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Okanogan Public Utility District No. 1 of Okanogan County, WA; Notice of Availability of Draft Environmental Assessment; Notice

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 12569–001]

Okanogan Public Utility District No. 1 of Okanogan County, WA; Notice of Availability of Draft Environmental Assessment

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission or FERC's) regulations, 18 Code of Federal Regulations (CFR) Part 380 (Order No. 486, 52 **Federal Register** [FR] 47897), the Office of Energy Projects has reviewed Okanogan Public Utility District No. 1 of Okanogan County's (Okanogan PUD) application for license for the Enloe Hydroelectric Project (FERC Project No. 12569), located on the Similkameen River near the city of Oroville in Okanogan County, Washington. Part of the project would occupy a total of 35.47 acres of federal lands administered by the U.S. Bureau of Land Management.

Staff prepared this draft environmental assessment (EA), which analyzes the potential environmental effects of relicensing the project, and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the draft EA is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site at *http://www.ferc.gov* using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCOnlineSupport@ferc.gov* or toll-free at 1–866–208–3676, or for TTY, 202–502–8659.

You may also register online at *http://www.ferc.gov/docs-filing/esubscription.asp* to be notified via e-mail of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Any comments should be filed within 30 days from the date of this notice. Comments may be filed electronically via the Internet. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's Web site *http://www.ferc.gov/docs-filing/efiling.asp.* Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at *http://www.ferc.gov/docs-filing/ecomment.asp.* You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail an original and seven copies to: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426.

For further information, contact Kim Nguyen by telephone at (202) 502–6105, or by e-mail at *kim.nguyen@ferc.gov.*

Dated: May 9, 2011.

Kimberly D. Bose,

Secretary.

Environmental Assessment for Hydropower License

Enloe Hydroelectric Project—FERC Project No. 12569—Washington

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

[May 2011]

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Acronyms and Abbreviations

μg microgram
AHS Archaeological and Historical Services
APE area of potential effect
BLM U.S. Bureau of Land Management
BMP best management practice
°C degrees Celsius
cfs cubic feet per second
Colville Confederated Tribes of the Colville Reservation
Commission Federal Energy Regulatory Commission
CSMP Construction Sediment Management Program
Corps U.S. Army Corps of Engineers
CRITFC Columbia River Inter-tribal Fish Commission
CRWG Cultural Resources Working Group
CWA Clean Water Act
dB decibel
DO dissolved oxygen
EA environmental assessment
EFH essential fish habitat
Enloe Project or project Enloe Hydroelectric Project
ESCP Erosion and Sediment Control Plan
ESA Endangered Species Act
FERC Federal Energy Regulatory Commission
FPA Federal Power Act
FTE full-time equivalent
FWS U.S. Department of the Interior, Fish and Wildlife Service
g the acceleration due to gravity (32.2 feet per second^2)
GWh gigawatt-hour
HAER Historic American Engineering Record
HPMP Historic Properties Management Plan
Interior U.S. Department of the Interior
kg kilogram
kV kilovolt
KOP key observation point
L liter
mg milligram
mm millimeter
Ministry of Environment British Columbia Ministry of Environment
msl mean sea level
MW megawatt
MWh megawatt-hour
National Register National Register of Historic Places
NERC North American Electric Reliability Council
NHPA National Historic Preservation Act of 1966
NMFS National Marine Fisheries Service
Okanogan PUD Public Utility District No. 1 of Okanogan County
Okanogan Shoreline Program Okanogan County's Shoreline Master Program
OTID Oroville-Tonasket Irrigation District
PA Programmatic Agreement
Park Service National Park Service
Reclamation U.S. Bureau of Reclamation
RM river mile
SCORP State Comprehensive Outdoor Recreation Plan
SD1 Scoping Document 1
SD2 Scoping Document 2
Scenic Trail Pacific Northwest National Scenic Trail
State Parks Commission Washington State Parks and Recreation Commission
TCP traditional cultural property
TDG total dissolved gas
TMDL total maximum daily load
UCR Upper Columbia River
USGS U.S. Geological Survey
Vegetation Plan Vegetation Mitigation and Monitoring Plan
Washington DFW Washington Department of Fish and Wildlife
Washington DNR Washington Department of Natural Resources
Washington DOE Washington Department of Ecology
Washington PC Washington Parks Commission
Washington RCO Washington Recreation and Conservation Office
Washington SHPO State Historic Preservation Office
Water Trail Committee Greater Columbia Water Trail Steering Committee
WSMA Washington State's Shoreline Management Act of 1971

Executive Summary

Proposed Action

On August 22, 2008, the Public Utility District No. 1 of Okanogan County, Washington (Okanogan PUD) filed an application seeking a license with the Federal Energy Regulatory Commission (Commission or FERC) for the proposed 9.0-megawatt (MW) Enloe Hydroelectric Project (Enloe Project or project) to be located on the Similkameen River near Oroville in Okanogan County, Washington. The project would occupy 35.47 acres of federal lands administered by U.S. Bureau of Land Management (BLM).

Project Description and Proposed Facilities

The Enloe dam and development was originally constructed for hydroelectric generation between 1919 and 1923. The project operated from 1923 to 1958 when it was decommissioned. The original project included an intake, penstock, and powerhouse located 850 feet downstream of the dam on the west bank of the Similkameen River. On September 13, 1996, the Commission issued an order to Okanogan PUD to redevelop the Enloe Project using the existing dam and rehabilitating the original intake, penstock, and powerhouse. However, on February 23, 2000, that order was rescinded.

