage facilities and operating the facilities according to the criteria established in the Wells HCP; (2) conducting video monitoring of the Wells dam fish ladders to monitor for bull trout; (3) conducting periodic upstream and downstream passage evaluations for bull trout; (4) implementing specific measures (e.g., PIT tagging, fish sampling) if significant number of juvenile bull trout are observed passing Wells dam; (5) conducting bull trout stranding evaluations during periods of low reservoir elevation; (6) monitoring Wells hatchery activities and other aquatic resource implementation activities for bull trout incidental take; (7) developing an informational and educational display for bull trout at the Wells Dam Visitor Center; and (8) preparing annual reports. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that these measures would help address project-related effects on bull trout passage and thereby assist in the recovery and protection of bull trout (a federally listed species) populations in the project area. In addition, the educational display for bull trout would provide additional information at the Wells Dam Visitor Center, thereby informing the public of bull trout conservation efforts and enhancing recreation resources. We estimate that the levelized annual cost of these measures would be \$60,890 and conclude that the benefits of the measures would justify the cost.

We recommend that Douglas PUD modify the objective of the bull trout information and education display to provide specific information about the project and measures undertaken to promote the conservation and recovery of bull trout in project waters, instead of conservation of bull trout throughout the larger upper Columbia River and tributaries as proposed in the plan. Requiring that the information and education display promote project-specific measures would provide a means to educate the public about the project's contributions to hydroelectric generation and endangered species protection. We estimate that there would be no additional costs to modify the objectives of the bull trout display and conclude that the benefits justify the measure.

We also recommend that Douglas PUD develop a detailed study plan to guide implementation of bull trout stranding evaluations and guide a monitoring program for evaluating incidental take of bull trout during implementation of other aquatic resource measures and operation of the Wells Hatchery. Such a plan would provide a framework for implementing the monitoring and evaluation programs and would assist the Commission in administering compliance with the approved requirements of the Bull

Trout Management Plan. We estimate that the levelized annual costs of developing the plan would be \$640 and conclude that the compliance benefits would justify the cost.

We do not recommend the provisions of the plan that would require Douglas PUD to implement as-yet unidentified plans, measures, or modifications to project facilities or operations to address bull trout passage-criteria exceedances or allowable bull trout incidental take exceedances. While these contemplated measures could potentially enhance conditions for bull trout at the Wells Project, we have insufficient information about the benefits and costs of the future potential measures. If any of these potential measures would be proposed as specific environmental measures in the future, Douglas PUD, in consultation with the settlement parties, could file an application to amend any license to incorporate the measures.

We do not recommend the proposed plan measure that would require Douglas PUD to participate in regional information exchanges for bull trout research and monitoring. While coordination and consultation would be conducted during implementation of bull trout monitoring studies, participating in information exchanges would not be necessary to address or mitigate project effects.

We also do not recommend that Douglas PUD be required to collect tissue samples and fund genetic analysis of bull trout collected in the Wells dam fishway facilities or at off-project broodstock collection facilities. Our analysis indicates that this measure would support general management of bull trout populations but would not provide any specific project-related enhancements to bull trout in the project area.

Finally, we do not recommend requiring Douglas PUD to monitor and study bull trout incidental take and bull trout passage performance at off-project hatcheries and broodstock collection facilities associated with the Wells HCP at an annual cost of \$16,000. The off-project broodstock collection facilities are used to support hatchery production at the Methow Hatchery, a non-project facility located more than 50 miles from the project, which produces hatchery spring Chinook to support the Wells HCP, Rocky Reach and Rock Island HCPs, and the Priest Rapids Salmon and Steelhead Agreement. Because the facilities are non-project facilities, they are unrelated to the proposed action, and we therefore conclude that we have no justification for requiring Douglas PUD to conduct monitoring activities at any of the facilities.

Pacific Lamprey Management Plan

We recommend adopting the following provisions of the plan: (1) operating the project fish ladders and downstream juvenile bypass facilities and conducting fish ladder salvage activities according to the criteria established in the Wells HCP; (2) continuing to count adult Pacific lamprey 24-hours-per-day during the adult fish ladder monitoring season (May 1–November 15); (3) conducting a fishway inspection and implementing up to four ladder improvement measures (entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools); (4) evaluating the effectiveness of any of the four specific fishway improvement measures that are implemented and conducting periodic

monitoring of passage effectiveness; and (5) preparing annual reports. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that these measures would protect and enhance lamprey passage through the project area and thereby assist in the recovery and protection of Pacific lamprey populations in the project area, which are a culturally significant native species in the Columbia River. We estimate that the levelized annual cost of these measures would be \$98,810 and conclude that the benefits of the measures would justify the cost.

We additionally recommend that Douglas PUD file plans with the Commission for approval prior to implementation and evaluation of any of the four specific fishway improvement measures that may be selected after consultation with the Aquatic SWG. These plans could include measures to increase the percentage of migrating lamprey that are detected at the counting station to more accurately evaluate the effectiveness of the implemented measures and to improve monitoring of the number of lampreys migrating past the project. Including these filing and approval requirements in any license issued would assist the Commission in administering compliance with the license requirements for enhancing upstream Pacific lamprey passage. The cost of filing these plans would be minimal.

We do not recommend provisions of the Pacific Lamprey Management Plan that would require Douglas PUD to operate the upstream fishways in accordance with operating criteria approved and/or amended by FWS and NMFS in consultation with the Wells HCP Coordinating Committee, Aquatic SWG, and BIA. Compliance with future operating criteria would be addressed if and when new criteria are approved through a license amendment proceeding.

We do not recommend the provisions of the plan that would require Douglas PUD to conduct an operations study and upstream passage literature review to study potential operational modifications to enhance Pacific lamprey passage, implement as-yet unidentified passage improvement measures, conduct future potential juvenile lamprey passage studies if the appropriate technology exists during the term of the license to conduct such a study, or implement future unspecified lamprey counting technology upgrades. While these contemplated measures could potentially provide an enhancement to existing conditions for Pacific lamprey at the Wells Project, we have insufficient information on the benefits and costs of these future potential measures. If any of these potential measures would be proposed as specific environmental measures in the future, Douglas PUD, in consultation with the settlement parties, could file an application to amend the license to incorporate the measures.

We also do not recommend the proposed plan measure requiring Douglas PUD to conduct literature reviews to evaluate juvenile lamprey passage survival through Columbia and Snake River hydroelectric facilities, conduct a study of juvenile lamprey downstream passage and survival if a suitable technology becomes available, or participate in regional lamprey working groups to support regional lamprey conservation efforts. While coordination and consultation would be inherent during implementation of

other measures to enhance lamprey passage, contributing to regional conservation efforts and reviewing passage survival at other projects would not be project-related. Regarding the study of juvenile lamprey downstream passage, we cannot evaluate the costs and benefits of such a study until an appropriate technology is developed and a study has been proposed.

Finally, we do not recommend the provision of the proposed plan requiring Douglas PUD to conduct a study of lamprey habitat and relative abundance in the project area. Determining juvenile Pacific lamprey presence and relative abundance in the reservoir could provide information to the agencies on lamprey use of the reservoir. We note, however, that we already have sufficient information to evaluate the project's effects on juvenile Pacific lamprey that may be rearing in the Wells reservoir. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that juvenile lamprey rearing in the reservoir would not be adversely affected by reservoir operations. We estimate that the levelized annual cost of the study would be \$6,200 and conclude that the minimal benefits of the study would not justify the cost.

Pacific Lamprey Passage Standards

We do not recommend that Douglas PUD continue to implement lamprey passage improvements until performance at Wells dam is similar to other mid-Columbia River hydroelectric dams or until lamprey passage standards are established by the Lamprey Technical Work Group. While our analysis in section 3.3.1, *Aquatic Resources*, indicates that Douglas PUD's identified lamprey passage improvements could potentially increase lamprey passage through the project, we find the proposed measures problematic for a number of reasons. First, passage performance at other mid-Columbia projects would be unrelated to Wells Project effects and may vary in time and thus would be difficult to enforce. Second, the passage rates that could be achieved at other projects may be unreasonable or infeasible when applied to the Wells Project. Third, given the uncertainty of the measures that would be required to comply with an unidentified standard, we cannot evaluate the benefits or costs of the measures.

We also do not recommend adopting the Confederated Tribes of the Umatilla Indian Reservation recommendation that Douglas PUD provide effective upstream and downstream passage for lamprey, including a requirement to achieve an upstream passage standard of 80 percent. While our analysis in section 3.3.1, *Aquatic Resources*, indicates that the specific measures included in Douglas PUD's proposed action would likely enhance lamprey passage at the project, there is no information in the record to indicate the level of enhancement from any of the contemplated measures or the attainment of an 80 percent passage standard. Additionally, it is not apparent, based on our review of the record, that the recommended passage standard is necessary to recover or maintain the Columbia River lamprey population. Based on this information, we do not recommend including this requirement in any license issued for the project.

White Sturgeon Management Plan

We recommend the following provisions of the plan: (1) developing a broodstock collection and breeding plan; (2) implementing a two-phase juvenile white sturgeon stocking program and monitoring and evaluation program; (3) implementing a two-phase index monitoring program to assist in implementation of the stocking program; (4) tracking a portion of the stocked fish using active-tags; (5) determining natural production potential in Wells reservoir; and (6) preparing annual reports. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that these measures would protect and enhance the white sturgeon (a regionally important native fish species) population in Wells reservoir. We estimate that the levelized annual cost of these measures would be \$447,970 and conclude that the benefits of the measures would justify the cost.

We recommend that Douglas PUD file the broodstock collection and breeding plan with the Commission for approval prior to implementation. Including this filing and approval requirement in any license issued would assist the Commission in administering compliance with conditions of the plan. We estimate the cost of filing the plans would be minimal, and conclude that the benefits would justify the cost.

We do not recommend a license requirement that would require Douglas PUD to participate in the development of a mid-Columbia hatchery facility jointly funded by Douglas, Chelan, and Grant PUDs to accommodate various phases of white sturgeon supplementation. Although Douglas PUD could enter into a cooperative off-license agreement to develop a hatchery to support the sturgeon supplementation program, the Commission would not have the authority to impose cost-sharing requirements on the other PUDs through the Wells Project license and, therefore, would only require that Douglas PUD fulfill the sturgeon supplementation requirements of any license issued. Consequently, we do not recommend the inclusion of any cost-sharing provisions in any license issued.

We do not recommend provisions of the plan requiring Douglas PUD to compile information on other white sturgeon supplementation programs in the Columbia River Basin to ensure consistency with Douglas PUD's program and other supplementation programs. The project's supplementation program would need to meet the objectives for the program set forth in any license issued for the project, regardless of the status of supplementation programs elsewhere in the Columbia River Basin. We estimate that the levelized annual cost of this measure would be \$49,610 and conclude that we have no justification for requiring this measure.

We do not recommend that Douglas PUD be required to develop as-yet unidentified adult white sturgeon passage measures that are consistent with measures being implemented at other mid-Columbia projects or implement alternative measures to be determined by the Aquatic SWG if juvenile sturgeon stocking deadlines cannot be achieved. We have insufficient information on the benefits and costs of these potential measures. Moreover, passage measures at other mid-Columbia projects may be unreasonable or infeasible when applied to the Wells Project. If any of these future

potential measures are proposed as specific environmental measures in the future, Douglas PUD, in consultation with the settlement parties, could file an application to amend any license to incorporate the measures. The Commission would make a public interest determination on the merits of the measures at that time.

Finally, we do not recommend that Douglas PUD be required to identify appropriate White Sturgeon Management Plan activities as opportunities for education to local public entities such as schools, cities, and fishing and recreation groups. While the contemplated activities could potentially provide public education of the project's contributions toward white sturgeon enhancement in the mid-Columbia River, the proposed measure is so general that we are unable to determine its benefits and costs.

Resident Fish Management Plan

We do not recommend the proposed Resident Fish Management Plan, which would require Douglas PUD to conduct resident fish studies throughout the term of the license, implement as-yet unidentified measures to address major shifts in native resident fish populations, monitor the effects on native resident fish and their habitat from any future potential changes to project operations and implement as-yet unidentified measures to address such effects, and prepare annual reports.

In regard to the resident fish studies, it is not clear why this information is needed or how it would be used. Our analysis in section 3.3.1, *Aquatic Resources*, indicates that there are many factors outside of the influence of the project that could cause shifts in resident fish population abundance. Examples of these factors could include: drought, flooding, disease, and harvest. Monitoring all of these factors in an attempt to separate their effects from those attributable to the implementation of the other Aquatic Settlement resource management plans would be difficult and costly and could still lead to disagreement as to project-specific effects. Moreover, we are already recommending a comprehensive set of enhancement measures that would benefit native fish species at the project (e.g., upstream and downstream fish passage facilities, water quality monitoring program, predator control program). While it is possible that there could still be some adverse effects on native resident fish from project operations and from implementing other measures to enhance other fish species at the project, the staff-recommended measures would protect and enhance fish populations at the project. Moreover, we estimate that the levelized annual cost of the studies would be \$71,520 and conclude that the benefits of the studies would not justify the cost.

In regard to implementation of as-yet unidentified measures to address future effects of potential changes in project operations and future potential shifts in native resident fish populations, it is possible that the as-yet unidentified future measures could provide some benefits to native resident fish; however, we have insufficient information on the measures to assess the benefits and costs of the measures or their relationship to project effects or purposes.

Aquatic Nuisance Species Management Plan

We recommend the following provisions of the plan: (1) implementing containment efforts using BMPs during implementation of recreation enhancement measures; (2) monitoring for the presence of aquatic nuisance species; (3) notifying agencies and implementing containment measures if aquatic nuisance species are detected during monitoring activities; (4) monitoring by-catch data from implementation of other aquatic resource measures for aquatic nuisance species; (5) implementing public outreach measures for preventing the spread of aquatic nuisance species; and (6) preparing annual reports. We also recommend modifying the plan to include the specific BMPs that would be implemented to prevent the spread of aquatic nuisance species during construction of recreation enhancement measures and the specific containment measures that would be implemented if additional aquatic nuisance species are detected during monitoring efforts. We estimate the cost of modifying the plan would be minimal and conclude that the benefits would justify the cost.

Our analysis in section 3.3.1, *Aquatic Resources*, indicates that these measures would help reduce the spread and proliferation of aquatic nuisance species, which would help protect aquatic habitat and native fish species and wildlife in the project area. We estimate that the levelized annual cost of these measures would be \$51,890 and conclude that the benefits of the measures would justify the cost.

We do not recommend the provisions of the plan requiring Douglas PUD to assess the potential effects of any future changes in project operation on the proliferation of aquatic nuisance species and implement as-yet unidentified measures to address potential adverse effects. While these measures could potentially help prevent the proliferation of aquatic nuisance species in the project area, we have insufficient details on the measures to determine the benefits and costs of the measures or their relationship to the project.

We also do not recommend adopting the proposed plan measure that would require Douglas PUD to participate in regional efforts to coordinate monitoring activities for aquatic nuisance species. While coordination and consultation would be inherent during implementation of other measures to monitor for and control the proliferation of aquatic nuisance species, participating in regional monitoring efforts would not necessarily address project-specific effects.

Wildlife and Botanical Management Plan

Douglas PUD proposes to implement a Wildlife and Botanical Management Plan. This plan includes measures targeting noxious weeds, special-status plants and wildlife, and riparian and wetland habitat. As proposed, Douglas PUD would meet with the Terrestrial RWG when requested to discuss management of wildlife and botanical species on project lands. Any changes to the plan would be made in writing and by unanimous consent by all parties, and it would be submitted to the Commission for review and approval. However, Douglas PUD does not explain how it would determine when such updates are needed.

FWS recommends implementing the plan in consultation with the Terrestrial RWG. FWS also recommends that Douglas PUD provide annual reports and conduct annual coordination meetings with the Terrestrial RWG to provide updates on the success of the mitigation measures implemented in the management plan. FWS recommends that the annual meetings are to be initiated, coordinated, and documented by Douglas PUD.

Washington DOE requests to be consulted on any future changes to the plan because of their oversight responsibilities relating to the propagation and protection of fish, shellfish and wildlife in connection with water bodies. Douglas PUD welcomes the participation of Washington DOE in the Terrestrial RWG but does not believe that a special license requirement is needed to permit Washington DOE's participation and review of the plan.

Implementing the plan would improve Douglas PUD's ability to prevent, detect, and control noxious weeds without inadvertent damage to non-target species or to herbicide-sensitive individuals; protect special-status plants; protect existing roost and perch habitat for bald eagles and ensure recruitment of suitable perch trees in the future; improve potential winter cover and forage for sharp-tailed grouse; reduce disturbance to American white pelicans that rest and forage on the reservoir; improve the condition of wetland and riparian habitat that could be used by amphibians and waterfowl at Cassimer Bar and Bridgeport Bar; and provide additional forage for waterfowl. The benefits of implementing the Wildlife and Botanical Management Plan would be worth the annualized cost of \$139,550, and we recommend its implementation.

We recommend two additional minor modifications to the plan: annually reviewing the Washington NHP rare plant list and providing an updated list of sensitive species in the annual reports described above. These updates would ensure that the noxious weed control would be done with consideration of any future rare and sensitive species that may be identified in the project area and that the plan would be modified accordingly. One of the noxious weed measures in the proposed plan involves updating the list of noxious weeds at 1-year intervals to ensure that the plan continues to reflect current state and county requirements for control throughout any new license period. Because this would be done in conjunction with annual noxious weed list updates, there would be no additional cost.

We recommend that Douglas PUD prepare the recommended annual reports in consultation with the Terrestrial RWG and Washington DOE because this would provide the resource agencies and the Commission a mechanism for determining if the management objectives are being achieved and if modifications to the plan are warranted. Such reports would facilitate the Commission's oversight of the license. Consultation with the Terrestrial RWG would be inherent in the development of such reports and would be sufficient for administering implementation of the plan. However, requiring the annual meetings would not be enforceable by the Commission because we cannot require the attendance of other parties at such meetings. Therefore, we do not recommend a

requirement for annual meetings in any license issued for the project. Developing the annual reports would have a negligible cost.

Conclusion

Based on our review of the agency and public comments filed on the project and our independent analysis pursuant to section 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Wells Project, as proposed by Douglas PUD with staff's modifications, additions, and deletions, would be best adapted to a plan for improving or developing the Columbia River watershed.

5.3 UNAVOIDABLE ADVERSE EFFECTS

Some individual anadromous salmonids would continue to experience migratory delays, injury, or mortality associated with the operation of the project. The project has no documented adverse effects on adult bull trout; however, it is reasonable to assume that passage delays and injury and mortality occur at a level similar to that seen for adult anadromous salmonids, and there is some potential for stranding mortality associated with changes in reservoir elevation. The project would continue to block upstream passage of adult white sturgeon, which likely prevents white sturgeon from having access to the full range of habitat types needed to sustain a self-reproducing population in the project area. Some individual Pacific lamprey may continue to experience migratory delays, injury, or mortality associated with the operation of the project. Reservoir level fluctuations associated with project operation would continue to limit the establishment of wetland and riparian vegetation along the reservoir shoreline and adversely affect the aesthetic appearance of the reservoir and access at boat launches when the reservoir is at low elevations.