Okanogan PUD proposes again to redevelop the Enloe Project by using the existing concrete gravity arch dam impounding a 76.6-acre reservoir, and constructing a new penstock intake structure and above-ground steel penstocks carrying flows from the intake to the new powerhouse located 370 feet downstream of the dam on the east bank of the Similkameen River. The existing

dam crest elevation of 1,044.3 feet would be increased by installing new 5-foot-high crest gates which would increase the reservoir to 1,049.3 feet elevation and the surface area to 88.3 acres. The powerhouse would contain two vertical Kaplan turbine/generator units with a total installed capacity of 9.0 MW. The project would also include a substation adjacent to the powerhouse, and a 100-foot-long, 13.2-kilovolt primary transmission line connecting the substation to an existing distribution line. The project would also include about 1.5 miles of new and upgraded access roads. The Enloe Project would operate automatically in a run-of-river mode, with a normal operating water level of the reservoir between 1,048.3 and 1,049.3 feet mean sea level.

Proposed Environmental Measures

Okanogan PUD proposes the following environmental measures to protect, mitigate, and enhance water quality, aquatic, terrestrial, recreation, aesthetic, and cultural resources during construction and operation of the project.

During construction:

- Implement a Construction Sediment Management Program (CSMP), an Erosion and Sediment Control Plan (ESCP), and a Spill Plan;
- Implement a Blasting Plan;
- Employ best management practices (BMPs) including flagging and fencing wetland areas;
- Provide biological monitoring;
- Implement a Noxious Weed Control Program;
- Survey disposal sites and control noxious weeds prior to spoil disposal;
- Revegetate spoil disposal sites;
- Schedule construction activities in the summer and early fall to minimize effects on overwintering birds and bald eagles;
- Conduct pre-disposal site surveys for wildlife and schedule vegetation clearing to avoid wildlife conflicts;
- Survey for Ute ladies-tresses prior to, during, and postconstruction to identify locations and avoid effects;
- Monitor and avoid known archaeological sites listed in the National Register of Historic Places (National Register) during construction of project facilities; and
- Develop and implement a Safety During Construction Plan and limit public access.

During project operation:

- For water quality:
  - Design and place the intake structure and channel to minimize sediment transport;
  - Place the powerhouse tailrace below Similkameen Falls so that it discharges to and circulates water in the plunge pool downstream of the falls, preventing stagnation and consequently water quality degradation of the pool habitat;
  - Provide aeration in the powerhouse draft tubes to maintain dissolved oxygen (DO) levels; and
  - Monitor water quality, including water temperatures, DO, and total dissolved gases (TDG) in the tailrace for a five-year period.
- For aquatic resources:
  - Ensure that logs and woody debris can pass over the dam and transporting large debris off-site if needed;
  - Place two clusters of boulders in the Similkameen River upstream of the reservoir to improve mountain whitefish habitat and recreational fisheries;
  - Include trashracks with 1-inch bar spacing on the project intake(s) so that smaller fish would be able to pass safely through the trashrack and larger fish would be discouraged or prevented from passing through the trashracks and turbines;
  - Design and place the tailrace to avoid effects on fish;
  - Install and monitor entrainment and mortality of fish at the tailrace barrier nets;
  - Operate run-of-river and implementing agency-recommended ramping rates downstream of the project during project start-up and shut-down;
  - Improve spawning, rearing, and summer thermal refugia downstream of the powerhouse tailrace in an existing side channel;
  - Supplement gravel in the river reach downstream of the tailrace to increase the amount of gravel in the river downstream of Enloe dam and improve spawning habitat;
  - Develop and implement a biological review process including the establishment of a Technical Review Group (TRG) comprising agencies and the Confederated Tribes of the Colville Reservation (Colville); and
  - Develop a fish monitoring database for organizing and storing monitoring data related to aquatic resources for all proposed studies.
- For terrestrial resources, design the project transmission line to minimize effects on raptors and other birds and implement a Vegetation Plan that includes:
  - Returning the abandoned shoreline road to natural conditions;
  - Planting riparian vegetation along the abandoned road and along and upstream of the east and west banks of the reservoir;
  - Installing grazing control measures;
  - Monitoring restored areas and planting additional willows if needed; and
  - Developing an environmental training program to inform employees about sensitive habitats.
- For recreation resources, implement a Recreation Management Plan that includes:
  - Installing barricades, fencing, and a stock watering tank as part of the Fence Plan;
  - Providing public access downstream of Enloe dam on the east bank;
  - Transferring ownership rights of the trestle bridge to Okanogan County for the development of a future public, non-motorized, recreational use trail;
  - Improving the existing informal boat ramp upstream of Enloe dam;
  - Restoring the wooded area on the east bank and conducting annual cleanup activities of the wooded area and along the Ditch Road;
  - Developing an interpretive publication, including a map illustrating public access and recreation sites;
  - Developing interpretive displays by placing an information board near Enloe dam; and interpretive signage near the parking, picnic area, and near the access bridge to the abandoned powerhouse;
  - Removing existing trash and conducting annual cleanup;
  - Providing parking, picnic tables, primitive campsites, and a vault toilet on the east bank upstream of Enloe dam;
  - Maintaining existing signage, safety cables, and grab ropes upstream of the dam;
  - Installing safety and warning signs and a log boom across the channel to protect boaters; and
  - Coordinating with BLM and other landowners on how to prevent public access to the old powerhouse.
- For aesthetic resources, implement an Aesthetics Management Plan that includes:
  - Using visually-compatible colors and building materials for facilities along the east bank;
  - Consulting with the Colville and other stakeholders regarding restoration;
  - Using non-reflective surfaces where possible during construction; and
  - Grading and repairing slopes with native plants following removal of buildings.
- For cultural resources, finalize a draft May 2009 Historic Properties Management Plan (HPMP) that includes:
  - Soliciting for a new owner of the historic Enloe powerhouse, and failing that, demolishing the structure and providing interpretive signage using visually-compatible colors and building materials for facilities along the east bank;
  - Reviewing and reaching agreement on the HPMP and incorporating

information into a Programmatic Agreement (PA);

○ Monitoring effects of shoreline fluctuation on archaeological sites in shoreline areas and mitigating, as needed;

○ Determining if there would be effects on archaeological sites around project recreation areas; and

○ Developing an inadvertent discovery plan.