5.4 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or any other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: FWS (filed on October 6, 2010, and amended on November 19, 2010), NMFS (filed on October 8, 2010), and Washington DFW (filed on October 8, 2010). Table 33 lists the federal and state recommendations filed pursuant to section 10(j) and whether the recommendations are adopted under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document and the previous section.

We recommend adopting all of the agencies' fish and wildlife recommendations that we consider to be within the scope of section 10(j).

Table 33. Fish and wildlife agency recommendations for the Wells Project (Source: staff).

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
1. Term of new license should be 50 years.	FWS, Washington DFW ^a	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	NA	The Commission will make its determination regarding the term of any new license in the license order, based on the record.
2. Limit the new Wells Project license to a term that is no longer than the term of the Wells HCP.	NMFS	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	NA	The Commission will make its determination regarding the term of any new license in the license order, based on the record.
3. Continue to implement the Wells HCP.	FWS (in part), ^b NMFS, Washington DFW	Yes.	No cost ^c	Adopted.
4. Implement the Water Quality Management Plan, except as noted in items 5 through 13, below.	Washington DFW	Yes.	\$179,090	Adopted.
5. Transmit hourly TDG data from the Wells forebay and tailrace stations on a daily basis to the applicable web-accessible database used by Washington DOE and regional fish management agencies.	Washington DFW	No, furnishing compliance monitoring data to agencies for their use is an administrative matter rather than a specific fish and wildlife measure.	Negligible	Adopted.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
6. Coordinate the annual Wells HCP Project Fish Bypass/Spill Operations Plan with the current GAP in consultation with the Aquatic SWG and use the best available information to minimize the production of TDG during periods of spill.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Adopted to the extent that we recommend that any operational measures for minimizing TDG are implemented within the operational criteria established in the Wells HCP and do not conflict with the other requirements of any license issued.
7. All operations identified within the Wells HCP Project Fish Bypass/Spill Operations Plan shall require the approval of the Wells HCP Coordinating Committee and the Aquatic SWG.	Washington DFW	No, reservation of authority to the agencies for final approval of project operations is not a specific fish and wildlife measure.	Negligible	Not adopted. Any spill operations would be subject to the operational criteria and approval requirements established in the Wells HCP and would not require approval by the Aquatic SWG.
8. Pending Washington DOE's approval of each subsequent GAP, continue to implement the activities identified within the previously-approved plan. Submit the GAP to Washington DOE by February 28 of each year, or on a less frequent basis, as documented by Washington DOE in writing. Submit the GAPs through the term of the new license or until no longer required by Washington DOE.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Adopted, with the exceptions that the annual GAP would have to be filed with the Commission for final approval. Additionally, the TDG annual report would have to be filed with the Commission to document compliance with the plan requirements.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
9. If no new reasonable and feasible improvements have been identified to achieve compliance with water quality standards, propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown	<p>Not adopted. We have insufficient information to determine the benefits and costs of the as-yet unidentified alternatives.</p> <p>Implementation of any as-yet unidentified alternatives would require prior Commission approval after the filing of an application to amend the license.</p>
10. Make temperature data from the monitoring program at Wells dam and software and results of the CE-QUAL-W2 model available to EPA and other entities to assist in the development of the Columbia River temperature TMDL. Implement the measures identified in the TMDL.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$6,200	<p>Adopted in part. We recommend the Douglas PUD make temperature monitoring and CE-QUAL-W2 model results available to assist in the TMDL process.</p> <p>However, implementation of any future as-yet unidentified measures as a result of the TMDL process would require prior Commission approval after the filing of an application to amend the license.</p>
11. Continue participation in the CSR-SRI and continue participation in both the Water Quality Team and Adaptive Management Team meetings to address regional water quality issues.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$12,400	Not adopted. The measure is too broad in scope and would not be an enforceable license condition.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
12. For the term of the new license, Douglas PUD shall, upon reasonable notice, allow Washington DOE staff access to inspect the project, including inside the dam, for the purpose of assessing spill prevention and control measures.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Adopted.
13. Douglas PUD may, following notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with other mid-Columbia hydroelectric operations to the extent practicable. Coordinated operations are intended to reduce spill, increase generating efficiencies, and thereby reduce the potential for exceedances of the TDG numeric criteria.	Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Adopted to the extent that any coordination is carried out within the constraints of the operating requirements of any license issued. Implementation of any measures that are outside of the operating requirements of any license issued would require prior Commission approval after the filing of an application to amend the license.
14. Implement the Bull Trout Management Plan, except as noted in items 15 through 21, below.	FWS, Washington DFW	Yes.	\$60,890	Adopted.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
15. Implement as-yet unidentified plans, measures, or modifications to project facilities or operations to address bull trout passage criteria exceedances or allowable bull trout incidental take exceedances.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown	Not adopted. We have insufficient information to determine the benefits and costs of the as-yet unidentified passage measures. Implementation of any as-yet unidentified measures would require prior Commission approval after the filing of an application to amend the license.
16. Conduct up to five bull trout stranding assessments during the first 5 years following license issuance, and one bull trout stranding assessment every 5 years thereafter, when reservoir elevation is below 773 feet msl.	FWS, Washington DFW	Yes.	Cost is already included in the cost for item no. 14	Adopted. However, we also recommend that a detailed study plan be filed with the Commission for approval, prior to implementation.
17. Monitor and study bull trout incidental take at the Wells Hatchery, at off-project hatcheries and broodstock collection facilities, and during implementation of other aquatic resource management measures (e.g., white sturgeon, Pacific lamprey).	FWS, Washington DFW	Yes, for monitoring at Wells Hatchery and for implementation of other aquatic resources measures. No, for monitoring and studies at off-project hatchery facilities because those facilities are not project facilities.	\$16,000 (cost for monitoring at off-project facilities). Cost for other related measures are included in item no. 14.	Adopted in part. We are recommending preparation of a plan for a monitoring program to assess incidental take of bull trout during operation of the project's Wells Hatchery and during implementation of other aquatic resource measures included in any license issued. However, we do not recommend bull trout monitoring at off-project facilities because they are unrelated to the project and would have no nexus to the relicensing action.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
18. Collect tissue samples and fund genetic analysis of sampled bull trout.	FWS, Washington DFW	No, funding genetic analysis of tissue samples is not a specific fish and wildlife measure.	\$1,160	Not adopted. Genetic analysis of captured bull trout would support general management of bull trout populations but would not provide any specific project-related enhancements to bull trout in the project area.
19. Consideration of FWS reasonable and prudent measures included as appendix A of the Bull Trout Management Plan for ESA section 7 consultation for bull trout.	FWS, Washington DFW	No, administrative actions are not specific measures to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Not adopted. The Commission would evaluate any reasonable and prudent measures through initiation of ESA consultation with FWS.
20. Construct an informational and educational display at the Wells Dam Visitor Center to promote the conservation and recovery of bull trout in the upper Columbia River and tributaries.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Cost is already included in the cost for item no. 14.	Adopted to the extent that we recommend that the displays describe information about the project and include project-specific measures for promoting the conservation and recovery of bull trout in the project vicinity.
21. Participate in regional information exchanges for bull trout research and monitoring studies.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$2,850	Not adopted. The measure is too broad in scope and would not be an enforceable license condition.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
<p>22. Implement the following measures included in the Pacific Lamprey Management Plan: operate upstream fishways and downstream bypass system in accordance with criteria established in the Wells HCP, salvage lamprey during fish ladder maintenance activities, conduct a fishway inspection and implement up to four specific fishway improvement measures (entrance efficiency, diffuser gratings, transition zones, and ladder traps/exit pools), monitor effectiveness of any of the four specific fishway improvement measures that are implemented, and prepare annual reports to document compliance with lamprey management activities.</p>	<p>FWS, Washington DFW</p>	<p>Yes.</p>	<p>\$98,810</p>	<p>Adopted. However, we also recommend that the proposed plan and schedule to address any of the four specific fishway improvement measures that are proposed to be implemented be filed with the Commission for approval, prior to implementation.</p>
<p>23. If requested by the Aquatic SWG, develop an operations study plan to study potential operational modification alternatives to enhance Pacific lamprey upstream passage through the project.</p>	<p>FWS, Washington DFW</p>	<p>No, operations study could have been done during pre-filing.</p>	<p>\$6,200^e</p>	<p>Not adopted. The project fish facilities operate as required by the operating criteria established in the Wells HCP.</p>

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
24. If additional passage measures are deemed necessary by the Aquatic SWG following implementation of the operations study plan, then conduct a literature review on the effectiveness of upstream passage measures (e.g., lamprey passage systems, plating over diffuser grating, modifications to orifices, rounding sharp edges, and fishway operational changes) implemented at other Columbia and Snake River hydroelectric facilities.	FWS, Washington DFW	No, literature review could have been done during pre-filing.	\$830 ^e	Not adopted. The project fish facilities operate as required by the operating criteria established in the Wells HCP. Implementation of any as-yet unidentified operational measures would require prior Commission approval after the filing of an application to amend the license.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
25. Continuously count upstream migrating lamprey 24-hours per day during the May 1–November 15 adult fish ladder monitoring and counting season using the most-current technology available.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown (cost for using the most-current technology) Cost for continuous lamprey counting is included in item no. 22.	Adopted in part. We recommend continuous lamprey counting during the adult fishway monitoring period; however, we do not recommend a requirement to use the “most-current technology available” because we have insufficient information to determine the benefits and costs of non-specific future counting technologies. Implementation of any as-yet unidentified counting technologies would require prior Commission approval after the filing of an application to amend the license.
26. Potentially implement alternative measures to improve lamprey counting accuracy, including the use of alternative upstream passage routes.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown	Not adopted. We have insufficient information to determine the benefits of alternative measures to improve lamprey counting accuracy. Implementation of any as-yet unidentified alternative lamprey passage routes would require prior Commission approval after the filing of an application to amend the license.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
27. Improve adult lamprey passage until performance at Wells dam is determined to be similar to other mid-Columbia River hydroelectric dams, or until lamprey passage standards and evaluation techniques are established by the Lamprey Technical Work Group, and adopted regionally.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$41,340 ^e	Not adopted. Because no such lamprey passage standards exist at this time, we are unable to determine whether such standards would be attainable.
28. Conduct a study to examine the presence and relative abundance of juvenile Pacific lamprey in habitat affected by the project.	FWS, Washington DFW	No, study could have been during pre-filing.	\$6,200	Not adopted. Minimal benefits would not justify the cost.
29. Conduct a juvenile lamprey downstream passage evaluation, if appropriate technology is developed during the license term to conduct such a study. Implement as-yet unidentified measures, studies, or operational modifications if the results of a juvenile lamprey downstream passage evaluation indicate that Wells Project operations are adversely affecting Pacific lamprey populations above Wells dam.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$124,020 ^e	Not adopted. Because no technology currently exists to conduct such a study, we are unable to determine the costs or benefits of requiring such a study. Implementation of any as-yet unidentified measures would require prior Commission approval after the filing of an application to amend the license.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
30. Conduct literature reviews at 5-year intervals to evaluate juvenile lamprey passage and survival through Columbia and Snake River hydroelectric facilities and participate in Pacific lamprey work groups in order to support regional conservation efforts.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$7,230	Not adopted. Literature reviews and participation in regional conservation efforts would provide no specific project-related benefits to lamprey within the project area. While some coordination would be inherent during license implementation, the agencies would ultimately be responsible for monitoring ongoing lamprey management activities in the Columbia and Snake River basins.
31. Implement the White Sturgeon Management Plan, except as noted in items 33 through 36 below.	FWS, Washington DFW	Yes.	\$447,	Adopted.
32. As part of a white sturgeon supplementation program, potentially develop a mid-Columbia hatchery facility funded by Douglas, Chelan, and Grant PUDs to accommodate the white sturgeon supplementation program.	FWS, Washington DFW	No, funding is not a specific fish and wildlife measure	Cost is part of the Phase I Juvenile White Sturgeon Stocking	Not adopted. Douglas PUD may enter in to a cooperative agreement with the other PUDs to construct and operate a hatchery but would ultimately only be responsible for fulfilling the white sturgeon supplementation requirements in any license issued.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
33. Compile information on other white sturgeon supplementation programs in the Columbia River Basin to ensure that Douglas PUD's program is consistent with other supplementation programs in the basin. Also obtain updated information, when available, on other white sturgeon recovery programs (e.g., upper Columbia River, Kootenai River, mid-Columbia PUDs) in order to improve the monitoring and evaluation program and refine its implementation.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$49,610	Not adopted. The project's supplementation and monitoring and evaluation program would need to meet the objectives for the program set forth in any license issued for the project, regardless of the status of supplementation programs elsewhere in the Columbia River Basin.
34. Develop as-yet unidentified adult white sturgeon passage measures consistent with measures being implemented at other mid-Columbia projects.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$4,130 ^e	Not adopted. Passage measures at other mid-Columbia projects may be unreasonable or infeasible when applied to the Wells Project. Moreover, we have insufficient information to determine the costs and benefits of the as-yet unidentified passage measures. Implementation of any as-yet unidentified measures would require prior Commission approval after the filing of an application to amend the license.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
35. Identify appropriate White Sturgeon Management Plan activities as opportunities for education to local public entities such as schools, cities, and fishing and recreation groups.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$2,480 ^e	Not adopted. The measure is too broad in scope and would not be an enforceable license condition.
36. Continue to implement annual predator control activities for northern pikeminnow and avian predators as outlined in the Wells HCP.	FWS, Washington DFW	Yes.	No cost ^c	Adopted. This is already required through the Wells HCP.
37. Continue to implement the Douglas Land Use Policy.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	No cost ^c	Adopted.
38. In year 2 of license issuance and every 10 years thereafter, conduct a resident fish study to determine the relative abundance of the various resident fish species within Wells reservoir.	FWS, Washington DFW	No, general fish population monitoring is not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$43,410	Not Adopted. It is unclear why this information is needed or how it would be used. We, therefore, conclude that the limited benefits of general resident fish population monitoring would not justify the costs.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
39. Implement reasonable and appropriate measures to address negative changes in resident fish populations that are not caused by and cannot be corrected by other aquatic resources management plans or activities.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$10,335 ^e	Not adopted. We have insufficient information to determine the costs and benefits of the as-yet unidentified measures. Implementation of any as-yet unidentified measures would require prior Commission approval after the filing of an application to amend the license.
40. Implement an assessment of changes in fish habitat (e.g., spawning, rearing, and migration) if future changes in Wells dam operations are proposed and the Aquatic SWG concludes such habitat would be affected, and implement reasonable and appropriate measures to address any potential effects.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown	Not adopted. We have insufficient information to determine the benefits and costs of future potential studies and measures to assess the effects of future potential changes in project operations. Any future potential changes to project operations and subsequent effects on resident fish would need to be addressed through the filing of an application to amend the license.
41. Prepare a Resident Fish Management Plan annual report.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$17,780	Not adopted. We are not recommending any measures specific to a Resident Fish Management Plan; therefore, we have no justification for requiring Douglas PUD to prepare an annual report.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
42. Implement the Aquatic Nuisance Species Management Plan, except as noted in items 44 through 47, below.	FWS, Washington DFW	Yes.	\$51,890	Adopted.
43. If modifications to project recreation facilities require disturbance of aquatic macrophyte beds, then Douglas PUD must implement containment methods using BMPs established by the Aquatic SWG.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Cost included in the cost of item no. 42.	Adopted. However, we also recommend that the plan be modified to identify the specific BMPs that would be implemented.
44. If aquatic nuisance species are detected, then implement reasonable and appropriate measures to address the nuisance species.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$6,200	Adopted. However, we also recommend that the plan be modified to identify the specific measures that would be implemented if aquatic nuisance species are detected.
45. Participate in information exchanges and regional efforts to coordinate monitoring activities.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	\$6,200	Not adopted. The measure is too broad in scope and would not be an enforceable license condition.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
46. If the Aquatic SWG identifies adverse effects on aquatic resources due to the potential proliferation of aquatic nuisance species that are attributable to future approved changes in project operations, then Douglas PUD must develop and implement measures to address adverse effects.	FWS, Washington DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Unknown	Not adopted. We have insufficient information to determine the benefits and costs of the as-yet unidentified measures. Implementation of any as-yet unidentified measures would require prior Commission approval after the filing of an application to amend the license.
47. Implement the Wildlife and Botanical Management Plan including measures to protect RTE plants and sensitive wildlife species, and controlling noxious weeds.	FWS	Yes.	\$139,550	Adopted.
48. As part of implementing the Wildlife and Botanical Management Plan, consult with FWS and the Terrestrial RWG, meet annually with the Terrestrial RWG, and prepare annual reports.	FWS	No, not a specific measure to protect.	NA	Adopted in part. Meeting annually with the Terrestrial RWG would not be an enforceable license condition. Instead, staff recommends the development of the annual reports in consultation with FWS.
49. Implement the Avian Protection Plan including measures to install bird flight diverters, maintenance of the transmission line corridor, and nest management protocol.	FWS	Yes.	\$4,340	Adopted.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Adopted or Not Adopted
50. The licensee shall, for the conservation, development, and mitigation of damages to fish and wildlife resources, use the Wells Aquatic SWG and the Terrestrial RWG as the primary forums to ensure consistency and timely coordination with the committees established by the Wells HCP.	FWS	No, not a specific measure to protect, mitigate, or enhance fish and wildlife resources.	Negligible	Not adopted. This measure is too broad in scope and would not be an enforceable license condition. The entities involved in the working groups and Wells HCP Coordinating Committee would be welcome to voluntarily coordinate activities implemented pursuant to the HCP and other license requirements.

Note: Unless otherwise noted, all costs are provided by Douglas PUD.

- ^a Washington DFW also opposes coordination of expiration of the Wells license with the new licenses for the Rocky Reach and Priest Rapids projects.
- ^b FWS' recommendation only included provisions for implementing section 7 and section 8 of the Wells HCP.
- ^c These costs are part of the continuation of the existing Wells HCP and are already included in the ongoing costs of the project, so we show no new or additional costs here.
- ^d These costs are already included in the ongoing costs of the project, so we show no new or additional costs.
- ^e Cost estimate provided by Douglas PUD.

5.5 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 29 comprehensive plans that are applicable to the project, located in Washington. No inconsistencies were found.

Table 34 presents comprehensive plans currently on file with the Commission that may be relevant to the project:

Table 34. FERC comprehensive plans considered for the Wells Hydroelectric Project.