On October 28, 2010, Okanogan PUD filed additional information regarding ongoing consultations with Washington Department of Ecology (Washington DOE) and Washington Department of Fish and Wildlife (Washington DFW) for the 401 Water Quality Certification process. In this filing, Okanogan and Washington DFW and DOE have developed the following understanding with regards to the bypassed reach:

- Providing 30 cubic feet per second (cfs) minimum flows from mid-July to mid-September, and 10 cfs rest of the year to the pool in the bypassed reach;
- Monitoring DO and water temperature in the bypassed reach;
- Initiating an adaptive management program to enhance DO and monitor water temperature in the bypassed reach if water quality standards are not met;
- Providing downramping rates in the bypassed reach; and
- Determining means and withdrawal location for minimum flows released to the bypassed reach.

Alternatives Considered

This draft environmental assessment (EA) considers the following alternatives: (1) No-action—the project would not be constructed and there would be no changes or enhancements at the site; (2) Okanogan PUD's proposal—as outlined above; and (3) a staff alternative—Okanogan PUD's proposal with staff's additions and modifications.

Under the staff alternative, the project would include Okanogan PUD's proposed measures, as outlined above, with the exception of placing boulder clusters in the project forebay and entrainment and resident fish monitoring. In addition, the staff alternative would include: (1) A Spoil Disposal Plan; (2) a water quality monitoring plan that includes: Selecting water quality monitoring locations, filing of reports at the end of year 5, and conducting additional temperature, DO, and TGD monitoring beyond the 5-year period, if needed; (3) consultation with the TRG prior to implementation of the Blasting Plan, the woody debris plan, the proposed side-channel enhancement plan, the proposed gravel supplementation program, and the Spill Plan; (4) consultation with Interior and Washington DFW during final design of the intake structure and trashracks; (5) a project compliance monitoring plan; (6) revision of the Vegetation Plan to include filing monitoring reports annually for first 5 years and in year 8 and providing the Commission, FWS, BLM, and Washington DFW with these reports and filing for Commission approval, any proposals for further restoration measures; (7) incorporation of the land occupied by the side-channel enhancement and length of the project access road from the Loomis-Oroville Road to the powerhouse into the project boundary; (8) retention of dead trees along the reservoir and provisions for 10 artificial perch poles; (9) preparation of an Ute ladies'-tresses survey plan after consultation with FWS, BLM, and Washington DFW and an additional plan to avoid or minimize adverse effects on the Ute ladies'-tresses if they are identified in the project areas; (10) consultation with stakeholders on the final Recreation Management Plan; (11) a plowing schedule for winter months; (12) a recreation use monitoring plan developed in consultation with BLM; (13) a fire suppression program; (14) removal of the one small, deteriorated building on Okanogan PUD land at the north end of the proposed Enloe dam recreation area; (15) consultation with BLM and local emergency response agencies on the Safety During Construction Plan; (16) creation of a river access point at Miner's Flat; (17) consultation with BLM and the Colville to develop details on how the facilities and laydown or construction areas would blend into the existing landscape; and (18) a revised HPMP to include provisions for: Further consideration of the potential effects of capping site 45OK532, a description of the proposed side-channel enhancement site, two separate defined APEs that delineate the proposed Enloe project and the proposed side-channel enhancement site, consultation with the Cultural Resources Working Group regarding the resolution of adverse effects on the historic Enloe powerhouse, re-evaluating the Oroville-Tonasket Irrigation Canal for National Register-eligibility, completing determinations of eligibility for unidentified cultural resources on BLM lands, periodic review of the HPMP, a site monitoring program, cultural interpretative and education measures, and revising the APEs to accommodate modifications to the project boundary.

Public Involvement and Areas of Concern

Before filing its license application, Okanogan PUD conducted pre-filing consultation under the traditional licensing process. The intent of the Commission's pre-filing process 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.

After the license application was filed, we conducted scoping to determine what issues and alternatives should be addressed. On December 16, 2008, we distributed Scoping Document 1 (SD1) to interested parties, soliciting comments, recommendations, and information on the project. An environmental site review of the project was held on January 15, 2009. Two scoping meetings were held in Oroville, Washington, on January 14 and 15, 2009, 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 7, 2009. On December 28, 2009, we issued a notice that the application was ready for environmental analysis and requested conditions and recommendations.

The primary issues associated with licensing the project are the effects of project construction and operation on geology and soils; water quality; aquatic, terrestrial, and cultural resources; threatened and endangered species; and recreation, land use, and aesthetic resources.

Staff Alternative

Aquatic Resources

Measures proposed in the ESCP, CSMP, Spill Plan, Blasting Plan, and Safety During Construction Plan would help prevent adverse effects from erosion and sedimentation that may result from construction and operation of the project, and would help prevent adverse effects on geology and soils and water quality.

Run-of-river operation would minimize effects on aquatic resources. Locating the tailrace downstream of Similkameen Falls would reduce TDG and enhance conditions for aquatic resources in the Similkameen downstream of the falls. In addition, designing the tailrace in a manner to provide circulation in the pool and aerating the draft tubes would ensure

adequate DO for aquatic resources downstream of Similkameen Falls.

Providing minimum flows in the bypassed reach would provide some refuge for resident fish in the plunge pool downstream of Enloe dam. The 1-inch trash rack spacing on the intake trashrack, and installation and monitoring of a tailrace net barrier would minimize adverse affects on aquatic resources.

The construction of the side channel, gravel enhancement, riparian planting projects, and improved water quality due to reductions in TDG and enhanced DO levels are expected to have long-term benefits for holding, spawning, and rearing fish, particularly anadromous salmonids, and should increase anadromous salmonid productivity in the Similkameen River downstream of the project.

Terrestrial Resources

Measures in the Vegetation Plan, including grazing controls, noxious weed control, vegetation monitoring, employing BMPs, providing biological monitor during construction, retaining dead trees and installing artificial perch poles for bald eagle perching habitat, and employee training would prevent adverse effects on riparian and wetland areas which provide habitat for wildlife, as well as mitigate for adverse effects during construction of the project.

Threatened and Endangered Species

The Similkameen River below Similkameen Falls is designated critical habitat for the threatened UCR steelhead, the only fish species known to occur in project affected waters that is listed under the Endangered Species Act (ESA). Proposed measures to reduce TDG, increase DO through draft tube aeration, supplement spawning gravel, transport large woody debris, and construct the side-channel enhancements would improve spawning and rearing habitat in the river downstream of the falls and increase productivity. The biological review process, fisheries monitoring, and ongoing refinement would provide long-term benefits for UCR steelhead and UCR steelhead designated critical habitat.

Additional surveys for the threatened Ute ladies'-tresses prior to, during, and postconstruction would either confirm that the species does not occur in areas affected by the project or guide the development of avoidance or mitigative measures. The survey results and filing, with the Commission for approval, proposed measures to avoid or mitigate impacts to listed species; implementation of the Vegetation Plan, including noxious weed control, employing BMPs during construction, employee training, and provision of a biological monitor during construction would protect potential Ute ladies'-tresses habitat in areas affected by the project and at the proposed side channel enhancement site.

Recreation and Land Use

Implementation of the Recreation Management Plan would improve existing recreational facilities and opportunities. The Safety During Construction Plan, as well as the Fence Plan, would help keep visitors to the project away from the construction activities and reduce user conflicts between recreationists and cattle grazing activities.

Inclusion of the entire Oroville-Tonasket Irrigation District Ditch Road as a project feature and bringing it into the project boundary would ensure maintenance of the entire road for the purpose of providing public access to the campground, boat launch, picnic areas, and access trail to the river below the dam.

Aesthetic Resources

Okanogan PUD's proposal to use visually-compatible colors and building materials, use non-reflective surfaces where possible, and consult with the Colville during restoration activities, would provide some protection for visual resources. The staff alternative with additional recommendations including coordination with stakeholders to include specific approaches for blending existing and proposed Enloe Project facilities into the existing landscape character; revegetating, stabilizing, and landscaping the new construction areas and areas immediately adjacent; grading, planting native vegetation, repairing slopes damaged by erosion, and preventing future erosion; monitoring restored areas; and conducting maintenance activities would provide additional protection.

Cultural Resources

Revising and implementing the May 2009 HPMP, with staff's additional measures, would ensure protection of historic properties over the license term.

No-Action Alternative

Under the no-action alternative, environmental conditions would remain the same, and no enhancement of environmental resources would occur. BLM stated that it would require Okanogan PUD to remove the dam and all associated facilities from the public lands under the existing right-of-way permit if a license is be issued. We discussed dam removal under cumulative effects in section 3.5.

Conclusions

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

In section 4.2 of the EA, 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 Okanogan PUD's proposed alternative, the project would cost $106,470, or $2.40/megawatt-hours (MWh), less than the likely alternative cost of power. Under the staff alternative, the project power would cost $83,920, or $1.89/MWh, less than the likely 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 (44.4 gigawatt-hours annually); (2) the project could save an equivalent amount of fossil fuel-fired electric generation and capacity, which may help conserve non-renewable energy resources and reduce atmospheric pollution, including greenhouses gases; and (3) the recommended environmental resources proposed by Okanogan 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.

We conclude that issuing a new license for the project, with the environmental measures we recommend, would not be a major federal action significantly affecting the quality of the human environment.

Draft Environmental Assessment

Federal Energy Regulatory Commission, Office of Energy Projects, Division of Hydropower Licensing, Washington, DC

Enloe Hydroelectric Project

Project No. 12569–001—Washington

1.0 Introduction

1.1 Application

On August 22, 2008, the Public Utility District No. 1 of Okanogan County, Washington (Okanogan PUD) filed an application seeking a license with the Federal Energy Regulatory Commission (Commission or FERC) for the 9.0-megawatt (MW) Enloe Hydroelectric Project (Enloe Project or project) located on the Similkameen River at river mile (RM) 8.8 near the city of Oroville, Okanogan County, Washington (figure

1). The project would occupy 35.47 acres of federal lands administered by U.S. Bureau of Land Management (BLM). The project would generate an average of 45 gigawatt-hours (GWh) of energy annually.

Enloe dam was originally constructed for hydroelectric generation between 1919 and 1923. The project operated from 1923 to 1958 when it was decommissioned. The original project included an intake, penstock, and powerhouse located 850 feet downstream of the dam on the west bank of the Similkameen River. On September 13, 1996, the Commission issued an order to Okanogan PUD to redevelop the Enloe Project using the existing dam and rehabilitating the original intake, penstock, and powerhouse. However, on February 23, 2000, that order was rescinded.