Comprehensive Plan	Agency
Anadromous Fish Agreement and Habitat Conservation Plan: The Wells Hydroelectric Project (FERC Project No. 2149). March 26, 2002.	National Marine Fisheries Service, Washington, D.C.
Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. No date.	U.S. Fish and Wildlife Service, Washington, D.C.
An Assessment of Outdoor Recreation in Washington State: A State Comprehensive Outdoor Recreation Planning (SCORP) Document 2002–2007. October 2002.	Interagency Committee for Outdoor Recreation, Olympia, WA.
State of Washington Outdoor Recreation and Habitat: Assessment and Policy Plan, 1995–2001. November 1995.	Interagency Committee for Outdoor Recreation, Tumwater, WA.
Washington State Trails Plan: Policy and Action Document. June 1991.	Interagency Committee for Outdoor Recreation, Tumwater, WA.
The Sixth Northwest Electric Power and Conservation Plan. Council Document 2010-09.	Northwest Power and Conservation Planning Council, Portland, OR.
Columbia River Basin Fish & Wildlife Program. Council Document 2000–19. <i>As superseded by:</i> 2009 Columbia River Basin Fish & Wildlife Program. Council Document.	Northwest Power and Conservation Planning Council, Portland, OR.
Mainstem Amendments to the Columbia River Basin Fish & Wildlife Program. Council Document 2003-11.	Northwest Power and Conservation Planning Council, Portland, OR.
Protected Areas Amendments and Response to Comments. Council Document 88-22.	Northwest Power and Conservation Planning Council, Portland, OR.

Comprehensive Plan	Agency
Resource Protection Planning Process-Paleoindian Study Unit. 1987.	Washington State Dept. of Community Development, Office of Archaeology and Historic Preservation, Olympia, WA.
Water Resources Management Program-Methow River Basin. November 1977.	Washington Department of Ecology, Olympia, WA.
Water Resources Management Program -Okanogan River Basin. February 1978.	Washington Department of Ecology, Olympia, WA.
State Wetlands Integration Strategy. December 1994.	Washington Department of Ecology, Olympia, WA.
Application of Shoreline Management to Hydroelectric Developments. September 1986.	Washington Department of Ecology, Olympia, WA.
Hydroelectric Project Assessment Guidelines. 1987.	Washington Department of Fisheries, Olympia, WA.
Strategies for Washington's Wildlife. May 1987.	Washington Department of Game, Olympia, WA.
State of Washington Natural Heritage Plan. 1987.	Washington Department of Natural Resources, Olympia, WA.
Final Habitat Conservation Plan. September 1997.	Washington Department of Natural Resources, Olympia, WA.
Settlement Agreement pursuant to the September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-513. Columbia River Fish Management Plan. November 1987.	State of Washington, State of Oregon, State of Idaho, Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Confederated Tribes and Bands of the Yakama Indian Nation.
A Resource Protection Planning Process Identification Component for the Eastern Washington Protohistoric Study Unit. 1987.	Washington Dept. of Community Development, Office of Archaeology and Historic Preservation, Olympia, WA.
Washington State Hydropower Development/Resource Protection Plan. December 1992.	Washington State Energy Office, Olympia, WA.

Comprehensive Plan	Agency
North American Waterfowl Management Plan. May 1986.	U.S. Fish and Wildlife Service, Canadian Wildlife Service. U.S. Department of the Interior. Environment Canada.
Fishery management plan for commercial and recreational salmon fisheries off the coasts of Washington, Oregon, and California commencing in 1978. Department of Commerce. March 1978.	National Marine Fisheries Service, Seattle Washington and Pacific Fishery Management Council, Portland, OR
Eighth Amendment to the Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California. January 1988.	Pacific Fishery Management Council, Portland, OR
Nationwide Rivers Inventory, January 1982.	Department of the Interior, National Park Service. Washington, D.C.
Statute Establishing the State Scenic River System, Chapter 79.72 Revised Code of Washington, 1977.	State of Washington, Olympia, WA.
Washington State Scenic River Assessment and Scenic Rivers Program Report. 1988.	Washington State Parks and Recreation Commission. Olympia, WA.
Resource Protection Planning Process—mid-Columbia Study Unit. 1987.	Washington Department of Community Development. Office of Archaeology and Historic Preservation. Olympia, WA.
Instream Resource Protection Program for the Main Stem Columbia River in Washington State. 1982.	Washington Department of Ecology. Olympia, WA.

6.0 LITERATURE CITED

- Anchor Environmental, LLC and Douglas PUD (Public Utility District No. 1 of Douglas County). 2008. Annual report, calendar year 2007, of activities under the anadromous fish agreement and habitat conservation plan, Wells Hydroelectric Project.
- Anchor Environmental, LLC and Douglas PUD. 2005. Annual report, calendar year 2004, of activities under the anadromous fish agreement and habitat conservation plan, Wells Hydroelectric Project.
- Anchor QEA, LLC and Douglas PUD. 2011. Annual report, calendar year 2010, of activities under the anadromous fish agreement and habitat conservation plan, Wells Hydroelectric Project. Douglas PUD's 2010 HCP Annual Report. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Anchor QEA, LLC and Douglas PUD. 2010. Annual report, calendar year 2009, of activities under the anadromous fish agreement and habitat conservation plan, Wells Hydroelectric Project. Douglas PUD's 2009 HCP Annual Report. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- APLIC (Avian Power Line Interaction Committee). 2006. Suggested practices for avian protection on power lines: The state of the art in 2006. Edison Institute. Avian Power Line Interaction Committee and the California Energy Commission, Washington, D.C. and Sacramento, CA.
- APLIC. 1994. Mitigating bird collisions with power lines: The state of the art in 1994. Edison Electric Institute, Washington, D.C.
- APLIC and FWS (U.S. Fish and Wildlife Service). 2005. Avian protection plan guidelines. Edison Electric Institute, Washington, D.C., and U.S. Fish and Wildlife Service.
- Aquatic Nuisance Species Committee. 2001. Washington State aquatic nuisance species management plan. Pamala Meacham (ed.). Washington Department of Fish and Wildlife.
- Aspbury, A.S. and R.M. Gibson. 2004. Long-range visibility of greater sage grouse leks: A GIS-based analysis. *Animal Behaviour* 2004 (67):1,127–1,132.
- Atamian, M., J. Sedinger, and C. Frey. 2007. Dynamics of greater sage-grouse (*Centrocercus urophasianus*) populations in response to transmission lines in central Nevada. Progress Report: Year 5. Available at: www.ag.unr.edu/sedinger/Progress_Report_2007.doc. Accessed December 28, 2010. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno, NV.

- Baxter, C.V. and F.R. Hauer. 2000. Geomorphology, hyporheic exchange, and the selection of spawning habitat by bull trout (*Salvelinus confluentus*). *Canadian Journal of Fisheries and Aquatic Sciences* 57:1,470–1,481.
- Beak and Rensel (Beak Consultants, Inc. and Rensel Associates). 1999. Assessment of resident fish in Lake Pateros, Washington. Final Report. Prepared for Public Utility District No. 1 of Douglas County. Beak Consultants, Inc. in cooperation with Rensel Associates, Arlington, WA.
- Beck, J.L., K.P. Reese, J.W. Connelly, and M.B. Lucia. 2006. Movements and survival of juvenile greater sage-grouse in southeastern Idaho. *Wildlife Society Bulletin* 34(4):1,070–1,078.
- Berger, M., and G.D. Hartmann. 2006. Cultural resources data review for Chelan, Douglas, and Okanogan counties, Washington, Wells Hydroelectric Project, FERC No. 2149. Prepared by Western Shore Heritage Services, Inc., Bainbridge Island, WA. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. (not seen, as cited in Douglas PUD, 2010)
- Berman, C.H. and T.P. Quinn. 1991. Behavioral thermoregulation and homing by spring Chinook salmon, *Oncorhynchus tshawytscha* (Walbaum), in the Yakima River. *J. Fish Biol.* 39:301–312.
- BioAnalysts (BioAnalysts, Inc.). 2006. Aquatic macroinvertebrate inventory and RTE assessment. Wells Hydroelectric Project, FERC No. 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by BioAnalysts, Inc., Eagle Rock, ID.
- BioAnalysts. 2004. Movement of bull trout within the mid-Columbia River and tributaries, 2001–2004. Prepared for Public Utility District No. 1 of Chelan County, Wenatchee, WA, Public Utility District No. 1 of Douglas County, East Wenatchee, WA, and Public Utility District No. 2 of Grant County, Ephrata, WA. Prepared by BioAnalysts, Inc., Eagle Rock, ID.
- Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. In: Meehan, W.R. Influences of Forest and Rangeland Management of Salmonid Fishes and Their Habitats. *American Fisheries Society* 83–138.
- Blackwell, B.F., R.A. Dolbeer, and L.A. Tyson. 2000. Lethal control of piscivorous birds at aquaculture facilities in the northeast United States: Effects on populations. Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1142&context=icwdm_usdanwrc. Accessed January 7, 2011. Wildlife Damage Management, Internet Center for U.S. Department of Agriculture, National Wildlife Research Center, University of Nebraska, Lincoln, NE.
- Brown, L.G. 1995. Mid-Columbia River summer steelhead stock assessment—A summary of the Priest Rapids steelhead sampling project, 1986–1994 cycles.

Prepared by Washington Department of Fish and Wildlife, Anadromous Fish Division, Fish Management Program. AF95-02. (not seen, as cited in Douglas PUD, 2010)

- Butler, R.W. 1992. Great blue heron (*Ardea herodias*). The birds of North America (A. Poole, ed.). Available at: <http://bna.birds.cornell.edu/bna/species/025>. Accessed December 28, 2010. Cornell Lab of Ornithology, Ithaca, NY.
- Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley) from the American Northwest. California Fish and Game 64:139174.
- Chapman, D., C. Peven, A. Giorgi, T. Hillman, F. Utter, M. Hill, J. Stevenson, and M. Miller. 1995. Status of sockeye salmon in the mid-Columbia Region. Don Chapman Consultants, Inc., Boise, ID.
- Chapman, D., C. Peven, A. Giorgi, T. Hillman, and F. Utter. 1994a. Status of summer steelhead in the mid-Columbia River. Don Chapman Consultants, Boise, ID. (not seen, as cited in Douglas PUD, 2010)
- Chapman, D., A. Giorgi, T. Hillman, D. Deppert, M. Erho. S. Hays, M. Peven, B. Suzumoto, and R. Klinge. 1994b. Status of summer/fall Chinook salmon in the mid-Columbia Region. Don Chapman Consultants, Boise, ID.
- Close, D.A., M. Fitzpatrick, and H. Li. 2002. The ecological and cultural importance of a species at risk of extinction, Pacific lamprey. Fisheries 27(7). July 2002.
- Close, D. A., M. Fitzpatrick, H. Li, B. Parker, D. Hatch, and G. James. 1995. Status report of the Pacific lamprey (*Lampetra tridentata*) in the Columbia River Basin. Technical Report DOE/BP-39067-1. Prepared for Bonneville Power Administration.
- Collins, J.F. and A. Storfer. 2003. Global amphibian declines: sorting the hypotheses. Special issue: amphibian declines. Diversity and Distribution (2003) 9:89–98. Available at: http://www.collinslab.asu.edu/publications/11Collins_Global_amphibian.pdf. Accessed December 28, 2010.
- Cooke, G.D. 1980. Lake level drawdown as a macrophyte control technique. Water Resources Bulletin 16:317–322.
- Corps, BPA, and Reclamation (U.S. Army Corps of Engineers, Bonneville Power Administration, and U.S. Bureau of Reclamation). 2007. Comprehensive analysis of the Federal Columbia River Power System and mainstem effects of Upper Snake and other tributary actions. U.S. Army Corps of Engineers, Portland, OR.

- CPC (Center for Plant Conservation). 2008. *Spiranthes diluvialis* national collection plant profile. Available at: http://www.centerforplantconservation.org/ASP/CPC_ViewProfile.asp?CPCNUM=4077. Accessed January 3, 2011.
- Dean Runyan Associates. 2008. Washington State county travel impacts, 1991–2007. Prepared for Washington State Community, Trade and Economic Development Tourism Office. Dean Runyan Associates, Portland, OR. September. (not seen, as cited in Douglas, PUD, 2010)
- Dell, M., M. Erho, and B. Leman. 1975. Occurrence of gas bubble disease symptoms on fish in mid-Columbia River reservoirs. Prepared by PUD of Chelan, Grant, and Douglas counties, WA. 49 pgs.
- Devore, J. B. James, C. Tracy, and D. Hale. 1995. Dynamics and potential production of white sturgeon in the unimpounded lower Columbia River. Transactions of the American Fisheries Society 124:845–856.
- Douglas PUD. (Public Utility District No. 1 of Douglas County). 2011. Supplemental draft biological assessment and essential fish habitat analysis for the proposed action of issuing a new operating license for the Wells Hydroelectric Project (FERC No. 2149-152). Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Filed August 29, 2011.
- Douglas PUD (Public Utility District No. 1 of Douglas County). 2010. Wells Hydroelectric Project, FERC No. 2149, final license application. Public Utility District No. 1 of Douglas County, East Wenatchee, WA. May 2010.
- Douglas PUD. 2009. 2009 juvenile bypass operating plan. In: Anchor QEA, LLC and Douglas PUD. 2010. Annual report, calendar year 2009, of activities under the anadromous fish agreement and habitat conservation plan, Wells Hydroelectric Project. Douglas PUD's 2009 HCP Annual Report. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 2008. An evaluation of the effects of and alternatives to the existing bird and mammal control programs (piscivorous wildlife control study), Wells Hydroelectric Project, FERC No. 2149. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 2006. Wells Hydroelectric project pre-application document. Report Prepared by the Public Utility District No. 1 of Douglas County for the Federal Energy and Regulatory Commission. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 2004. Wells Hydroelectric Project bull trout monitoring and management plan, 2004–2008. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.

- Douglas PUD. 2002. Wells Hydroelectric Project anadromous fish agreement and habitat conservation plan. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 1982. Public use plan, Wells Hydroelectric Project FERC No. 2149. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 1974. Recreation plan supplement, Wells Hydroelectric Project FERC No. 2149. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD. 1967. Recreation plan, Wells Hydroelectric Project FERC No. 2149. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD and CBE (Columbia Basin Environmental). 2009. 2009 turbidity monitoring on the Okanogan River. Data collected by Columbia Basin Environmental for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Douglas PUD and LGL (LGL Limited Environmental Research Associates). 2008. Survival and rates of predation for juvenile Pacific lamprey migrating through the Wells Hydroelectric Project (juvenile lamprey study). Prepared for Public Utilities District No. 1 of Douglas County, East Wenatchee, WA.
- DTA (Devine, Tarbell & Associates, Inc.). 2008. An evaluation of recreational needs within the project. Wells Hydroelectric Project FERC No. 2149. Prepared by Devine, Tarbell & Associates, Inc. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- DTA. 2006a. Effects of water level fluctuations on natural resources within the project: A review of existing information. Wells Hydroelectric Project FERC No. 2149. Prepared by Devine, Tarbell & Associates, Inc. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- DTA. 2006b. Recreation visitor use assessment. Wells Hydroelectric Project FERC No. 2149. Prepared by Devine, Tarbell & Associates, Inc. for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Duke (Duke Engineering & Services, Inc.). 2000. Rocky Reach Hydroelectric Project, FERC Project No. 2145, RTE wildlife and cover type mapping. Final Report. Prepared for Public Utility District No. 1 of Chelan County, Wenatchee, WA.
- EDAW (EDAW, Inc.) 2006a. Botanical resources study report: Cover type mapping, rare threatened and endangered plant surveys and invasive plant surveys. Final. Wells Hydroelectric Project, FERC No. 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- EDAW. 2006b. Wildlife resources study report: Avian, amphibian, reptile and small mammal surveys. Wells Hydroelectric Project, FERC No. 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.

- EES Consulting, Inc., J. Carroll, ENSR, and Parametrix, Inc. 2007. Total dissolved gas production dynamics study. Wells Hydroelectric Project FERC No. 2149. Prepared by EES Consulting, Bellingham, Washington for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- EES Consulting, Inc. 2006. Comprehensive limnological investigation. Wells Hydroelectric Project FERC No. 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by EES Consulting, Inc., Bellingham, WA.
- FERC (Federal Energy Regulatory Commission). 2006. Final environmental impact statement, Priest Rapids Hydroelectric Project, Washington, FERC Project No. 2114. Federal Energy Regulatory Commission, Washington, D.C. November 2006.
- FERC. 2004. Final preliminary draft environmental assessment for hydropower license, Rocky Reach Hydroelectric Project, FERC Project No. 2145. Washington, D.C. 271 pgs.
- Fielder, P.C. 1982. Food habits of bald eagles along the mid-Columbia River, Washington. *Murrelet* 63:46–50.
- Finley, M., B. Wazaney, and G.F. Moura. 2008. Traditional cultural property study component of the Wells Hydroelectric Project (draft). History/Archaeology Program, Confederated Tribes of the Colville Reservation. Report submitted to Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Fish Passage Center. 2010. Fish Passage Center web site. Available at: http://www.fpc.org/adultsalmon/adultqueries/Adult_Annual_Totals_Query_Results.asp. Accessed December 28, 2010. Fish Passage Center, Portland, OR.
- Framatome ANP DE&S. 2003. Terrestrial habitat assessment—Priest Rapids Project. Report prepared for Public Utility District No. 2 of Grant County, Ephrata, Washington. License application technical appendix E-5.C.
- Franson, J.C., L. Sileo, and N.J. Thomas. 1995. Causes of eagle deaths. page 68. In: *Our Living Resources*. E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac (eds.). U.S. Department of Interior, National Biological Service, Washington, D.C.
- Friesen, T.A., and D.L. Ward. 1999. Management of northern pikeminnow and implications for juvenile salmonid survival in the lower Columbia and Snake rivers.
- Furey, P.C., R.N. Nordin, and A. Mazumder. 2006. Littoral benthic macroinvertebrates under contrasting drawdown in a reservoir and a natural lake. *Journal of the North American Benthological Society* 25:19–31.

- FWS (U.S. Fish and Wildlife Service). 2010. Amended comments, recommendations, terms and conditions, and prescriptions. Wells Hydroelectric Project —Review of Notice of Application Ready for Environmental Analysis, Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions for the Wells Hydroelectric Project, Project No. 2149-152, Chelan and Douglas counties, Washington (ER 10/686). U.S. Fish and Wildlife Service. November 19, 2010.
- FWS. 2008. Bull trout (*Salvelinus confluentus*), 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, Portland, OR.
- FWS. 2004. Ute ladies'-tresses (*Spiranthes diluvialis*) species profile. Available at: <http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=Q2WA>. Accessed January 2009). U.S. Fish and Wildlife Service.
- FWS. 2002. Chapter 22, Upper Columbia Recovery Unit, Washington. 113 p. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.
- FWS. 1995. Ute ladies'-tresses (*Spiranthes diluvialis*) recovery plan. U.S. Fish and Wildlife Service, Denver, CO.
- Glahn, J.F., E.S. Rasmussen, T. Tomsa, and K.J. Preusser. 1999. Distribution and relative impact of avian predators at aquaculture facilities in the northeastern United States. North American Journal of Aquaculture 61: 340–349.
- Hallet, M. 1990. 1989 annual report, Wells Wildlife Mitigation Program, Wells Hydroelectric Project, Federal Energy Regulatory Commission License Number 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by Washington Department of Wildlife.
- Hamilton, S.C. 2008. Results of the 2007–2008 Wells reservoir cultural resources field reconnaissance and intensive archaeological survey, Chelan, Douglas, and Okanogan counties, WA. History/Archaeology Program, Confederated Tribes of the Colville Reservation. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Hartmann, G. 2010. Historic Properties Management Plan, Wells Hydroelectric Project, FERC No. 2149. Cultural Resources Consultants, Bainbridge Island, WA. Report prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- HawkWatch International. 2008. Count results: 1999 through 2008. Available at: http://www.hawkwatch.org/home/index.php?option=com_content&task=category§ionid=4&id=25&Itemid=47. Accessed January 11, 2011.
- Hays, D.W., M.J. Tirhi, and D.W. Stinson. 1998a. Washington State status report for the sage grouse. Washington Department of Fish and Wildlife, Olympia, WA.