Okanogan PUD proposes to again redevelop the Enloe Project by using the existing concrete gravity arch dam impounding a 76.6-acre reservoir; and constructing new penstock intake structure, and above-ground steel penstocks carrying flows from the intake to the new powerhouse located 370 feet downstream of the dam on the east bank of the Similkameen River.

1.2 Purpose of Action and Need for Power

1.2.1 Purpose of Action

The Commission must decide whether to issue a license to Okanogan PUD for the Enloe 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.

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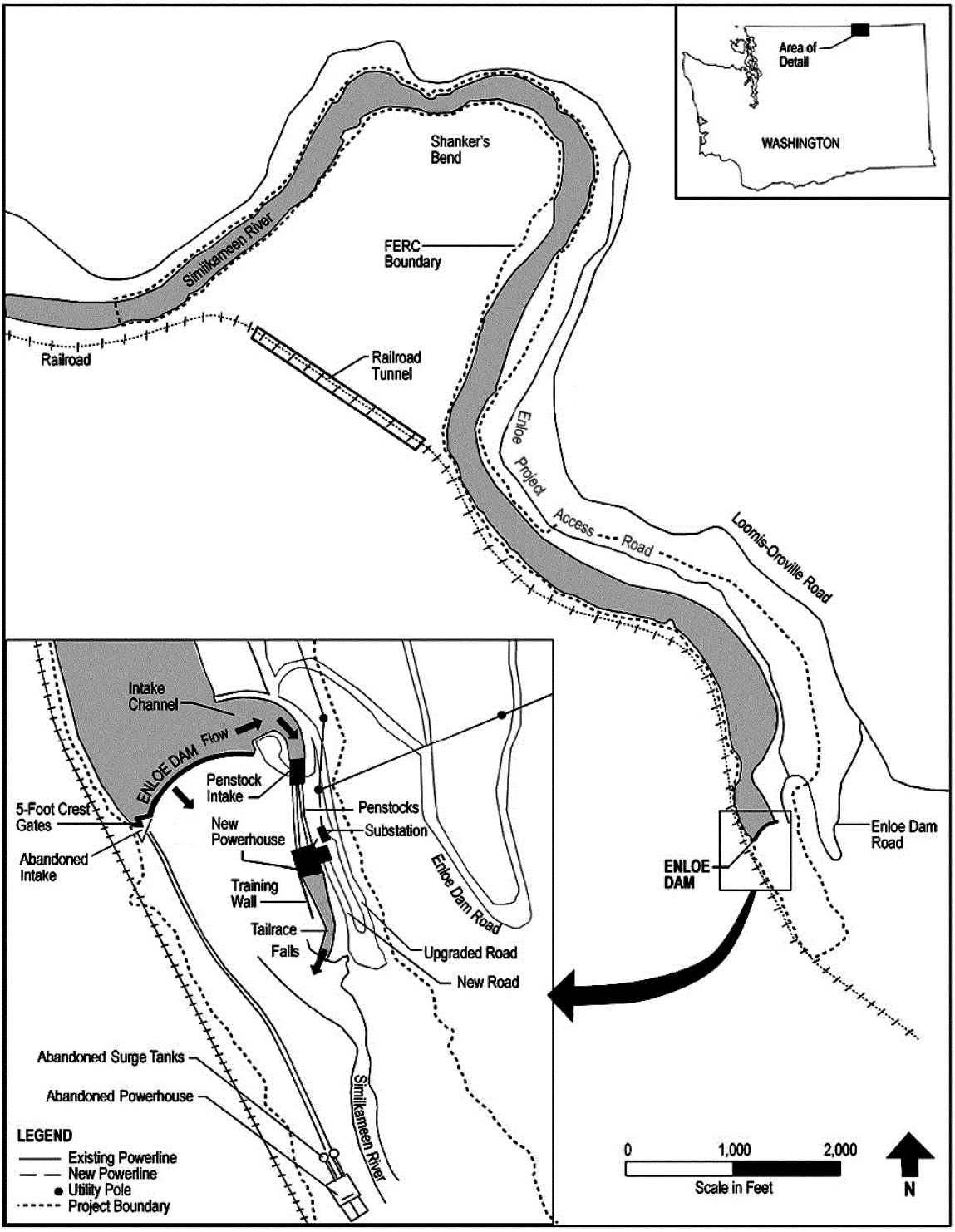

Figure 1. Location of the Enloe Hydroelectric Project (Source: Okanogan PUD, 2008a, as modified by staff).

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Issuing a license for the Enloe Project would allow the Okanogan PUD to generate electricity for the term of the license, making electrical power from a renewable resource available to its customers.

This draft environmental assessment (EA) assesses the effects associated with construction and operation of the project and alternatives to the proposed project. It also includes recommendations to the Commission on whether to issue a license, and if so, includes the recommended terms and

conditions to become a part of any license issued.

In this draft EA, we assess the environmental and economic effects of construction and operation of the project as proposed by Okanogan PUD, and with our recommended measures. We also consider the effects of the no-action alternative. Important issues that are addressed include the protection of geology and soils, water quantity and quality, cultural resources, aesthetics resources, and recreation and land use during project construction and operation.

1.2.2 Need for Power

The Enloe Project would provide hydroelectric generation to meet part of Okanogan PUD's power requirements, resource diversity, and capacity needs. The project would have an installed capacity of 9.0 MW and generate approximately 44.4 GWh per year.

The North American Electric Reliability Council (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Enloe Project is located in the Northwest subregion of the Western Electricity Coordinating Council region of the NERC. According to NERC's 2010 forecast, winter peak demands and annual energy requirements for the Northwest subregion are projected to grow at rates 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 Enloe Project would help meet a need for power in the Northwest subregion in both the short and long term. The project would provide power that displaces non-renewable, fossil-fired generation and contributes to a diversified generation mix. Displacing the operation of fossil-fueled facilities may avoid some power plant emissions and creates an environmental benefit.

1.3 Statutory and Regulatory Requirements

A license for the Enloe Project would be subject to numerous requirements under the Federal Power Act (FPA) and other applicable statutes. We summarize the major regulatory requirements in table 1 and describe them below.

TABLE 1—MAJOR STATUTORY AND REGULATORY REQUIREMENTS FOR THE ENLOE HYDROELECTRIC PROJECT

[Source: Staff]

Requirement	Agency	Status
Section 18 of the FPA (fishway prescriptions).	NMFS, FWS	NMFS and FWS filed reservations of authority on February 26, 2010.
Section 4(e) of the FPA (land management conditions).	Interior	No section 4(e) conditions have been filed.
Section 10(j) of the FPA	Washington DFW, FWS, NMFS	Washington DFW, FWS, and NMFS all filed section 10(j) recommendations on February 26, 2010.
Clean Water Act—Water Quality Certification.	Washington DOE	Application for certification was received on February 25, 2011; action on the application due by February 25, 2012.
Endangered Species Act Consultation.	NMFS, FWS	Commission staff is initiating formal consultation with both agencies.
Coastal Zone Management Act Consistency.	Washington DOE	By letter dated September 25, 2009, Washington DOE waived its requirement for compliance with its Coastal Zone Management Program for the project.
National Historic Preservation Act	Advisory Council on Historic Preservation; Washington Department of Archaeology and Historic Preservation.	The Commission designated Okanogan PUD as a non-federal representative for conducting section 106 consultation on September 26, 2005. Okanogan PUD filed a Historic Properties Management Plan on June 16, 2009.
Pacific Northwest Power Planning and Conservation Act.		The project is not located within the designated protected area of the Columbia River Basin and would be in compliance with specific provisions to be considered in the licensing or relicensing of non-federal hydropower projects.
Magnuson-Stevens Fishery Conservation and Management Act.	NMFS	Licensing the project could adversely affect Chinook salmon essential fish habitat. Commission staff is initiating formal consultation with NMFS.

Notes: 401 WQC—401 Water Quality Certificate
BLM—U.S. Bureau of Land Management
Commission—Federal Energy Regulatory Commission
FPA—Federal Power Act
FWS—U.S. Department of the Interior, Fish and Wildlife Service
Interior—U.S. Department of the Interior
NMFS—National Marine Fisheries Service
Okanogan PUD—Public Utility District No. 1 of Okanogan County
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 Commerce or the U.S. Department of the Interior (Interior). The National Marine Fisheries Service (NMFS) by letter dated February 26, 2010, and the U.S. Department of the Interior, Fish and Wildlife Service (FWS) by letter dated February 26, 2010, request that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

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. Interior, on behalf of the U.S. Bureau of Land Management (BLM), filed recommended terms and conditions by letter dated February 26, 2010, and did not prescribe any conditions pursuant to section 4(e) of the FPA.

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.

NMFS, FWS, and Washington Department of Fish and Wildlife (Washington DFW) all timely filed, on February 26, 2010, recommendations under section 10(j), as summarized in table 23, 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 February 24, 2010, Okanogan PUD applied to the Washington Department of Ecology (Washington DOE) for a 401 Water Quality Certificate (WQC) for the Enloe Project. Washington DOE received this request on February 25, 2010. Washington DOE has not yet acted on the request. Washington DOE action is due by February 25, 2011.

On October 28, 2010, Okanogan PUD filed a status report on its negotiations with Washington DOE and Washington DFW regarding possible conditions for the WQC for the Enloe Project, and on November 10, 2010, it filed supplemental information regarding the basis for the potential conditions. In this filing, measures for aquatic resources would include:

- A minimum flows of 30 cfs from mid-July to mid-September, and 10 cfs rest of the year to the pool below Enloe dam.
- Monitoring water temperature in the bypassed reach for a period of time postconstruction; and adopting an adaptive management program to enhance DO and water temperatures should monitoring indicate that water quality standards are not being met.
- Determining appropriate thresholds for downramping rates immediately downstream of Enloe dam based on monitoring and field observations prior to operations.
- Selecting an appropriate minimum flow release location in consultation with fisheries resource agencies (Washington DOE, Washington DFW, Interior, NMFS, BLM, and the Colville), and making appropriate project modifications to provide minimum flow releases.

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. NMFS notified the Commission in its February 26, 2010, filing that one ESA-listed threatened species of anadromous fish is known to occur in the Similkameen River below Enloe dam: The upper Columbia River (UCR) steelhead distinct population segment. Designated critical habitat includes the Similkameen River below Similkameen Falls (the falls). There is no critical habitat designation upstream of Similkameen Falls.

FWS lists five additional ESA-listed species of fish, wildlife, and plants that occur in Okanogan County, Washington, including the bull trout (threatened), Canada lynx (threatened), grizzly bear (threatened), northern spotted owl (threatened), and Ute ladies'-tresses (threatened). There is no designated critical habitat for any of these species within the Enloe Project boundary. Our analyses of project impacts on threatened and endangered species are presented in section 3.3.5, *Threatened and Endangered Species,* and our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative.*

We conclude that licensing the project would have no effect on bull trout, Canada lynx, grizzly bear, and northern spotted owl.