- Hays, D.W., M.J. Tirhi, and D.W. Stinson. 1998b. Washington State status report for the sharp-tailed grouse. Washington Department of Fish and Wildlife, Olympia, WA
- Hudon, C., S. LaLonde, and P. Gagnon. 2000. Ranking the effects of site exposure, plant growth form, water depth, and transparency on aquatic plant biomass. *Can. J. Fish. Aquat. Sci.* 57:Suppl. 131–42.
- IISC and ISDA (Idaho Invasive Species Council and Idaho State Department of Agriculture. 2007. 2008 statewide strategic plan for Eurasian watermilfoil in Idaho. Available at: <http://www.agri.idaho.gov/Categories/PlantsInsects/NoxiousWeeds/Documents/Milfoil/EWM%20Strategy%20Final.pdf>. Accessed January 18, 2011. Idaho Invasive Species Council and Idaho State Department of Agriculture Boise, ID. October 17, 2007.
- Jackson, A.D., D.R. Hatch, B.L. Parker, M.S. Fitzpatrick, D.A. Close, and H. Li. 1997. Pacific lamprey research and restoration annual report 1997. Prepared for the Bonneville Power Administration, Portland, OR.
- Jacobs Engineering. 2009. Supporting technical information document, Wells Hydroelectric Project. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by Jacobs Engineering, Bellevue, WA.
- Jacobs Engineering. 2008. Evaluation of public access to and use of the Wells reservoir as it relates to reservoir fluctuations, aquatic plants and substrate buildup. Wells Hydroelectric Project FERC No. 2149. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by Jacobs Engineering, Bellevue, WA.
- Jacobs Engineering. 2007. Wells Hydroelectric Project: Spill Prevention Control and Countermeasure (SPCC) Plan. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Prepared by Jacobs Engineering, Bellevue, WA.
- Jerald, T. 2007. White sturgeon (*Acipenser transmontanus*) population and life history assessment, Wells reservoir. Thesis. Central Washington University, Ellensburg, WA.
- Johnson, P.N., B. Le and J.G. Murauskas. 2010. Assessment of adult pacific lamprey response to velocity reductions at Wells dam fishway entrances (2009 DIDSON study report). Public Utility District No. 1 of Douglas County, East Wenatchee, WA. 17p.
- Johnson, R.K. and M.L. Ostrofsky. 2004. Effects of sediment nutrients and depth on small-scale spatial heterogeneity of submersed macrophyte communities in Lake Pleasant, Pennsylvania. *Can. J. Fish. Aquat. Sci.* 61:1493–1502.

- Keefer, M., E. Johnson, T. Clabough, M. Jepson, C. Caudill, and M. Moser. 2009. Preliminary evaluation of radio telemetry and half-duplex PIT tag data for Pacific lamprey at Bonneville Dam in 2009. University of Idaho College of Natural Resources, Moscow, ID. September 25, 2009.
- Knopf, F.L. and R.M. Evans. 2004. American white pelican (*Pelecanus erythrorhynchos*). The Birds of North America web page (A. Poole, ed.). Available at: <http://bna.birds.cornell.edu/bna/species/057>. Accessed December 10, 2010. Cornell Lab of Ornithology, Ithaca, NY.
- Kochert, M.N., K. Steenhof, C.L. McIntyre, and E.H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). The Birds of North America web page (A. Poole, ed.). Available at: <http://bna.birds.cornell.edu/bna/species/684>. Accessed December 10, 2010. Cornell Lab of Ornithology, Ithaca, NY.
- Kostow, K. 2002. Oregon lampreys: Natural history status and analysis management issues. Oregon Department of Fish and Wildlife.
- Kraus, F. 2009. Alien reptiles and amphibians: A scientific compendium and analysis. Invading nature: Spring Series. In: Invasion Ecology 4. Springer Science+Business Media.
- LCFRB (Lower Columbia Fish Recovery Board). 2004. Lower Columbia salmon and steelhead recovery and subbasin plan. Technical Foundation Volume III: Other Species. Prepared for Northwest Power and Conservation Council. Draft dated May 28, 2004.
- Lê, B. 2008. Total dissolved gas abatement plan, Wells Hydroelectric Project. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Lê, B. and S. Kreiter. 2008. An assessment of adult Pacific lamprey spawning within the project (lamprey spawning assessment). Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Lê, B. and S. Kreiter. 2006. project aquatic macrophyte identification and distribution study, 2005. Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Leonard, W.P., H.A. Brown, L.L.C. Jones, K.R. McAllister, and R.M. Storm. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society. The Trailside Series. Seattle, WA.

- LGL and Douglas PUD (LGL Environmental Research Associates and Public Utility District No. 1 of Douglas County). 2008a. Adult Pacific Lamprey passage and behavior study, Wells Hydroelectric Project, No. 2149. Report prepared by LGL Environmental Research Associates and Public Utility District No. 1 of Douglas County. Prepared for Public Utility District No.1 of Douglas County, East Wenatchee, WA.
- LGL and Douglas PUD. 2008b. Bull Trout Monitoring and Management Plan 2005-2008 Final Report for Wells Hydroelectric Project (FERC License No. 2149). Report prepared by LGL Environmental Research Associates and Public Utility District No. 1 of Douglas County. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Mann, R. and C. Peery. 2005. Effects of water temperature exposure on spawning success and developing gametes of migrating anadromous fish, 2004. Study Code: ADS-00-05. Prepared for U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, WA. Prepared by Fish Ecology Research Laboratory, ICFWRU, University of Idaho Moscow, ID. August 2005.
- McCullough, D.A. 1999. A review and synthesis of effects of alterations to the water temperature regime on freshwater life stages of salmonids, with special reference to Chinook salmon. EPA 910-R-99-010. Prepared for the U.S. Environmental Protection Agency, Region 10, Seattle, WA. July 1999.
- McGee, J. 1979. Fisheries survey of Wells reservoir. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. 18 pgs.
- Mcintyre, J. and J. Barr. 1997. Common loon (*Gavia immer*). The Birds of North America web site (A. Poole, ed.). Available at: <http://bna.birds.cornell.edu/bna/species/313>. Accessed December 10, 2010. Cornell Lab of Ornithology, Ithaca, NY.
- McPhail, J.D. and C.C. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fish. Res. Board Can. Bull. 173:381 p.
- Meeuwig, M.H., J.M. Bayer, J.G. Seelye, and R.A. Reiche. 2002. Identification of larval Pacific lampreys (*Lampetra tridentata*), river lampreys (*L. ayresi*), and western brook lamprey (*L. richardsoni*) and thermal requirements of early life history stages of lampreys. Report by U.S. Geologic Survey, Western Fisheries Resources Division, Columbia River Research Laboratory for the Bonneville Power Administration, Project No. 2000-029.
- Michelsen, T. 2003. Development of freshwater sediment quality values for use in Washington State. Phase II report: Development and recommendation of SQVs for freshwater sediments in Washington State. Publication No. 03-09-088. Prepared for Washington Department of Ecology, Toxics Cleanup Program, Sediment Management Unit. Olympia, WA. Prepared by Avocet Consulting. September 2003. (not seen, as cited in Douglas PUD, 2010)

- Moser, M., D. Ogden, and B. Sandford. 2007. Effects of surgically implanted transmitters on anguilliform fishes: lessons from lamprey. *Journal of Fish Biology* 71:1847-1952.
- Moser, M.L., D.A. Ogden, and C.A. Peery. 2005. Migration behavior of adult Pacific lamprey in the lower Columbia River and evaluation of Bonneville dam modifications to improve passage, 2002. Final Report. Prepared for the U.S. Army Corps of Engineers, Portland District, Portland, OR.
- Murauskas, J.G. and P.N. Johnson. 2009. Assessment of adult Pacific lamprey behavior in response to temporary velocity reductions at fishway entrances. Study plan prepared for the Aquatic Settlement Work Group, Wells Hydroelectric Project FERC No. 2149, with technical support from J. Skalski, R. Wielick, D. Allison, M. Hallock, and B. Le, East Wenatchee, WA.
- Nass, B., C. Sliwinski, and D. Robichaud. 2005. Assessment of adult Pacific Lamprey migratory behavior at Wells dam using radio-telemetry techniques, 2004. Prepared by LGL Limited Environmental Research Associates, Ellensburg, WA. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.1. Available at: <http://www.nature-serve.org/explorer>. NatureServe, Arlington, VA.
- NERC (North American Electric Reliability Corporation). 2010. 2010 long-term reliability assessment to ensure the reliability of the bulk power system. Princeton, NJ. October 2010.
- Nez Perce, Umatilla, Yakama and Warm Springs Tribes. 2008. Tribal Pacific lamprey Restoration Plan for the Columbia River Basin. Available at: http://www.critfc.org/text/lamprey/restor_plan.pdf. Formal Draft. May 15, 2008. Nez Perce, Umatilla, Yakama and Warm Springs Tribes.
- NMFS (National Marine Fisheries Service). 2008. Remand of 2004 biological opinion on the Federal Columbia River Power System (FCRPS) including 19 Bureau of Reclamation projects in the Columbia Basin (Revised pursuant to court order, NWF v. NMFS, Civ. No. CV 01-640-RE (D. Oregon)). Available at: <http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/Final-BOs.cfm>. Accessed on December 12, 2010.
- NMFS. 2007. Upper Columbia spring Chinook salmon and steelhead recovery plan. Available at: <http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Upper-Columbia/Upper-Col-Plan.cfm>. Accessed December 31, 2010.

- NMFS. 2003. Biological opinion, unlisted species analysis, and Magnuson-Stevens Fishery Conservation and Management Act consultation for proposed issuance of a section 10 Incidental Take Permit to Public Utility District No. 1 of Douglas County for the Wells Hydroelectric Project (FERC No. 2149) Anadromous Fish Agreement and Habitat Conservation Plan.
- NMFS. 2002. Anadromous fish agreements and habitat conservation plans: Final environmental impact statement for the Wells, Rocky Reach, and Rock Island hydroelectric projects. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Region, Portland, OR. December 2002.
- Normandeau (Normandeau Associates Inc.). 2000. An Evaluation of Water Quality and Limnology for the Priest Rapids Project Area. Report prepared for Public Utility District No. 2 of Grant County, Ephrata, WA.
- NRC (National Research Council). 1996. Upstream: Salmon and society in the Pacific Northwest. National Academy Press, Washington, D.C.
- NWPPC (Northwest Electric Power and Conservation Planning Council). 2009. Step 2 review of the Chief Joseph Hatchery Program, Project # 2003-023-00. Available at: <http://www.nwcouncil.org/news/2009/05/f6step.pdf>. Accessed December 28, 2010. Northwest Electric Power and Conservation Planning Council, Portland, OR.
- Oak Ridge National Laboratory. 1980. Analysis of environmental issues related to small-scale hydroelectric development. In: III, Water Level Fluctuation. Contributing Authors, R.R. Turner, R.R., L.D. Wright, A.T. Szluha, B. Tschantz, and S. Tam. S.G. Hildebrand, (ed.). Publication No. 1581. Oak Ridge National Laboratory, Environmental Sciences Division. 78 pp.
- Page, L.M. and B. M. Burr. 1991. A field guide to freshwater fishes of North America North of Mexico. The Peterson Field Guide Series, Houghton-Mifflin Co., Boston, MA.
- Parametrix (Parametrix, Inc.). 2009a. Plant and wildlife surveys and cover type mapping of the Wells Hydroelectric Project 230-kV transmission corridor. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. Report by Parametrix, Bellevue, WA.
- Parametrix. 2009b. Continued monitoring of DO, pH, and turbidity in the Wells forebay and lower Okanogan River (DO, pH, and turbidity study). Wells Hydroelectric Project, FERC No. 2149. Initial Study Report required by FERC. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.

- Parametrix. 2008. Assessment of DDT and PCBs in fish tissue and sediment in the lower Okanogan River (Okanogan Toxins Study), Wells Hydroelectric Project FERC No. 2149. Initial Study Report required by FERC. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA. 42 pp.
- Parsley, J.J. and L.G. Beckman. 1994. White sturgeon spawning and rearing habitat in the lower Columbia River. *North American Journal of Fisheries Management* 14:812–827.
- Patterson, B. 2010. Douglas PUD fish production facilities for the Wells Hydroelectric Project, FERC No. 2149.
- Plotnikoff, R.W. and S.I. Ehinger. 1997. Using invertebrates to assess quality of Washington streams and to describe biological expectations. *Ecology Publication* No. 97-332. Washington Department of Ecology, Olympia, WA.
- Politano, M., A. Arenas Amado, and L. Weber. 2009a. An investigation into the total dissolved gas dynamics of the project (total dissolved gas investigation): Wells Hydroelectric Project, FERC No. 2149. Updated Study Report required by FERC. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Politano, M., A. Arenas Amado, and D. Hay. 2009b. Total dissolved gas modeling and compliance evaluation for the Wells Hydroelectric Project. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Politano, M., A.A. Amado, and L. Weber. 2008. An investigation into the total dissolved gas dynamics of the project (total dissolved gas investigation): Wells Hydroelectric Project, FERC No. 2149. Initial Study Report required by FERC. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- PSMFC (Pacific States Marine Fisheries Commission). 1992. White sturgeon management framework plan. Report by the White Sturgeon Planning Committee, Pacific States Marine Fisheries Commission, Portland, OR.
- Reynolds, T.D., T.D. Rich, and D.A. Stephens. 1999. Sage thrasher (*Oreoscoptes montanus*). The Birds of North America web page (A. Poole, ed.). Available at: <http://bna.birds.cornell.edu/bna/species/463>. Accessed December 11, 2010. Cornell Lab of Ornithology, Ithaca, NY.
- Richardson, S., D. Hays, R. Spencer, and J. Stofel. 2000. Washington State status report for the common loon. Washington Department of Fish and Wildlife, Olympia, WA.

- Rieman, B.E., D.C. Lee, and R.F. Thurow. 1997. Distribution, status and likely future trends of bull trout within the Columbia River and Klamath basins. *North American Journal of Fisheries Management* 17(4):1111–1125.
- Rieman, B.E. and J.D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. *Transactions of American Fisheries Society* 124 (3):285–296.
- Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302. U.S. Forest Service, Intermountain Research Station.
- Robichaud, D., B. Nass, and Douglas PUD. 2009. Adult Pacific lamprey passage and behavior study (adult lamprey passage study), Wells Hydroelectric Project, FERC No. 2140. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Roby, D.D., D.P. Craig, K. Collis, and S.L. Adamany. 1998. Avian predation on juvenile salmonids in the lower Columbia River: 1997 annual report. Available at: http://www.columbiabirdresearch.org/Reports/1997_Annual_Report.pdf. Accessed January 7, 2011. Prepared for Bonneville Power Administration and the U.S. Army Corps of Engineers.
- Rodgers, J.A., and H.T. Smith. 1997. Buffer zone distances to protect foraging and loafing waterbirds from human disturbance in Florida. *Wildlife Society Bulletin* 25(1):139–145.
- Rotenberry, J.T. and J.A. Wiens. 1980. Habitat structure, patchiness, and avian communities in North American steppe vegetation: A multivariate analysis. *Ecology* 61:1,228–1,250.
- Schaeffer, L. 1992. Avian predators at ODFW hatcheries: Their identification and control. Available at: <http://www.fishlib.org/library/Documents/Oregon/DFW/inforept92-1.pdf>. Accessed January 7, 2011. Oregon Department of Fish and Wildlife, Technical Services, Portland, OR. February, 1992.
- Scherer, G., R. Everett, and B. Zamora. 1997. *Trifolium thompsonii* stand conditions following a wildfire event in the Entiat Mountains of Central Washington. Available at: <http://www.fs.fed.us/pnw/wenlab/pdf/5255-Scherer.pdf>. Accessed January 3, 2011. U.S. Forest Science Lab, Wenatchee, WA.
- Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. *Bull. Fish. Res. Board Can.* 184:1–966.
- Serdar, D. 2003. TMDL technical assessment of DDT and PCBs in the lower Okanogan River Basin. Publication No. 03-03-013. Washington State Department of

- Ecology, Environmental Assessment Program, Olympia, WA. July 2003. (not seen, as cited in Douglas PUD, 2010)
- Skalski, J.R. and R.L. Townsend. 2005. Analysis of the Douglas County Public Utility District #1 Sturgeon Mark-Recapture Study. Columbia Basin Research. School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA.
- Smith, M.R., P.W. Mattocks, Jr., and K.M. Cassidy. 1997. Breeding birds of Washington State. In: Washington State Gap Analysis Final Report. Vol. 4 Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich (eds.). Seattle Audubon Soc. Publ. in Zool. No. 1, Seattle, WA.
- Snow, C., C. Frady, A. Fowler, and A. Murdoch. 2008. Monitoring and evaluation of Wells and Methow Hatchery programs in 2007. Prepared for Douglas County Public Utility District and Wells Habitat Conservation Plan Hatchery Committee. Prepared by Washington Department of Fish and Wildlife. March 2008.
- Spence, B.C., G.A. Lomicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. (Available from the National Marine Fisheries Service, Portland, OR). ManTech Environmental Research Services Corporation, Corvallis, OR. 356pp.
- Stinson, D. W., and M. A. Schroeder. 2010. Draft Washington State recovery plan for the Columbian sharp-tailed grouse. Washington Department of Fish and Wildlife, Olympia, WA.
- Tu, M., C. Hurd, and J.M. Randall. 2001. Weed control methods handbook. Available at: <http://tncweeds.ucdavis.edu>. Accessed December 22, 2010. The Nature Conservancy. Version: April 2001.
- UCWSRI (Upper Columbia White Sturgeon Recovery Initiative). 2002. Upper Columbia white sturgeon recovery plan. Available at: <http://uppercolumbiasturgeon.org/RecoveryEfforts/Rec-RecPlan.html>. Accessed January 19, 2011. Upper Columbia White Sturgeon Recovery Initiative, Revelstoke, BC. November 28, 2002.
- USGS (U.S. Geological Survey). 2010a. USGS surface-water for Washington web page. Available at: <http://waterdata.usgs.gov/ca/nwis/sw>. Accessed November 8, 2010. U.S. Geological Survey, Reston, VA.
- USGS (U.S. Geological Survey). 2010a. USGS surface-water for Washington web page. Available at: <http://waterdata.usgs.gov/ca/nwis/sw>. Accessed November 8, 2010. U.S. Geological Survey, Reston, VA.
- USGS (U.S. Geological Survey). 2010b. Dreissena species FAQs: A closer look. Available at: http://fl.biology.usgs.gov/Nonindigenous_Species/Zebra_mussel_FAQs/Dreissena_FAQs/dreissena_faqs.html. Accessed November 2010.

- USGS. 2008. White sturgeon passage at The Dalles Dam. Available at: <http://pubs.usgs.gov/fs/2008/3081/>. Accessed January 13, 2011. U.S. Geological Survey, Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA. September 2008.
- van der Leeuw, B.K., M.J. Parsley, C.D. Wright, and E.E. Kofoot. 2006. Validation of critical assumption of the riparian habitat hypothesis for white sturgeon: U.S. Geological Survey Scientific Investigation Report 2006-5225. 20 p.
- Vander Haegen, M. 2004. Sage thrasher. In: Management Recommendations for Washington's Priority Species, Volume IV: Birds. E. Larsen, J. M. Azerrad, N. Nordstrom (eds.). Washington Department of Fish and Wildlife, Olympia, WA. pp. 32-1-32-4.
- Vaughn, C.C. 2005. Freshwater mussel populations in southeastern Oklahoma: population trends and ecosystem services. Proceedings of Oklahoma Water 2005, Tulsa, Oklahoma. Paper #18. Oklahoma Water Resources Institute, Stillwater, OK. 12 pp.
- Volk, E.C. 2000. Using otolith strontium to infer migratory histories of bull trout and Dolly Varden from several Washington State rivers. Submitted to Olympic National Park in fulfillment of Contract #2550041. Washington Department of Fish and Wildlife, Olympia, WA.
- Washington Biodiversity Council. 2007. Washington Biodiversity Conservation Strategy: Sustaining our natural heritage for future generations. December, 2007. Available at: <http://www.biodiversity.wa.gov/council/strategy-sections.html>. Accessed December 23, 2010.
- Washington DFW (Washington Department of Fish and Wildlife). 2004. Living with beavers. Available at: <http://wdfw.wa.gov/living/beavers.html>. Accessed December 23, 2010. Washington Department of Fish and Wildlife.
- Washington DOE (Washington Department of Ecology). 2011. Washington State Coastal Zone Management Program web page. Available at: <http://www.ecy.wa.gov/programs/sea/czm/prgm.html>. Accessed January 19, 2011.
- Washington IAC (Washington Interagency Committee for Outdoor Recreation). 2002. An assessment of outdoor recreation in Washington State: A state comprehensive outdoor recreation planning (SCORP) document, 2001-2007. Available at: http://www.rco.wa.gov/documents/rec_trends/SCORP_Oct_2002.pdf. Accessed February 26, 2011. Interagency Committee for Outdoor Recreation, Olympia, WA. October 2002.

- Washington NHP (Washington Natural Heritage Program). 2011. List of Vascular Plants Tracked by the Washington Natural Heritage Program. Available at: <http://www1.dnr.wa.gov/nhp/refdesk/lists/plantrnk.html>. Accessed September 23, 2011. Washington Natural Heritage Information System, Washington State Department of Natural Resources. April 2011.
- Washington NHP (Washington Natural Heritage Program). 2009. List of known occurrences of rare plants Douglas County, Washington, with web links to rare species fact sheets. Available at: <http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/douglas.html>. Accessed December 17, 2010. Washington Natural Heritage Information System, Washington State Department of Natural Resources. February 2009.
- Washington DOE. 2004. Guidelines for preparing Quality Assurance Project Plans for environmental studies. Available at: <http://www.ecy.wa.gov/biblio/0403030.html>. Accessed March 3, 2011. Publication Number 04-03-030. Washington Department of Ecology, Olympia, WA.
- Washington NHP. 2007. Non-native Freshwater Plants: Eurasian Watermilfoil. Available at: <http://www.ecy.wa.gov/programs/wq/plants/weeds/milfoil.html>. Accessed August 2007.
- Washington NHP. 2005. Field guide to selected rare plants of Washington. Available at: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/htm/fgmain.htm>. Accessed December 17, 2010. Washington Department of Natural Resources, Olympia, WA.
- Washington NHP. 1999. *Trifolium thompsonii* Morton. Thompson's clover. Available at: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/trth.pdf>. Accessed December 17, 2010. Washington Department of Natural Resources, Olympia, WA.
- Washington Water Trails Association. 2011. Greater Columbia water trail web page. Available at: http://www.wwta.org/trails/greater_columbia/index.asp. Accessed February 26, 2011. Washington Water Trails Association, Seattle, WA.
- Watson, J. and M. Whalen. 2004. Golden eagle. In: Management Recommendations for Washington's Priority Species, Volume IV: Birds. E. Larsen, J. M. Azerrad, N. Nordstrom (eds.). Washington Department of Fish and Wildlife, Olympia, WA. pp 8-1 to 8-7.
- Weitkamp, D.E. and M. Katz. 1980. A review of dissolved gas supersaturation literature. Transactions of American Fisheries Society 109:659-702.

- West Consultants, Inc. 2008. Development of a water temperature model relating project operations to compliance with the Washington State and EPA water quality standards (Water Temperature Study). Wells Hydroelectric Project, FERC No. 2149. Initial Study Report required by FERC. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.
- Wolfe, D.H., M.A. Patten, E. Shochat, C.L. Pruett, and S.K. Sherrod. 2007. Causes and patterns of mortality in lesser prairie chickens *Tympanuchus pallidicinctus* and implications for management. *Wildlife Biology* 13 (Suppl. 1):95–104.
- Wydoski, R.S. and R.R. Whitney. 2003. *Inland fishes of Washington*. University of Washington Press, Seattle, WA. 2nd edition.
- Wydoski, R. S., and R. R. Whitney. 1979. *Inland fishes of Washington*. University of Washington Press, Seattle, WA.

7.0 LIST OF PREPARERS

Federal Energy Regulatory Commission

Kim Nguyen—FERC Project Coordinator, Need for Power, Developmental Analysis, Water Quantity, Water Quality, (Civil Engineer; B.S., Civil Engineering)

Matt Cutlip—Aquatic Resources, Water Quality, and Water Quantity (Fisheries Biologist; B.S., Fisheries Science)

Nicholas Palso—Recreation, Land Use, Aesthetics, Socioeconomics (Environmental Protection Specialist; Recreation, Park, and Tourism Management; MPA, Masters of Public Administration; B.S., Wildlife Biology)

David Turner—Terrestrial Resources (Wildlife Biologist; M.S., Zoology; B.S., Forest Resources and Wildlife Biology)

Frank Winchell—Cultural Resources (Archeologist; B.A., M.A., Ph.D., Anthropology)

Kelly Wolcott—Terrestrial Resources (Environmental Biologist; M.S., Natural Resources; B.S., Biology)

Contractor Staff

Fred Winchell—Deputy Project Manager, Aquatic Resources (Fisheries Biologist; M.S., Fisheries Biology)

George Gilmour—Fisheries Resources, Threatened and Endangered Species (B.S., Biology)

John Hart—Water Quantity and Water Quality (Hydrologist; B.A., Physics)

Kenneth Hodge—Need for Power and Developmental Analysis (Senior Engineer; B.S., Civil Engineering)

Coreen Johnson—Editorial Review (Technical Editor; B.A., English/Education)

Alison Macdougall—Cultural Resources (Senior Environmental Manager; B.A., Anthropology)

Eileen McLanahan—Terrestrial Resources, Threatened and Endangered Species (M.S., Biology)

Leslie Pomaville—Recreation, Land Use, Aesthetics (Scientist; B.S., Environmental and Natural Resources)

Denise Short, Socioeconomics (M.S., Agriculture, Food, and the Environment; B.A., English)

Jane True—Graphics (Graphic Designer; B.A., Graphic Arts)

8.0 LIST OF RECIPIENTS

Julee Welch
Office of General Counsel
P.O. Box 3621
Portland, OR 97208-3621

Bonneville Power Administration
FERC Contact
P.O. Box 3621
Portland, OR 97208-3621

Jim Blanchard
Bureau of Reclamation
Special Projects Off.
P.O. Box 815
Ephrata, WA 98823-0815

Columbia River Gorge Commission
Chairman
P.O. Box 730
White Salmon, WA 98672-0730

Steve S. Parker, Harvest Manager
Confederated Tribes and Bands
of the Yakama Nation
P.O. Box 151
Toppenish, WA 98948-0151

Carl Merkle, Policy Analyst
Confederated Tribes of the Umatilla
46411 Timine Way
Pendleton, OR 97801

Charlie McKinney
Department of Ecology
15 W. Yakima Ave., Suite 200
Yakima, WA 98902

Douglas County
P.O. Box 747
Waterville, WA 98858-0747

Federal Energy Regulatory Commission
Portland Regional Office
805 SW Broadway Fox Tower, Suite 550
Portland, OR 97205

Craig Hansen
Fish & Wildlife Service, Region 1
510 Desmond Drive SE
Lacey, WA 98503

Forest Service
FERC Coordinator
Wenatchee National Forest
215 Melody Lane
Wenatchee, WA 98801-5933

Richard Hastings
House of Representatives
Washington, D.C. 20515

Christopher Fontecchio, Attorney-
Advisor
NOAA/NMFS
7600 Sand Point Way NE
Seattle, WA 98115

Keith Kirkendall
NOAA
1201 NE Lloyd Blvd, Suite 1100
Portland, OR 97232

Bryan Nordlund, Hydraulic Engineer
NOAA Fisheries Service
Northwest Region
510 Desmond Drive SE, Suite 103
Lacey, WA 98503

Steven M. Fransen
NOAA/NMFS
510 Desmond Drive SE
Suite 103
Lacey, WA 98503

Will Stelle
Regional Administrator
NMFS
7600 Sand Point Way NE
Seattle, WA 98115-0070

Okanogan County
P.O. Box 232
Okanogan, WA 98840-0232

Karen Gustin, Superintendent
Olympic National Park
600 East Park Avenue
Port Angeles, WA 98362

Jeffery Erb, Asst. Gen Counsel
PacifiCorp
825 NE Multnomah Street, Suite 600
Portland, OR 97232

Dianne C. Balch
PacifiCorp Energy
825 NE Multnomah, Suite 600
Portland, OR 97232

Jim Schroeder
PacifiCorp
825 NE Multnomah, Suite 600
Portland, OR 97232

Loretta Mabinton
Assistant General Counsel
Portland General Electric
121 SW Salmon Street
Portland, OR 97204

Gregg Carrington
PUD No. 1 of Chelan County
Director, Hydro Services
P.O. Box 1231
Wenatchee, WA 98807-1231

Michelle L. Smith
PUD No. 1 of Chelan County
Licensing and Compliance Mgr
P.O. Box 1231
Wenatchee, WA 98807-1231

Carol Wardell, General Counsel
PUD No. 1 of Chelan County
327 N. Wenatchee Avenue
P.O. Box 1231
Wenatchee, WA 98801

Garfield Jeffers, Attorney
Jeffers, Danielson, Sonn & Aylward,
P.S.
2600 Chester Kimm Rd
Wenatchee, WA 98801

John Janney
PUD No. 1 of Chelan County
P.O. Box 1231
Wenatchee, WA 98807-1231

William Dobbins
General Manager
PUD No. 1 of Douglas County
1151 Valley Mall Pkwy
East Wenatchee, WA 98802

Tim Culbertson, Manager
PUD No. 2 of Grant County
PO Box 878
Ephrata, WA 98823-0878

Shane Bickford
Fisheries Biologist
PUD No. 2 of Grant County
1151 Valley Mall Parkway
East Wenatchee, WA 98802

James B. Vasile
Davis Wright Tremaine LLP
1919 Pennsylvania Avenue, NW
Suite 800
Washington, D.C. 20006-3401

Robert Neate
Puget Sound Energy, Inc.
P.O. Box 97034
Bellevue, WA 98009-9734

Joel L. Molander
Puget Sound Energy, Inc.
P.O. Box 97034
Snoqualmie, WA 98065

Donald E. Kempf, Envir. Specialist
Stillaguamish Tribe
P.O. Box 277
Arlington, WA 98223-0277

U.S. Bureau of Indian Affairs
Director
Portland Area Office
911 NE 11th Ave
Portland, OR 97232-4169

U.S. Bureau of Indian Affairs
P.O. Box 48
Aberdeen, WA 98520-0010

State Director (OR-936.1)
U.S. Bureau of Land Management
P.O. Box 2965
Portland, OR 97208-2965

Brian C. Cates
U.S. Fish & Wildlife Service
Mid-Columbia River Fishery Resource
Office
7501 Icicle Rd
Leavenworth, WA 98826-9319

Dan Haas
U.S. National Park Service
909 1st Ave
Seattle, WA 98104-1055

Senator Maria Cantwell
United States Senate
511 Dirksen Senate Office Building
Washington, D.C. 20515-0001

U.S. Army Corps of Engineers
Commander
P.O. Box 2946
Portland, OR 97208

Nolan Shishido, Attorney
U.S. Department of Interior
Office of the Regional Solicitor
805 SW Broadway, Suite 600
Portland, OR 97205

Mark Miller
U.S. Fish & Wildlife Service
Ecological Services
11103 E. Montgomery Dr.
Spokane Valley, WA 99206

Estyn Mead, Hydropower Coordinator
U.S. Fish & Wildlife Service
911 NE 11th Ave.
Portland, OR 97232-4181

Jennifer Frozena
U.S. Department of Interior
911 N.E. 11th Avenue
Portland, OR 97213

Robert Dach
Hydropower Program Manager
Bureau of Indian Affairs
911 N.E. 11th Avenue
Portland, OR 97232-1202

Ken Berg, Manager
U.S. Fish & Wildlife Service
510 Desmond Dr.
Lacey, WA 98503

Rory Westberg, Supt.
National Park Service
909 1st Ave
Seattle, WA 98104-1055

Roberta B. Estes
OR/WA BLM FERC Coordinator
Bureau of Land Management
3050 NE Third Street
Prineville, OR 97754

Lee Van Tussenbrook
Manager
Washington Dept. of Fish & Wildlife
2108 Grand Blvd
Vancouver, WA 98661-4624

Washington Dept. of Fish & Wildlife
Chief Habitat Division
600 N. Capitol Way
Olympia, WA 98504-0001

Patrick M. Verhey
Fish & Wildlife Biologist
Washington Dept. of Fish & Wildlife
1550 Alder St. N.W.
Ephrata, WA 98823

Washington Dept. of Agriculture
406 General Administration Building
Olympia, WA 98504-0001

Washington Office of Archaeology
SHPO
P.O. Box 48343
Olympia, WA 98504-8343

Pat Irle
Hydropower Projects Mgr.
Washington Dept. of Ecology
15 W. Yakima Ave., Ste 200
Yakima, WA 98902

Sonia Wolfman
Assistant Attorney General
Washington Office of Attorney General
P.O. Box 40117
Olympia, WA 98504-0117

Bill Frymire
Senior Counsel
Washington Office of Attorney General
P.O. Box 40100
Olympia, WA 00100

Tony Eldred
Washington Department of Fish &
Wildlife
3860 Chelan Highway N.
Wenatchee, WA 98801

Forest Practice, Coordinator
Washington Dept. of Natural Resources
950 Farman St N
Enumclaw, WA 98022-9282

SEPA Center
Washington Dept. of Natural Resources
P.O. Box 47015
Olympia, WA 98504-7015

Electric Section Specialist
Washington Utilities and Trans. Comm.
P.O. Box 47250
Olympia, WA 98504-7250

Virginia Ryan
Assistant District Counsel
U.S. Army Corps of Engineers, Seattle
District
4735 E. Marginal Way South
Seattle, WA 98134-2385

Mark Jenson
Operations Project Manager
P.O. Box 1120
Bridgeport, WA 98813

Okanogan National Forest
1240 2nd Ave S.
Okanogan, WA 98840-9723

NOAA NEPA Coordinator
SSMC3, Room 15723 (PPI)
1315 East-West Highway
Silver Spring, MD 20910

U.S. Bureau of Land Management
Regional Director
1515 SW 5th Ave
Portland, OR 97208

Washington Utilities and Transportation
Commission
P.O. Box 47250
Olympia, WA 98504

This page intentionally left blank.

APPENDIX A

**Staff Responses to Comments on the Draft Environmental Impact Statement
for the
Wells Hydroelectric Project (Project No. 2149-152)**

**STAFF RESPONSES TO COMMENTS
ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
WELLS HYDROELECTRIC PROJECT (PROJECT NO. 2149-152)**

The notice of availability of the draft environmental impact statement (EIS) was issued on April 6, 2011. Comments on the draft EIS were due on May 31, 2011. In this appendix, we summarize the comments received; provide responses to those comments; and indicate, where appropriate, how we modified the text in the final EIS. We grouped the comment summaries and responses by topic for convenience. The following entities filed comments on the draft EIS:

Commenting Entity	Filing Date
Public Utility District No. 1 of Douglas County (Douglas PUD)	May 16, 2011
City of Pateros	May 25, 2011
U.S. Environmental Protection Agency	May 27, 2011
Washington Department of Ecology (Washington (DOE))	May 27, 2011
Confederated Tribes of the Colville Reservation (Colville Tribes)	May 31, 2011
Washington Department of Fish and Wildlife (Washington DFW)	May 31, 2011
U.S. Department of the Interior (Interior)	May 31, 2011
Port of Chelan County	June 7, 2011
National Marine Fisheries Service (NMFS)	June 8, 2011
City of Bridgeport	June 10, 2011
U.S. Fish and Wildlife Service (FWS)	June 29, 2011
Colville Tribes	July 7, 2011
Congressman Doc Hastings	July 14, 2011
City of Brewster	July 20, 2011

Procedural and General

Comment 1: The City of Pateros (page 1), the City of Bridgeport (pages 1–2), the Port of Chelan County (page 1), and Congressman Doc Hastings (page 1) support the proposed 50-year license for the project.

Response: The Commission will make the final determination on licensing term for any license issued for the project.

Comment 2: Douglas PUD (pages 4–5, 7–9, 11–12, 18, and 20–22) recommends modification of the EIS to avoid conflicting jurisdictional oversight and to be consistent with other recently issued National Environmental Policy Act (NEPA) documents and with the license order for the Rocky Reach Project. Douglas PUD identifies requirements for Federal Energy Regulatory Commission (Commission or FERC) approval of Gas Abatement Plans (GAPs) and the white sturgeon broodstock collection and breeding plan as examples of such inconsistencies. Therefore, Douglas PUD requests that the Commission require the filing of the GAP and white sturgeon broodstock collection and breeding plan without the additional requirements for Commission approval. Douglas PUD (page 22) also comments that it disagrees with the requirement that the Wells Anadromous Fish Agreement and Habitat Conservation Plan (Wells HCP) Fish Bypass Operating Plan and Quality Assurance Project Plan be filed with the Commission for approval prior to implementation.

Response: As discussed in the Commission’s Policy Statement on Hydropower Licensing Settlements, the Commission must approve a licensee’s post-filing plans and cannot cede that authority to other agencies. We evaluate each project independently, and in this instance, we conclude that without the recommended requirements to submit the plans for Commission approval, there would be no mechanism that would enable the Commission to administer compliance with: (1) approved project operational requirements to meet total dissolved gas (TDG) criteria (including Washington DOE-approved TDG criteria exemptions); (2) the specific measures included in a white sturgeon broodstock and breeding plan; (3) fish bypass operations (as modified and updated in consultation with the Aquatic Settlement Work Group (SWG) and Wells HCP Coordinating Committee); and (4) plans for monitoring water quality. For these reasons, we continue to find that it would be in the public interest to include the approval requirements in any license issued for the project.