We conclude that licensing the project would adversely affect federally listed UCR steelhead because proposed project construction and habitat enhancement projects could result in short-term increases in turbidity and sedimentation and the risk of injury or mortality to eggs, fry, juveniles, or adults by instream use of equipment. Construction of the tailrace could result in injury or mortality to eggs, fry, juveniles, or adults caused by capture and transport, relocation, and blasting. UCR steelhead injury or mortality could result from fish swimming into draft tubes and hitting the turbine runner during project operation. We conclude, however, that the proposed project would not appreciably diminish the value of designated UCR steelhead critical habitat for both survival and recovery of this species and the proposed enhancement measures would provide some long-term beneficial effects. Consequently, we will request formal consultation with NMFS pursuant to section 7 of the ESA.

Potential habitat for Ute ladies'-tresses exists along the reservoir and in the side channel enhancement area. No populations of this species were discovered during Okanogan PUD's rare plant surveys, but there are agency concerns about the adequacy of the surveys. If Ute ladies'-tresses grows in the habitat identified at the edge of the reservoir, operation of the proposed crest gates would inundate the population. If this species occurs at the side-channel enhancement site, construction, operation, and maintenance of the proposed facility could adversely affect the plants, but it may be possible to adjust the facility's footprint so that the plants are not affected.

In response to agency recommendations for additional surveys, Okanogan PUD proposes to survey areas that could potentially provide habitat for Ute ladies'-tresses for an additional 3 years as part of its proposed Vegetation Mitigation and Monitoring Plan (Vegetation Plan). Thereafter, potential habitat for Ute ladies'-tresses would be resurveyed only if site management changes occur that could affect that habitat. Okanogan PUD's proposed surveys would either confirm that Ute ladies'-tresses does not occur in areas that would be affected by the project or would guide the development of avoidance or mitigative measures for this species. Therefore, licensing the project with the

recommended protection, mitigation, and enhancement measures would not be likely to adversely affect Ute ladies'-tresses.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA),[1] 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 Okanogan PUD's certification.

By letter dated September 25, 2009, the Washington DOE waived its requirement for compliance with its Coastal Zone Management Program for the project. Therefore, no consistency certification is required.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA)[2] and its implementing regulations,[3] 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, and objects significant in American history, architecture, engineering, 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 construction, operation, and maintenance of the Enloe Project. The terms of the PA would ensure that Okanogan PUD addresses and treats all historic properties identified within the project's areas of potential effects (APEs) for the proposed project and the side-channel enhancement site through implementation of a revised Historic Properties Management Plan (HPMP).

1.3.6 Pacific Northwest Power Planning and Conservation Act

Under section 4(h) of the Pacific Northwest 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 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 should take into account, to the fullest extent practicable, the program adopted under the Pacific Northwest Power Planning and Conservation 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.

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) Specific plans for fish facilities prior to construction; (2) assurance that the project would not degrade fish habitat or reduce numbers of fish; (3) assurance all fish protection measures are fully operational at the time the project begins operation; (4) timing construction activities, insofar as practical, to reduce adverse effects on wintering grounds; and (5) replacing vegetation if natural vegetation is disturbed.

Our recommendations in this EA (sections 2.2 and 2.3) are consistent with the applicable provisions of the program, listed above. Further, a condition of any license issued would reserve the Commission's 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 (protected area) in the Pacific Northwest region as not being suitable for hydroelectric development. 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). The Pacific Fishery Management Council manages the fisheries for coho, Chinook, and Puget Sound pink salmon and has defined EFH for these three species. Salmon EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, except areas upstream of certain impassable human-made barriers (Pacific Fisheries Management Council, 2010), and longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). The historically accessible reaches of the Similkameen River (RM 0 to the falls) are EFH for Chinook salmon.

Based on our analysis in this EA of the proposed action as specified in the license application, we conclude that licensing the project would be likely to adversely affect EFH for the UCR Chinook salmon for the same reasons we conclude that licensing the project would adversely affect the UCR steelhead and its designated critical habitats (see section 1.3.3, *Endangered Species Act*). Consequently, we will request that NMFS provide any EFH recommendation along with its biological opinion regarding listed anadromous fish.

1.4 Public Review and Consultation

The Commission's regulations (18 CFR, section 4.38) 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 EA, we conducted scoping to determine what issues and alternatives should be addressed. Scoping Document 1 (SD1) was issued on December 16, 2008. Two scoping meetings were noticed on December 16, 2008, and held on January 14 and 15, 2009, in Oroville, Washington. 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:

[1] 16 U.S.C. 1456(c)(3)(A) (2006).

[2] 16 U.S.C. 470 *et seq.* (2006).

[3] 36 CFR Part 800 (2009).

Commenting entity	Date filed
Washington DFW	February 6, 2009.
National Park Service (Park Service)	February 9, 2009.
Richard Terbasket	February 12, 2009.
FWS	February 13, 2009.
BLM	February 17, 2009.
Columbia River Inter-Tribal Fish Commission (CRITFC)	February 17, 2009.
NMFS	February 17, 2009.
Washington DOE	February 17, 2009.
U.S. Bureau of Indian Affairs (BIA)	February 17, 2009.
U.S. Environmental Protection Agency (EPA)	February 17, 2009.
Lower Similkameen Indian Band	February 20, 2009.
Confederated Tribes of the Colville Reservation (Colville)	February 23, 2009.
Arnold N. Merchand	February 23, 2009.

A revised scoping document 2 (SD2), addressing these comments, was issued on May 7, 2009.