We note, however, that Douglas PUD, where applicable, would be welcomed to file the plans prior to license issuance. This would enable the Commission to approve the plans in any license issued. Once authorized, each plan would only require re-authorization if and when project operations, facilities, or measures are modified beyond the parameters set forth in the Commission-approved plans.

Proposed Action and Alternatives

Comment 3: Douglas PUD (page 13) states that federal takeover pursuant to section 14 of the Federal Power Act (FPA) does not apply to this proceeding because it is a municipality and Congress amended the FPA in 1953 to provide that section 14 “shall not be applicable to any project owned by a state or municipality.”

Response: We have revised section 2.5.2 accordingly.

Comment 4: Douglas PUD (page 10) comments that the 2004 Order Amending License (107 FERC ¶ 61,283) and NMFS’s Endangered Species Act (ESA) section 10 incidental

take permits did not include authorization for Hatchery Genetic Management Plans (HGMPs). Douglas PUD requests deletion of this statement from the EIS.

Response: We have revised section 2.2.3 to reflect that the HGMPs have not been approved by NMFS. Moreover, based on our review of the project record and comments filed on the draft EIS, we agree that future unspecified modifications to the project's Wells Hatchery to comply with a steelhead HGMP may require modification to licensed project facilities and approved exhibit drawings that were not previously authorized by the 2004 Order Amending License (107 FERC ¶ 61,283). Therefore, we have included the development of a Upper Columbia River (UCR) steelhead HGMP and corresponding upgrades to the Wells Hatchery as part of the proposed relicensing action. However, since Douglas PUD has not yet filed its steelhead HGMP, we currently have no basis for determining the costs of the hatchery upgrades. If Douglas PUD were to file its Wells Hatchery UCR steelhead HGMP (including any needed changes to exhibits) prior to license issuance, the Commission could evaluate the upgrades and may be able to include necessary approvals in any license issued.

Comment 5: Interior (page 9) comments that Douglas PUD currently implements measures associated with the Wells HCP for the upstream and downstream passage of salmon and steelhead and continued implementation of the HCP should be included in the no-action alternative.

Response: We have revised the no-action alternative in this EIS to include continued implementation of the Wells HCP.

Comment 6: Douglas PUD (pages 2, 6, and 9–10) comments that the action alternatives presented in the draft EIS are incomplete because its proposal is inaccurately characterized.

Response: We have revised section 1.4.4 accordingly.

Comment 7: Douglas PUD (pages 2 and 4), Interior (page 1), Washington DOE (page 2), and Washington DFW (pages 4–5, May 31, 2011, filing) request that the Commission analyze the effects of the Aquatic Settlement in its entirety in the final EIS.

Response: As discussed in the Commission's Policy Statement on Hydropower Licensing Settlements, the Commission cannot automatically accept all settlements or all provisions of settlements. Section 10(a)(1) of the FPA requires that the Commission determine that any licensed project is best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of waterpower development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section

4(e). Consequently, in reviewing settlements, the Commission looks not only to the wishes of the settling parties but also at the greater public interest, and whether settlement proposals meet the comprehensive development/equal consideration standard.

Accordingly, the staff alternative includes only those components of the Aquatic Settlement that staff found to: (1) be supported by substantial evidence; (2) be best adapted to a comprehensive plan for improving or developing the Columbia River waterway; and (3) meet the equal consideration standard, pursuant to sections 313(b), 10(a) and 4(e) of the FPA.

Comment 8: Douglas PUD (pages 3 and 6), Interior (page 1), Washington DOE (page 2), and Washington DFW (pages 2–3, May 31, 2011, filing) comment that the staff alternative excludes or mischaracterizes several of the provisions in the Aquatic Settlement and that they disagree with the exclusion of individual measures in management plans. Interior (page 1) comments that modification or exclusion of key provisions of the Aquatic Settlement may hinder the ability of Douglas PUD and other settlement parties to implement the Aquatic Settlement’s fish and wildlife conservation measures.

Response: We have modified our characterization of the Aquatic Settlement as proposed by Douglas PUD and the settlement parties. As previously noted, however, we include in the staff alternative only the specific measures of the Aquatic Settlement that staff found to: (1) be supported by substantial evidence; (2) be best adapted to a comprehensive plan for improving or developing the Columbia River waterway; and (3) meet the equal consideration standard, pursuant to sections 313(b), 10(a), and 4(e) of the FPA.

Comment 9: Washington DFW (page 2, May 31, 2011, filing) recommends that the Commission: (1) evaluate the environmental effects of approving the Aquatic Settlement and of reauthorizing the recently modified Wells HCP, and (2) remove the staff alternative without mandatory conditions from the final EIS.

Response: The effects of all of the environmental measures in the Aquatic Settlement are evaluated in the EIS, although as discussed above, not all are included in the staff alternative. We have updated the discussion of the Wells HCP hatchery mitigation requirements in section 3.3.1.2 of the EIS, and added a new table (table 18) presenting the current production objectives for the Wells HCP passage loss and compensation program in order to more thoroughly evaluate the environmental effects of implementing the Wells HCP. However, the Wells HCP has not been amended since its original authorization and the updated mitigation requirements are within the range that were approved in the June 21, 2004, Order Amending License and Authorizing the Wells HCP (107 FERC ¶ 61,283). For this reason, the Wells HCP would not require re-authorization in any new license issued.

The Commission must include mandatory conditions filed pursuant to sections 18 and 4(e) of the FPA in any license issued for the project. Because we do not recommend

including in the staff alternative several of the mandatory conditions filed by Interior pursuant to section 18 of the FPA, we must evaluate the staff alternative with mandatory conditions as its own distinct alternative in the EIS.

Comment 10: Douglas PUD (pages 3 and 6) and Washington DFW (pages 3 and 5–6, May 31, 2011, filing) comment that the Commission’s treatment of this project differs from the draft EIS for the Boundary and Sullivan Creek projects, for which the offers of settlement and settlement agreements were described as the proposed action and all of the measures, including adaptive management, were adopted.

Response: Both EISs evaluate four distinct alternatives: (1) no-action alternative, (2) applicant’s alternative, including an independent analysis of each of the individual measures contained in each settlement agreement, (3) staff alternative, and (4) staff alternative with mandatory conditions. Additionally, sections 5.1.2.2 and 5.1.2.3 of the Boundary/Sullivan Creek EIS provided a discussion of the additional measures (not included in the settlement agreement) recommended by staff and a discussion of the proposed settlement agreement measures that were not recommended by staff. Finally, staff recommended the adaptive management measures for these projects because the applicant had filed conceptual plans for a range of alternatives that contained enough detail for staff to determine the environmental effects, benefits and costs, and relationship of the measures to project effects and purposes.

Comment 11: Douglas PUD (page 4) notes that Washington DOE has indicated its intention to include the Aquatic Settlement in its section 401 water quality certification (WQC) and that ignoring Washington DOE’s proposed mandatory conditions could result in a flawed NEPA analysis and additional ESA consultation on the proposed action. Washington DOE (page 2) states that it will include the components of the Aquatic Settlement in the section 401 WQC and that it expects to see all components of the Aquatic Settlement in the final EIS as part of the staff alternative.

Response: We do not speculate on future potential conditions that may be included in a WQC. We will consider any WQC conditions under the staff alternative with mandatory conditions if and when such certification conditions are timely filed by Washington DOE pursuant to section 401 of the Clean Water Act.

Comment 12: Douglas PUD (page 11) comments that the wording in section 2.2 about the Pacific Lamprey Management Plan should be revised from *implementing* to *evaluate the need for*.

Response: We have revised sections 2.2, 3.3.1.2, and 5.2 accordingly.

Comment 13: Interior (page 2) and Washington DFW (page 5, May 31, 2011, filing) comment that the recommended alternatives and requirements described in the draft EIS are not consistent with the provisions set forth in the Aquatic Settlement, e.g., the

Commission's modification and/or deletion of certain sections of the proposed Bull Trout Management Plan and the Pacific Lamprey Management Plan. Interior (page 2) states that preserving the integrity of these management plans is critical to providing effective conservation and recovery actions.

Response: As we've said, the Commission cannot automatically accept all settlements or all provisions of settlements (see response to Comment 7). In conducting our analysis, we found that some measures in the Aquatic Settlement do not have a clear nexus to the project (are not tied to project effects or purposes), are not needed to fulfill any project-demonstrated need, are too vague to conduct the required public interest determination on their merits, would not be enforceable as license conditions, or do not provide benefits that justify their costs.

Statutory and Regulatory Requirements

Comment 14: Interior (page 9) requests that the full text of its fishway prescriptions be appended to the final EIS.

Response: In the interests of keeping our documents a reasonable size and not including supporting documents that are readily available in the project record, we do not generally append mandatory conditions to an EIS. Interior's fishway prescriptions are available on FERC's web site.

Comment 15: Interior (pages 1–2 and 5–8) comments that numerous conditions in its preliminary fishway prescriptions for bull trout and Pacific lamprey were not included in the staff alternative presented in the draft EIS. Interior and Washington DFW (page 2, May 31, 2011, filing) comment that the Commission is required to include, without modification, fishways prescribed by the Secretaries of the Interior or Commerce.

Response: In section 2.4 of the EIS, we acknowledge that the Commission must include any valid section 18 prescriptions, without modification, in any license issued for the project. We also identify the section 18 prescriptions that were not recommended by staff in the EIS, but would be included in any license issued for the project.

Comment 16: Interior (page 9) requests that sections 1.3.1.1 and 2.2.4 of the EIS include a list of the fish species that are included in its preliminary fishway prescription, as well as a discussion of Interior's request for reservation of authority.

Response: We have updated sections 1.3.1.1 and 2.2.4 accordingly. We have also modified the EIS to note that both Interior and NMFS requested reservation of authority to modify their fishway prescriptions.

Comment 17: Interior (pages 3–4) states that its section 10(j) recommendations for Douglas PUD to: (1) conduct literature reviews; (2) participate in regional information exchanges for bull trout research and monitoring studies; and (3) participate in regional

lamprey working groups to support regional lamprey conservation efforts, would enable the applicant to obtain and apply the latest science related to addressing impacts of the project on bull trout and lamprey and the licensee should be required to remain cognizant of the science and technological developments related to these species for the 30- to 50-year license period.

Response: We are not persuaded by Interior's assertion that it is the licensee's obligation to stay apprised of the most-current science and technological developments for bull trout and Pacific lamprey at other hydroelectric projects throughout the region. We continue to find that participation in regional information exchanges and regional working groups would not be project-related and would not be necessary to address project effects. We note, however, that Douglas PUD would be welcomed to participate in the information exchanges and working groups, outside of license requirements.

Comment 18: Interior (page 3) states that its section 10(j) recommendation for monitoring of incidental take at off-project facilities is important to the applicant's execution of the Wells HCP, which forms the foundation of the Aquatic Settlement. Interior recommends that the Commission modify the project boundary to include the off-project facilities identified in the incidental take statement, consistent with the Rocky Reach Project proceeding. Washington DFW (page 4, May 31, 2011, filing) comments that the broodstock trapping facilities operated as part of the requirements of the Wells HCP incidentally encounter more than 100 adult bull trout per year, and Washington DFW and Interior (pages 3–4) state that the intent of this one-time off-site study is to determine whether there is incidental take associated with the operation of those facilities.

Response: We do not recommend monitoring activities at these facilities because they are not project-related and therefore do not recommend bringing these facilities into the project boundary.

Comment 19: Interior (page 4) states that FWS' pending biological opinion for the Wells Project will include terms and conditions for off-site hatchery facilities along with the recommendation that they be brought into the project boundary.

Response: We will consider the terms and conditions of a biological opinion when it is filed by FWS through the ESA section 7 consultation for the relicensing action.

Comment 20: Interior (page 5) states that FWS needs assurance that Douglas PUD would resolve passage impediments involving bull trout as they arise at the project during the new license term, expected to be between 30 and 50 years. If and when passage impediments are detected, provisions for the Bull Trout Management Plan would require the applicant, in coordination with FWS and appropriate committees, to implement measures to remove the impediment and evaluate the effectiveness of such measures on bull trout passage. Interior states that attempting to resolve these issues through a

Commission-approved license amendment would not provide timely resolution to bull trout passage impediments.

Response: Eight years of monitoring at project facilities did not identify any adverse project-related effects on bull trout passage. We find, therefore, that we lack substantial evidence to recommend any future potential measures to address adverse effects on bull trout. Instead, staff recommends ongoing monitoring of project facilities to ensure that continued project operations do not adversely affect bull trout at project facilities. If any adverse effects are detected in the future, these could be addressed through a license amendment or the Commission’s standard fish and wildlife reopener.

Comment 21: Interior states (page 4) that its section 10(j) recommendation for conducting a study of lamprey habitat and abundance would contribute toward assessing project effects on juvenile Pacific lamprey, assist Douglas PUD in determining the exact scope and nature of effects, and aid in implementing corrective actions during the license period.

Response: As stated in the EIS, we have sufficient information to evaluate the project’s effects on juvenile Pacific lamprey in the reservoir, and the results of the applicant’s pre-filing studies indicate that project effects on lamprey due to reservoir operations are negligible. Therefore, we continue to find that the benefits of Interior’s recommended study would not justify the costs.

Comment 22: Interior (page 6) comments that the draft EIS oversimplifies adult Pacific lamprey’s ability to successfully reproduce in areas downstream of the project and its ability to adapt to project effects. The draft EIS’s conclusion that passage success through the project’s upstream fishway was shown to be 100 percent is also misleading. Douglas PUD currently does not meet the “safe, timely, and effective” upstream fish passage standard for the Pacific lamprey at this project because of the low fishway entrance efficiency rates at the project for adult upstream passage (resulting from approach velocities that are beyond the swimming capabilities of adult Pacific lamprey).

Response: We have revised section 3.3.1.2 and have clarified our analysis of fishway entrance efficiency rates.

Comment 23: Interior (pages 6–7) states its fishway prescriptions regarding “lamprey counts” (preliminary prescription 5.5 corresponding to Pacific Lamprey Management Plan section 4.1.3) were crafted to provide assurance that the applicant would enumerate lamprey in all areas associated with the project’s counting facility. If this action is not possible, the applicant would implement additional actions to direct all upstream migrating lamprey through the project’s traditional counting station (LGL and Douglas PUD 2008).

Response: The Commission’s Policy Statement on Hydropower Licensing Settlements states that adaptive management provisions would be problematic when there are no limits set forth in the license, because the Commission would not have had a prior opportunity to evaluate the environmental effects and benefits and costs of the measures. In this case, the Aquatic Settlement did not identify specific measures or describe a range of measures that might be implemented in the future to improve lamprey counts. Consequently, staff does not have enough information to evaluate the benefits or costs of potential project modifications or the environmental effects of such modifications on lamprey or other species, including ESA-listed salmon, steelhead, and bull trout. Without this information, staff has no basis for recommending inclusion of the measure in the staff alternative.

Comment 24: Interior (page 7) states that the decision to not recommend preliminary fishway prescription 5.2 appears to be an oversight. It states that this measure is recommended for adoption pursuant to section 10(j) of the FPA, in section 5.4 of the draft EIS.

Response: We only recommend the provisions for operating the existing upstream fishways at Wells dam in accordance with the operation criteria outlined in the Wells HCP. We have updated section 5 of the EIS to explain the basis for this decision.

Comment 25: Interior (page 6) states that scientific knowledge regarding passage standards for the mid-Columbia hydroelectric projects and other Columbia River projects is improving, and the intent is to achieve steady progress toward improving upstream passage of Pacific lamprey at these hydroelectric projects (FWS, 2010; CRITFC, 2008). FWS’ 10(j) recommendation to conduct an upstream passage improvement literature review would contribute to this goal.

Interior also states (page 4) that its section 10(j) recommendation for conducting a literature review would obligate Douglas PUD to investigate and resolve any future passage impediment to juvenile lamprey in a proactive manner.

Response: It is not Douglas PUD’s responsibility to track fish passage improvements at non-project facilities throughout the Columbia and Snake River Basins. If FWS informs Douglas PUD of technological improvements implemented at other hydroelectric projects that would benefit Pacific lamprey passage at the Wells Project, Douglas PUD could file an application to amend the license to incorporate the measures into the project. If FWS and Douglas PUD are not in agreement on the need for such measures, FWS could use the Commission’s standard fish and wildlife reopener to request that the Commission modify the license to require the measures. Either of these actions would allow the Commission to evaluate the measures and their corresponding effects on other aquatic resources, including ESA-listed salmon, steelhead, and bull trout, and determine if the measures would be in the public interest.

Comment 26: Interior (page 7) comments that the absence of information regarding juvenile lamprey passage survival at hydroelectric projects indicates the need to address this issue under the new license. The section 18 prescription requiring a study to assess downstream passage of juvenile lamprey at the project would assist in the resolution of any future passage impediments to juvenile lamprey.

Response: The Commission requires licensees to address project effects that are identifiable using current technologies. This element of Interior's section 18 prescription stipulates a future juvenile lamprey passage evaluation using methods that are not currently available. We continue to find, therefore, that we lack substantial evidence to require a future juvenile lamprey evaluation that will rely on a technology that does not currently exist.

Aquatic Resources

Comment 27: Douglas PUD (page 7) recommends that the Commission include the Resident Fish Management Plan in the staff alternative; it disagrees (page 18) with the Commission's recommendation to eliminate the Resident Fish Management Plan.

Response: As we've said in section 3.3.1.2 of the EIS, we are already recommending a comprehensive set of enhancement measures at the project that would be sufficient to protect and enhance resident fish species in the project area; therefore, implementation of a separate management plan for resident fish would not be necessary.

Comment 28: Douglas PUD (page 7) requests that the Commission change the characterization of "as-yet unspecified measures or studies" to "the Aquatic Settlement parties, through the use of clearly defined adaptive management policies and practices, will identify and implement various studies and measures to address project-related impacts. If there is a dispute over whether a measure has a nexus to the project, then FERC shall be consulted to make a final determination. Further, the licensee shall continue to seek FERC approval for any measure that has the potential to substantially alter either project structures or operations."

Douglas PUD (page 21) also requests that Commission staff revise Article 401 to state that if necessary and following approval from the Aquatic SWG, any lamprey plans that require a substantial alteration or addition to the fishways at Wells dam will be subject to the Commission's approval prior to implementation.

Response: The Commission's Policy Statement on Hydropower Licensing Settlements states that adaptive management provisions would be problematic when there are no limits set forth in the license because the Commission would not have had a prior opportunity to evaluate the environmental effects and benefits and costs of the measures. In this instance, we do not recommend the adaptive management provisions of the Aquatic Settlement where no specific measures or a range of potential measures were proposed. Moreover, all revisions to a license (regardless of whether they are substantial)

are, by definition, amendments. We continue to recommend, therefore, that Douglas PUD notify the Commission prior to making any changes to approved project operations or facilities and file an application to amend the license.

Comment 29: The Colville Tribes (page 2) comment that the cumulative effects from TDG will result in fewer fish being available for their reserved fishing rights and cultural and subsistence needs.

Response: As described in the EIS, the cumulative contribution of the Wells Project to the incidence of high TDG levels is limited by the low frequency of forced spills at the dam and the relatively small spill volumes that are required to provide effective downstream passage of migrating juvenile salmonids. In addition, the juvenile bypass system at Wells dam requires lower spill volumes than have been required at other dams on the mid- and lower-Columbia River to provide safe passage for downstream migrating fish. Therefore, as a result, the project's contribution to cumulative effects on TDG levels is relatively minor in comparison to other dams on the mid- and lower Columbia River. We recommend implementation of a Water Quality Management Plan and GAP, as described in section 5.2 to minimize the production of TDG during periods of spill.

Comment 30: Douglas PUD (pages 7–8, 11–12, 18, and 22) disagrees with staff's recommendation to notify the Commission of any occurrences of non-compliance with water quality criteria and obtain prior Commission approval if measures are proposed to address non-compliance with water quality criteria. It states that it should notify the Commission annually to address non-compliance that would substantially alter project structures or operations.

Response: As previously discussed, all permanent modifications to approved project facilities and operations are, by definition, license amendments. However, we acknowledge that some temporary modifications to approved project operations or facilities may be necessary to address water quality criteria deviations resulting from emergency situations or circumstances outside of the control of the project (e.g., high flow or flood flow conditions). We have revised section 5 of the EIS to clarify our recommendations for water quality monitoring and reporting. We now recommend that Douglas PUD notify the Commission within 48 hours of any temporary modifications to approved project operations or facilities that are necessary to protect aquatic resources, and file a summary of water quality monitoring results and any deviations from water quality criteria on an annual basis. The Commission would have an opportunity at that time to review any deviations from water quality standards and determine compliance with applicable water quality criteria, including compliance with any TDG criteria exceptions approved in the GAP.

Comment 31: Douglas PUD (page 14) states that there are no known adverse effects associated with slowing the rate at which water temperatures are reduced in the fall within the backwatered reaches of the Methow and Okanogan rivers.

Response: While there are no specific studies addressing this issue in Wells reservoir, information presented in Bjornn and Reiser (1991), Berman and Quinn (1991), NRC (1996), Spence et al. (1996), McCullough (1999), Mann and Peery (2005), and others clearly indicates that the alteration of water temperature patterns can affect the spawning success of locally adapted/native anadromous salmonids by causing a delay in the timing of river entry and spawning. This delay can result in reduced spawning success, increased predation, egg loss, and pre-spawning mortality for salmonids. Hydrologically, the slower rate of cooling in the backwater reaches is caused by the much larger volume of water associated with the impoundment and Columbia River compared to flows in the Methow and Okanogan rivers during the fall.

Comment 32: Douglas PUD (page 14) comments that footnote 25 is incorrect and should indicate that the Wells HCP and aquatic resource management plans in the Aquatic Settlement are adequate for the purposes of the section 401 Water Quality Attainment Plan (WQAP).

Response: We have revised the footnote to reflect that the Wells HCP and Aquatic Resource Management Plans are expected to be adequate for the purposes of the section 401 WQAP.

Comment 33: Washington DOE (page 1) comments that the EIS should be revised to accurately reflect its water quality standards and other items, including changing a classification, revising footnotes to table 8, and addition of information from Politano et al. (2009b).

Response: We have revised table 8. Information from the Politano et al. (2009b) study was provided on page 89 of the draft EIS. We revised section 3.3.1.2 to provide additional information on the effects of different spill patterns on the generation of TDG.

Comment 34: Washington DOE (page 2) comments that effects on water quality should be addressed in the discussion of fish facilities. Washington DOE states that the analysis should include the ability to obtain a National Pollutant Discharge Elimination System permit, plus meeting the requirements of a total maximum daily load (TMDL), as applicable.

Response: The best available information in the project record suggests that operations of the licensed Wells Hatchery does not adversely affect water quality of the Columbia River. We encourage our licensees to obtain all permits and approvals that are necessary to operate licensed project facilities; therefore, we expect that Douglas PUD would obtain any National Pollutant Discharge Elimination System permit that is necessary to comply with state water quality standards. We note that all licensed project facilities are required to meet any applicable TMDL.

Comment 35: The Colville Tribes (page 1, May 31, 2001, filing) comment that their fishery is significantly affected by the Wells Project and these effects will persist with continued operation. They request that the Commission consider “in place, in kind” mitigation to compensate them for effects on their fishery caused by the project. The Colville Tribes state that they rely on salmon and steelhead to meet their cultural and subsistence needs. They (page 2, May 31, 2001, filing) note that hatchery mitigation, as presented in the Wells HCP, will occur outside of their fishing areas and will not benefit the Colville Tribes. They (page 2, May 31, 2001, filing) state that relocating an equitable share of the inundation mitigation production of summer/fall Chinook to the acclimation pond that they will be developing on newly acquired property would serve to provide “in place, in kind” hatchery production and would benefit the Colville Tribes’ fishery. The Colville Tribes (page 1, July 7, 2011, filing) clarifies that they intend to continue working with Douglas PUD and the HCP Hatchery Committee to address their concerns about hatchery issues and mitigation for effects on fisheries.

Response: The FPA does not require that every past or future project effect be mitigated. Rather, it requires that in addition to power and developmental purposes for which licenses are issued, the Commission give equal consideration to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Accordingly, we conclude that staff’s recommended environmental measures, together with continued implementation of the Wells HCP, would provide an adequate level of protection and enhancement for fisheries resources of the project area as a whole, including those that are important to the Colville Tribes for cultural and subsistence needs, and contribute to the recovery of upper Columbia River salmon and steelhead populations.

Comment 36: Douglas PUD (page 14) comments that the description of the HCP phase designations is slightly different than that adopted by the HCP Coordinating Committee.

Response: We have revised section 3.3.1.2 accordingly.

Comment 37: Douglas PUD (page 14) comments that based upon survival verification studies conducted in 2010, the no net impact production levels for yearling spring migrating Chinook, coho, and steelhead have been revised. Juvenile project survival estimated during this study was 96.4 percent. The new 4-year average rate of hatchery production has subsequently been revised from historically requiring 3.8 percent mitigation to the requirement for only 3.7 percent hatchery mitigation. The number of no net impact hatchery fish has subsequently been changed to 59,395 yearling spring Chinook, 47,572 steelhead, and 105,712 yearling summer/fall Chinook.

Response: We have added a table (table 18) to section 3.3.1.2 to describe the revised hatchery mitigation requirements provided in the November 16, 2010, Draft Statement of Agreement by the Wells HCP Coordinating Committee provided in the 2010 Wells HCP

annual report. These numbers differ slightly from those provided by Douglas PUD in its comments, and the numbers stated by Douglas PUD are included as a footnote.

Comment 38: Douglas PUD (page 15) requests modification of the EIS to indicate that NMFS will require ESA consultation for ESA-listed steelhead and spring Chinook.

Response: We have updated the ESA consultation information in the final EIS to reflect information filed in the project record since issuance of the draft EIS.

Comment 39: Interior (page 9) comments that the discussion about the distribution and observation of Pacific lamprey should include the results of Douglas PUD's study of Pacific lamprey movements through the project area (LGL and Douglas PUD, 2008). This study provides a good analysis of radio-tagged Pacific lamprey that passed both upstream and downstream through the project and is referred to elsewhere in the draft EIS.

Response: We have updated section 3.3.1.1 to provide additional information about lamprey movements through the project area.

Comment 40: Douglas PUD (pages 8, 12, 18, and 21) comments that the draft EIS mistakenly refers to a *Pacific Management Plan* and that the Commission's proposed requirement to implement all five of these fishway improvement measures is premature.

Response: We have corrected the name of the *Pacific Lamprey Management Plan* in the EIS. We also clarified the intent of the Aquatic Settlement parties to implement the five fishway improvements measures only at such time as they are proposed, after consultation with the Aquatic SWG.

Comment 41: Douglas PUD (page 13) comments that the Pacific lamprey is not on the ESA candidate species list.

Response: We have updated information about the federal status of the Pacific lamprey in section 3.3.1.1.

Comment 42: Douglas PUD (page 7), Interior (pages 3–4), and Washington DFW (pages 4–5, May 31, 2011, filing) comment that they disagree with exclusion of collection and funding of genetic analysis of bull trout tissue samples from the staff alternative. Interior further states that its 10(j) recommendation for a bull trout genetic sampling and analysis program should be included in the staff alternative because the program would provide the information necessary to identify and mitigate project impacts to bull trout.

Response: We have sufficient information in the project record to determine that licensed project facilities do not adversely affect bull trout in the project area. As discussed in section 3.3.1.1, 8 years of monitoring have not identified any project-related

adverse effects on bull trout. While genetic studies may provide the resource agencies with additional information on bull trout migration patterns in the Columbia River Basin, the genetic studies would not specifically enhance bull trout occurring in the project area nor would they provide data that could be used to inform environmental enhancements for bull trout at licensed project facilities. We continue to find, therefore, that the cost of the studies is not justified due to the lack of project-related benefits to bull trout.

Comment 43: Douglas PUD (page 9) comments that although the draft EIS states, “improving passage for bull trout” is a primary issue for relicensing the project, there is not a bull trout passage issue at the project. Douglas PUD recommends changing the wording from *improving* to *passage for bull trout*.

Response: We have revised the Executive Summary accordingly.

Comment 44: Douglas PUD (page 8) requests clarification about why education and outreach programs in the White Sturgeon Management Plan were not included as part of the staff alternative.

Response: The Commission’s Policy Statement on Hydropower Licensing Settlements states that license conditions must be enforceable, and those conditions that do not clearly outline the licensee’s responsibilities and establish the parameters governing required actions may be difficult or impossible to enforce. In this instance, the proposed education and outreach program does not contain sufficient specificity on the individual program components to enable the Commission to administer compliance with the program. For example, the proposed measure lacks an implementation schedule, the location where the outreach activities would occur, and the types of activities that would be necessary to implement the program. For these reasons, we find that we have insufficient justification for recommending the education and outreach program in any license issued for the project.

Comment 45: Douglas PUD (page 13) comments that the life history of the white sturgeon is incorrectly characterized in the draft EIS.

Response: We have revised section 3.3.1.1 accordingly.

Comment 46: Interior (page 8) states that the geographic scope of the document’s cumulative effects analysis is restrictive and prevents the consideration of the aquatic resources that could be cumulatively affected by the proposed project, particularly salmonids throughout the remainder of the mid-Columbia River downstream from coordinated operation with other hydroelectric projects from the tailrace of Chief Joseph dam downstream to the beginning of the McNary reservoir.

Interior further recommends that the cumulative effects analysis should also consider the results of the study by Anglin et al. (2006) regarding the cumulative effects of mid-

Columbia River hydro system operations under the Hourly Coordination Agreement on spawning and rearing salmonids.

Response: We have revised the geographic scope (section 3.2.1) and cumulative effects analysis for anadromous salmonids (section 3.3.1.3).

Comment 47: Washington DFW (page 5, May 31, 2011, filing) states that it is concerned about the effects of reducing the Pacific lamprey's home range on lamprey population levels. It states that the following statement should be deleted, "Additionally, we have no information to indicate that adult Pacific lamprey failing to pass the project cannot successfully reproduce in areas downstream of the project."

Response: We have revised section 3.3.1.2 of the EIS to delete the referenced sentence and have included a more detailed analysis of potential project effects on Pacific lamprey.

Terrestrial Resources

Comment 48: Douglas PUD (page 15) states that beavers within the Wells Project, including the lower 15.5 miles of the Okanogan River, do not build dams or "levees" and that it doesn't know the source of this information.

Response: Information about beaver construction of "levees" along the Okanogan River is from page 64 of the Wildlife Resources Final Study Report titled *Avian, Amphibian, Reptile, and Small Mammal Surveys* prepared for Douglas PUD by EDAW in May 2006. We have revised the sentence in section 3.3.2.2 accordingly.

Cultural Resources

Comment 49: The Colville Tribes (page 2) comment that the project affects their traditional cultural practices and request funding to preserve and enhance its cultural activities.

Response: We have revised our analysis in section 3.3.4.2 to address this comment.

Comment 50: Douglas PUD (pages 9, 12–13, and 15–16) states there is no justification for requiring that Douglas PUD cease land-disturbing activities and consult with the appropriate federal agencies if paleontological resources are identified on federal lands, and it disagrees that the Historic Properties Management Plan should be revised to reflect this requirement. Douglas PUD requests that this requirement be removed from the EIS and not be included in the project license.

Response: We have re-evaluated this measure and have revised section 3.3.4.2 accordingly.

Recreation and Land Use

Comment 51: Washington DOE (page 2) comments that it regulates the uses of the state's shorelines and that it should be consulted in the development or updating of the Shoreline Management Plan, Land Use Policy, any recreation plans, and Wildlife Habitat Monitoring and Information and Education Plan.

Response: We have revised draft Article 413, *Recreation Management Plan*, and draft Article 414, *Douglas PUD Land Use Policy*, in appendix B to include Washington DOE as a consulting party. Nevertheless, Washington DOE is also included as a consulting party in draft Article 410, *Wildlife and Botanical Management Plan*.

Socioeconomics

Comment 52: Pat Kelleher comments that the draft EIS fails to adequately analyze and mitigate residential electrical market distortion. He states that Kittitas PUD and Douglas PUD should enter a settlement agreement to address this distortion to ensure that the Wells Project provides project power at cost for Kittitas PUD tier two residential growth above its 2010 high water mark.

Response: The fact that power from the project may result in lower electric rates for Douglas County as compared to other surrounding counties does not mean the project has a negative socioeconomic impact on those counties that must somehow be mitigated.

Development Analysis

Comment 53: Douglas PUD (pages 2–3, and 21) comments that although the Commission should include all future costs associated with the Wells HCP, those costs should not be included as part of the no-action alternative but rather as part of Douglas PUD's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Response: The measures and costs for those measures under the Wells HCP have already been approved and are included in the current license for the project. Therefore, they are considered to be part of the project's baseline costs, which are included as part of the no-action alternative. The no-action alternative assumes the project would continue as currently licensed.

Comment 54: Douglas PUD (pages 16–17) states that it is inappropriate to include the HCP costs in the no-action alternative because Douglas PUD would be expected to obtain about \$20 million per year to repair and replace structural assets without a guarantee of a new license for the project.

Response: The no-action alternative assumes the project would continue as currently licensed but without the additional measures proposed to be included in a new license. Therefore, the no-action alternative is appropriate as presented in the EIS.

Comment 55: Douglas PUD (page 20) comments that the cost of transmitting TDG data is not negligible and could be as high as \$15,000 per year for collecting, transmitting, and posting data.

Response: We agree that the cost of collecting, transmitting, and posting TDG data could be as high as \$15,000/year. However, the cost of recommendation no. 5 listed in table 33 is for transmitting of data only (which we believe is negligible), and does not include collection or posting of TDG data.

Comment 56: Interior (page 9) comments that because any subsequent license to be issued for the project is likely to be for 30 to 50 years, the analysis in section 4.3, *Cost of Environmental Measures*, should also consider 40- and 50-year time intervals to provide a more accurate depiction of costs. Interior also comments that it found discrepancies between the applicant's cost analysis contained in the final license application and the Commission's draft EIS and suggests that the Commission explain any discrepancies.

Response: Consistent with the Mead Decision of July 13, 1995 (see Mead Corporation, Publishing Paper Division, 72 FERC ¶ 61,027 (July 13, 1995)), the Commission analyzes a 30-year period of analysis for all economic analyses of hydropower projects, regardless of the potential length of the license term.

In its license application, the applicant provided capital and operating costs associated with each proposed measure but did not indicate in which year(s) each capital cost would be incurred. To develop our independent estimate of annualized costs, we used our best judgment to allocate these capital costs to the years in which each measure would be implemented. This may result in some differences in levelized 30-year costs for line items with capital costs. Overall, we do not consider any of these differences to be significant and those differences do not factor into decisions regarding adoption of individual proposed measures.

Conclusions and Recommendations

Comment 57: Douglas PUD (page 19) states that the description of the NMFS recommendation regarding license term is not accurate and recommends that the Commission request consultation with NMFS for a range of 30 to 50 years of incidental take associated with the continued operation of the project.

Response: We see no need to modify our characterization of NMFS' section 10(j) recommendation regarding the license term. Our characterization is taken verbatim from NMFS' filing and NMFS did not comment that we mischaracterized its recommendation. Moreover, we see no need to go into a lengthy discussion in the EIS of the potential ramifications of the license term. The Commission will make its determination on the license term in any license order issued, based on the facts in the project record.

Comment 58: Douglas PUD (page 20) states that the description of the proposed bull trout stranding assessments is not accurately characterized; the measures are to conduct stranding surveys when uncommon conditions occur where the reservoir is operated below 773 feet mean sea level.

Response: We have corrected the schedule regarding stranding assessments in section 5.4.

Comment 59: Douglas PUD (page 21) states that the implementation of Douglas PUD's Land Use Policy does have an annualized cost that is not included in the Wells HCP.

Response: We have added a new footnote to table 33 (item 37) to reflect that the cost of implementing the Douglas PUD Land Use Policy is included in the no-action alternative with no reference to the HCP.

Comment 60: Interior (page 10) recommends that the Commission include item 50 of table 33, which includes a measure to use the Wells Aquatic Work Group and the Terrestrial Work Group as the primary forums to ensure consistency and timely coordination with the committees established by the Wells HCP to ensure Douglas PUD continues this coordination for the duration of the new license.

Response: While we have no objection to the licensee and other entities establishing work group and forums, the Commission only has jurisdiction over its licensees and cannot enforce provisions against parties other than the licensee. We recommend, instead, including identification of the entities to be consulted in any license articles to be issued for the license order.

Comment 61: Interior (page 10) comments that several comprehensive plans were omitted from section 5.5, *Consistency with Comprehensive Plans*, including FWS' *Pacific Lamprey Draft Assessment and Template for Conservation Measures* (FWS, 2010), the Columbia River Intertribal Fish Commission's *Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin* (CRITFC, 2008), and the applicant's *Aquatic Settlement*.

Response: The Commission's current List of Comprehensive Plans (dated June 2011 and available at <http://www.ferc.gov/industries/hydropower/gen-info/licensing/complan.pdf>) does not include the three plans identified in Interior's comment, and we are not aware that they have been submitted to the Commission for evaluation pursuant to section 10(a)(1) of the FPA. Staff has reviewed these plans and find that the recommendations in the EIS are consistent with the objectives of these plans.

License Articles

Comment 62: Douglas PUD (pages 22–23) proposes to use the annual report of activities implemented under the Aquatic Settlement as a means of covering and consolidating the staff’s proposed separate reporting requirements for implementation of the water quality, Pacific lamprey, bull trout, white sturgeon and aquatic nuisance species management plans. Douglas PUD requests revision to the proposed license articles to eliminate the need to develop individual reports for each of the aquatic resource management plans.

Response: We agree that one comprehensive report describing all of the non-Wells HCP aquatic resource activities would be a reasonable approach to efficiently describe the measures implemented pursuant to the Aquatic Settlement and still provide a means for the Commission to administer compliance with the plan requirements. Accordingly, we now recommend that the reporting requirements for all of the aquatic resource management plans be consolidated into one license article.

Comment 63: Douglas PUD (page 23) requests 1 year, rather than 6 months, to complete and file the map depicting the exact location where the proposed non-motorized campsite would be constructed.

Response: We have revised draft Article 413, *Recreation Management Plan*, in appendix B of the EIS to provide additional time for completing and filing the map.

Comment 64: Douglas PUD (page 24) comments that the list of agencies to be consulted in the Land Use Policy draft license article is too specific. Douglas PUD suggests changing the consultation requirement to “...in consultation with the Recreation, Aquatic, Terrestrial, and Cultural Resource Work Group (RWGs) and Habitat Conservation Coordinating Committee, and other state and federal agencies, tribes and non-government organizations as appropriate” to allow flexibility for the long term of a new license, accounting for name changes and closures in the state and local agencies.

Response: We have no objection to Douglas PUD consulting with the Recreation, Aquatic, Terrestrial, and Cultural RWGs and the Habitat Conservation Coordinating Committee on its own, however, specifically listing out the agencies required to be consulted in the license article ensures clear and precise direction for the licensee.

APPENDIX B

Commission Staff-Recommended License Conditions

This page intentionally left blank.

LICENSE CONDITIONS RECOMMENDED BY STAFF

On October 6, 2010, the U.S. Department of the Interior (Interior) filed preliminary section 18 fishway prescriptions containing 28 conditions. On October 8, 2010, the U.S. Department of Commerce, National Marine Fisheries Service (NMFS) filed one preliminary section 18 fishway prescription. On July 21, and August 1, 2011, respectively, NMFS and Interior filed final fishway prescriptions.

I. MANDATORY CONDITIONS RECOMMENDED BY COMMISSION STAFF

We recommend including the following mandatory conditions in any license issued for the project: NMFS fishway prescription no. 1; Interior fishway prescription nos. 1.0, 2.0, 2.1, 2.2, 2.3, 3.0, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 5.3.

II. MANDATORY CONDITIONS NOT RECOMMENDED BY COMMISSION STAFF

We do not recommend including the following mandatory condition in any license issued for the project: Interior fishway prescriptions nos. 5.0, 5.1, 5.1.1, 5.5, 5.6.1, 5.8, 6.0. We also do not recommend including parts of the following Interior fishway prescriptions (see section 2.4 of the EIS): 4.6, 4.7, 4.8, 5.2, 5.4, 5.6, 5.6.2, 5.7. Although we do not recommend all or part of the mandatory conditions identified above, we recognize that any valid mandatory conditions must be included in any license issued for the project.

III. MODIFICATIONS TO MANDATORY CONDITIONS RECOMMENDED BY COMMISSION STAFF

We recommend certain modifications to the following remaining mandatory conditions issued by Interior.

Interior fishway prescription no. 5.6.2: We recommend that the plan and schedule required to address each of the following measures also be filed with the Commission for approval, prior to implementation: Entrance Efficiency, Diffuser Gratings, Transition Zones, Ladder Traps/Exit Pools.

IV. ADDITIONAL LICENSE ARTICLES RECOMMENDED BY COMMISSION STAFF

We recommend including the following license articles in any license issued for the project:

Article 401. *Commission Approval and Filing of Amendments.*

(a) Requirement to File Plans for Commission Approval

Several conditions of this license found in the U.S. Department of the Interior’s section 18 fishway prescriptions require the licensee to prepare and implement plans without prior the Federal Energy Regulatory Commission’s (Commission’s) approval. The following table indicates the additional entities with which the licensee shall consult with before preparing the plans along with the deadline for filing the plans with the Commission for approval.

U.S. Department of the Interior Section 18 Condition	Plan Name or Measure	Consulting Agencies	Due Date
5.6.2	Lamprey entrance efficiency plan	National Marine Fisheries Service	Within 1 year of license issuance
5.6.2	Plan and schedule for fish ladder diffuser gratings	National Marine Fisheries Service	Within 5 years of license issuance
5.6.2	Plan and schedule for fish ladder transition zones	National Marine Fisheries Service	Within 5 years of license issuance
5.6.2	Plan and schedule for fish ladder traps and exit pools	National Marine Fisheries Service	Within 5 years of license issuance

The Commission reserves the right to make changes to any plan submitted. Upon Commission approval, the plan becomes a requirement of the license, and the licensee shall implement the plan or changes in project operations or facilities, including any changes required by the Commission.

(b) Requirement to File Amendment Applications

Certain conditions in the U.S. Department of the Interior’s section 18 fishway prescriptions contemplate unspecified long-term changes to project operations, requirements, or facilities for the purpose of protecting and enhancing environmental resources. The licensee may not implement these changes without prior Commission authorization granted after the filing of an application to amend the license (18 CFR 4.200). These conditions are listed below.

Department of the Interior Section 18 Condition	Description
4.6, 4.7	Future potential measures to improve bull trout passage until compliance with the bull trout passage performance standard is achieved
4.8	Future potential measures to modify upstream fishways, downstream bypass, or operations to reduce identified impacts to bull trout passage
5.5	Alternative passage routes as a counting facility for adult Pacific lamprey.
5.6.2	Additional operational measures associated with the operations study plan
5.7, 5.8	Additional measures to improve upstream Pacific lamprey passage until lamprey passage standard is achieved
6.0	Future potential measures for downstream juvenile lamprey passage

Article 402. Water Quality Management Plan. Sections 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 4.2.3, 4.3, 4.4.1, 4.4.2, 4.4.3, 4.5.2, 4.6, and 4.6.1 of the Water Quality Management Plan, filed as Attachment G of the Aquatic Settlement Agreement on May 27, 2010, are approved and made part of the license with the following modifications:

- (a) Section 4.1.1 is modified to include a stipulation that the licensee shall annually file with the Commission, by May 31 of each year following license issuance, the annual report of all spill (and predicted total dissolved gas [TDG] levels in the tailrace) occurring outside the fish passage season;
- (b) Section 4.1.2 is modified to include a provision that the licensee shall annually file the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) Project Fish Bypass/Spill Operations Plan, with the Commission for approval prior to implementation;

- (c) Section 4.1.2 is modified to delete the stipulation that the licensee shall obtain Aquatic Settlement Work Group approval of the operations identified in the annual Wells HCP Project Fish Bypass/Spill Operations Plan;
- (d) Section 4.1.3 is modified to include a provision for the licensee to annually file, by May 31 of each year following license issuance, the TDG report;
- (e) Section 4.1.3 is modified to include a requirement for the licensee to annually file the Gas Abatement Plan, with the Commission, for approval prior to implementation;
- (f) Section 4.1.4 is modified to include a provision that the Commission shall be notified of any occurrences of non-compliance with TDG criteria in the Aquatic Settlement Annual Report required by Article 407, and any future proposed long-term changes to approved project operations or facilities to address TDG non-compliance shall only be implemented upon obtaining prior Commission approval after the filing of an application to amend the license;
- (g) Section 4.2.3 is modified to include a requirement that any future proposed long-term changes to project operations or facilities to address temperature non-compliance shall only be implemented upon obtaining prior Commission approval after the filing of an application to amend the license;
- (h) Section 4.3 is modified to include a provision that the Commission shall be notified within 48 hours of any temporary changes in project operations or facilities implemented to protect water quality and aquatic resources in emergency situations, and any future proposed long-term changes to project operations or facilities to address non-compliance shall only be implemented after obtaining prior Commission approval after the filing of an application to amend the license;
- (i) Section 4.6.1 is modified to include a provision that the study plans including the Quality Assurance Project Plans (QAPP) and any subsequent changes to the QAPPs, shall be filed with the Commission for approval, prior to implementation;
- (j) Section 4.2.2 is modified to delete the provision that reads: “Where the measures identified in the total maximum daily load (TMDL) are more protective than other measures in this plan, provisions of the temperature TMDL and implementation plans relevant to the Project and its operations, including specified time frames for implementing improvement measures, shall be implemented at the Project.”

Article 403. *Bull Trout Interpretive Display.* Within 3 years of license issuance, the licensee shall construct an information and educational display at the Wells Dam Visitor Center that provides information about the project and project-specific measures for promoting the conservation and recovery of bull trout in project waters.

The licensee shall consult with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, U.S. Bureau of Indian Affairs, and U.S. Bureau of Land Management prior to constructing the interpretive display. Proof of consultation and completion of the interpretive display shall be documented in the annual report required by Article 407.

Article 404. *Bull Trout Evaluations.* Within 1 year of license issuance, the licensee shall file, for Commission approval, a detailed study plan to conduct the following evaluations:

- (a) a total of five bull trout stranding assessments in Wells reservoir during the first 5 years following license issuance, and one bull trout stranding assessment every fifth year thereafter. The plan shall provide for the studies to be conducted when Wells reservoir elevation is lower than 773 feet above mean sea level.
- (b) a monitoring program to assess incidental take of bull trout during operation of the project's Wells Hatchery and during implementation of other aquatic resource measures (e.g., White Sturgeon Management Plan, Water Quality Management Plan, and Aquatic Nuisance Species Management Plan).

The licensee shall include with the plan, documentation of consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, U.S. Bureau of Indian Affairs, and U.S. Bureau of Land Management, copies of comments and recommendations on the completed plan after it has been prepared and provided to the consulted entities, and specific descriptions of how the consulted entities' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the consulted entities to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the plan is approved by the Commission. Upon

Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 405. White Sturgeon Management Plan. Sections 4.1.1, 4.1.2, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.3, 4.3.1, 4.3.3, 4.6, and 4.7 of the White Sturgeon Management Plan, filed as Attachment B of the Aquatic Settlement Agreement on May 27, 2010, are approved and made part of the license with the following modifications:

- (a) Section 4.1.1 is modified to include a provision that the Broodstock Collection and Breeding Plan shall be filed with the Commission for approval, prior to implementation;
- (b) Section 4.1.1 is modified to delete the provision that reads: “Development of a mid-Columbia hatchery facility funded by the three PUDs (Douglas, Chelan, and Grant) to accommodate various phases of white sturgeon supplementation; broodstock, egg incubation, and juvenile rearing.”
- (c) Section 4.1.2 is modified to delete the stipulation that reads: “If juvenile sturgeon stocking deadlines cannot be achieved, the National Marine Fisheries Service (NMFS), Fish and Wildlife Service (FWS), Washington Department of Fish and Wildlife (Washington DFW), Washington Department of Ecology (Washington DOE), Confederated Tribes of the Colville Reservation (Colville Tribes), Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), U.S. Bureau of Indian Affairs (BIA), and U.S. Bureau of Land Management (BLM) will determine alternative implementation measures that will be undertaken by Douglas (see table 4.7-1, footnote 2)”;
- (d) Section 4.2 is modified to delete the provision that reads: “Douglas shall also obtain updated information, when available, on other white sturgeon recovery programs (e.g., upper Columbia River, Kootenai River, mid-Columbia PUDs), in order to improve the monitoring and evaluation program and refine its implementation. The results of this information will also inform supplementation, monitoring and evaluation activities during implementation of Phase II of the WSMP.”
- (e) Section 4.6 is modified to include the following additional requirements: “The licensee shall annually file, by May 31 of each year following license issuance, a report that documents the results of the prior year’s studies and measures and the upcoming year’s proposed studies and measures implemented pursuant to the plan. The licensee shall include with the report, documentation of consultation with NMFS, FWS, Washington DFW, Washington DOE, the Colville Tribes, the Yakama Nation, BIA, and BLM, copies of comments and recommendations on the completed report after it has

been prepared and provided to the consulted entities, and specific descriptions of how the consulted entities' comments are accommodated by the report. The licensee shall allow a minimum of 30 days for the consulted entities to comment and to make recommendations before filing the report with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons based on project-specific information. The Commission reserves the right to require changes to project operations or facilities based on all available information and information included in the annual reports."

- (f) Table 4.7-1 is modified to delete the column that reads: "adult passage evaluation," and footnote "7".

Article 406. Aquatic Nuisance Species Management Plan. Sections 4.1, 4.2.1, 4.2.2, 4.2.3, and 4.4 of the Aquatic Nuisance Species Management Plan (ANS Management Plan), filed as Attachment F of the Aquatic Settlement Agreement on May 27, 2010, are approved and made part of the license. Within 6 months of license issuance, the licensee shall file an updated ANS Management Plan. The updated ANS Management Plan shall include the following:

- (a) Section 4.1 shall be modified to describe the specific best management practices that would be implemented;
- (b) Section 4.2.1 shall be modified to describe the specific reasonable and appropriate measures that would be implemented to be consistent with aquatic nuisance species management protocols; and
- (c) Section 4.2.1 shall be modified to delete the provision that reads: "Douglas shall participate in information exchanges and regional efforts to coordinate monitoring activities."

Article 407. Aquatic Settlement Annual Report. The licensee shall annually file, by May 31 of each year following license issuance, a report that documents the results of the prior year's studies and measures and the upcoming year's proposed studies and measures implemented pursuant to the following license requirements: Article 402, *Water Quality Management Plan*; Article 403, *White Sturgeon Management Plan*; Article 404, *Aquatic Nuisance Species Management Plan*; Article 405, *Bull Trout Interpretive Display*; Article 406, *Bull Trout Evaluations*; and appendix X, (Interior section 18 prescriptions) conditions 4.0-4.8, 5.0-5.8, 6.0). The licensee shall include with the report, documentation of consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, U.S. Bureau of Indian Affairs, and U.S. Bureau of Land

Management, copies of comments and recommendations on the completed report after it has been prepared and provided to the consulted entities, and specific descriptions of how the consulted entities' comments are accommodated by the report. The licensee shall allow a minimum of 30 days for the consulted entities to comment and to make recommendations before filing the report with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons based on project-specific information. The Commission reserves the right to require changes to project operations or facilities based on all available information and information included in the annual reports.

Article 408. *Reservation of Authority to Prescribe Fishways.* Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretaries of Commerce or of the Interior pursuant to section 18 of the Federal Power Act.

Article 409. *Columbia River Basin Fish and Wildlife Program.* The Commission reserves the authority to order, upon its own motion or upon the recommendation of federal and state fish and wildlife agencies, affected Indian Tribes, or the Northwest Power and Conservation Council, alterations of project structures and operations to take into account to the fullest extent practicable the regional fish and wildlife program developed and amended pursuant to the Pacific Northwest Electric Power Planning and Conservation Act.

Article 410. *Wildlife and Botanical Management Plan.* The licensee shall implement the Wildlife and Botanical Management Plan filed on May 27, 2010, as appendix E-3 of exhibit E of the final license application, with the following additions to section 4.7, *Consultation*:

The licensee shall annually file, by May 31 of each year following license issuance, a report that documents the results of the prior year's measures and the upcoming year's proposed measures implemented pursuant to the plan. The licensee shall include with the report an updated list of sensitive species, based upon an annual review of the Washington Natural Heritage Program rare plant list. The licensee shall also include with the report, documentation of consultation with the U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, the U.S. Bureau of Land Management, and Washington Department of Ecology, copies of comments and recommendations on the completed report after it has been prepared and provided to the consulted entities, and specific descriptions of how the consulted entities' comments are accommodated by the report. The licensee shall allow a minimum of 30 days for the consulted entities to comment and to make recommendations before filing the report with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons based on project-specific information. The Commission reserves the right to require changes to

project operations or facilities based on all available information and information included in the annual reports.

Article 411. Avian Protection Plan. The licensee shall implement the Avian Protection Plan filed on May 27, 2010, as appendix E-6 of exhibit E of the final license application. The Commission reserves the authority to require changes to the Avian Protection Plan at any time during the term of the license.

Article 412. Programmatic Agreement and Historic Properties Management Plan. The licensee shall implement the “Programmatic Agreement Among the Federal Energy Regulatory Commission, the Washington State Historic Preservation Officer, and the Confederated Tribes of the Colville Reservation Tribal Historic Preservation Officer for Managing Historic Properties That May be Affected by a License Issuing to Douglas County Public Utilities District for the Continued Operation of the Wells Hydroelectric Project in Okanogan County, Washington (FERC Project No. 2149)” executed on (DATE), and including but not limited to the Historic Properties Management Plan (HPMP). In the event that the Programmatic Agreement is terminated, the licensee shall continue to implement the provisions of its approved HPMP. The Commission reserves the authority to require changes to the HPMP at any time during the term of the license.

Article 413. Recreation Management Plan. The licensee shall implement the Recreation Management Plan filed on May 27, 2010, as appendix E-5 of exhibit E of the final license application, with the following addition to section 5.1.3, *Boat-in Tent Camping and Signage*.

Within 1 year of license issuance, the licensee shall also file, for Commission approval after consultation with the National Park Service; Washington State Parks and Recreation Commission; Washington State Recreation and Conservation Office; Washington Division of Fish and Wildlife; Washington Department of Transportation; Washington Department of Ecology; cities of Brewster, Bridgeport, and Pateros; Port of Chelan County; Friends of Fort Okanogan; and Okanogan Historical Society; U.S. Department of the Interior; Bureau of Land Management; Okanogan and Douglas counties; and Confederated Tribes of the Colville Reservation, a supplement to the Recreation Management Plan included in appendix E-5 that includes a map depicting the exact location where the proposed non-motorized campsite would be constructed.

Article 414. Douglas PUD Land Use Policy. Upon license issuance, the licensee shall implement the Douglas PUD Land Use Policy included in appendix E-13 of exhibit E. If changes to the Douglas PUD Land Use Policy are proposed in the future, the licensee shall develop a revised Douglas PUD Land Use Policy or addendum in consultation with the National Marine Fisheries Service; U.S. Fish and Wildlife Service; Washington Department of Fish and Wildlife; Washington Department of Ecology; Confederated Tribes of the Colville Reservation; Confederated Tribes and Bands of the Yakama Nation; U.S. Bureau of Indian Affairs; U.S. Bureau of Land Management;

National Park Service; Washington State Parks and Recreation Commission; Washington State Recreation and Conservation Office; Washington Department of Transportation; Cities of Brewster, Bridgeport, and Pateros; Port of Chelan County; Friends of Fort Okanogan; Okanogan Historical Society; U.S. Department of the Interior; and Okanogan and Douglas counties, and file the revised Douglas PUD Land Use Policy or addendum for Commission approval. The Commission reserves the right to require changes to the revised Douglas PUD Land Use Policy or addendum.

Article 415. *Use and Occupancy.*

(a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee also shall have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant or a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure to the satisfaction of the Commission's authorized representative that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine if the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this

paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69 kilovolt or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. If no conveyance was made during the prior calendar year, the licensee shall so inform the Commission in writing no later than January 31 of each year.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is 5 acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Energy Projects, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G map may be used), the nature of the proposed use, the identity of any

federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article: (1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the Washington State Historic Preservation Officer; (2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an exhibit E; or if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value; (3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.