1.4.2 Interventions

On October 29, 2008, the Commission issued a notice that Okanogan PUD had filed an application for a license for the Enloe Project. This notice set December 29, 2008, 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:

Intervenor	Date filed
Greater Columbia Water Trail Coalition (Water Trail Committee)	October 31, 2008.
American Whitewater	November 4, 2008.
Washington Department of Natural Resources (Washington DNR)	November 26, 2008.
Washington DFW	November 26, 2008.
American Rivers	December 8, 2008.
Washington DOE	December 11, 2008.
CRITFC	December 29, 2008.
Interior	December 29, 2008.
NMFS	December 30, 2008.
Colville [4]	April 10, 2009.

1.4.3 Comments on the License Application

A notice requesting conditions and recommendations was issued on December 28, 2009. The following entities commented:

Commenting agency and other entity	Date filed
British Columbia Ministry of Environment (Ministry of Environment)	February 18, 2010.
Chloe O'Loughlin, Canadian Parks and Wilderness Society—British Columbia Chapter	February 24, 2010.
Colville	February 26, 2010.
Interior (including FWS and BLM)	February 26, 2010.
NMFS	February 26, 2010.
Washington DFW	February 26, 2010.
American Rivers, American Whitewater, the Center for Environmental Law and Policy, the North Cascades Conservation Council (Cascade Chapter), Water and Salmon Committee of the Sierra Club, and the Columbia River Bioregional Education Project (American River *et al.*).	February 26, 2010.
U.S. Department of Agriculture, Forest Service (Forest Service)	February 27, 2010.
CRITFC	March 1, 2010.

Okanogan PUD filed reply comments on April 9, 2010.

2.0 Proposed Action and Alternatives

2.1 No-Action Alternative

The no-action alternative is license denial. Under the no-action alternative, the project would not be built, and the environmental resources in the project area would not be affected.

2.2 Applicant's Proposal

2.2.1 Proposed Project Facilities

The proposed Enloe Project would consist of: (1) An existing 315-foot-long, 54-foot-high concrete gravity arch dam with an integrated 276-foot-long central overflow spillway; (2) three 5-foot-high automated steel flap crest gates; (3) an existing 76.6-acre reservoir (narrow channel of the Similkameen River) with a storage capacity of 775 acre-feet at a surface elevation of 1,049.3 feet above mean sea level (msl); (4) a 190-foot-long intake canal on the east abutment of the dam diverting flows into the penstock intake structure; (5) a 35-foot-long by 30-foot-wide penstock intake structure; (6) two above-ground 8.5-foot-diameter, 150-foot-long steel penstocks carrying flows from the intake to the powerhouse; (7) a powerhouse containing two vertical Kaplan turbine/generator units with a total installed capacity of 9.0 MW; (8) a 180-foot-long tailrace channel, downstream of the

[4] Late intervention; no action has been taken on this petition.

falls; (9) a substation adjacent to the powerhouse; (10) a 100-foot-long, 13.2-kilovolt (kV) primary transmission line connecting the substation to an existing distribution line; (11) about 1.5 miles of new and upgraded access roads; and (12) appurtenant facilities. The project would generate an average of 45 GWh of electricity annually.

2.2.2 Project Safety

As part of the licensing process, the Commission would review the adequacy of the proposed project facilities. Special articles would be included in any license issued, as appropriate. Commission staff would inspect the licensed project both during and after construction. Inspection during construction would concentrate on adherence to Commission-approved plans and specifications, special license articles relating to construction, and accepted engineering practices and procedures. Operational inspections would focus 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, any license issued would require an inspection and evaluation every 5 years by an independent consultant and submittal of the consultant's safety report for Commission review.

2.2.3 Proposed Project Operation

The Enloe Project would operate automatically in a run-of-river mode, regardless of water year (wet, dry, or average). Under a run-of-river mode of operation, all project outflows would approximate all project inflows at any point in time, such that there would be minimal fluctuation of the reservoir surface elevation.[5] The existing dam crest elevation of 1,044.3 feet would be increased by re-installation of 5-foot-high crest gates which would increase the reservoir to 1,049.3 feet elevation. Automated crest gates would be installed that would automatically adjust to regulate spills and maintain a nearly constant reservoir elevation relative to reservoir inflow. Okanogan PUD plans to maintain reservoir levels between elevation 1,048.3 feet and elevation 1,049.3 feet (top of crest gates) when inflows are equal to, or less than, the maximum hydraulic capacity of the units (1,600 cfs). This is estimated to occur approximately 70 percent of the time. Discharge through the units would be approximately equal to inflow based on the maintenance of reservoir levels. When inflows are between 1,600 and 16,500 cfs, which is estimated to occur approximately 29 percent of the time, the reservoir elevation would be maintained between elevation 1,049.3 feet and elevation 1,050.3 feet. When inflows exceed 16,500 cfs, which is only estimated to occur approximately 1 percent of the time, the crest gates would be fully lowered and the water level would be controlled at the spillway. During low flow conditions, less than 500 cfs, the project would operate in run-of-river mode with one unit running. In this operational mode, a stable water level of the reservoir and stable flow in the downstream reach would be maintained. Under these conditions, the rate of change in the outflow from the reservoir would follow the natural rate of change on the inflow to the reservoir.

2.2.4 Proposed Environmental Measures

Okanogan PUD proposes the following environmental measures.[6]

Geology and Soil Resources

- Develop and implement the Erosion and Sediment Control Plan (ESCP) to minimize the effects of construction, repair, and operation of the dam and intake, penstocks, powerhouse, tailrace, impoundment, access roads, powerline, and construction camp (WQ–06).
- Develop and implement a Construction Sediment Management Program (CSMP) to minimize sediment disturbance and maximize sediment containment during construction (WQ–08).

Water Quality

- Monitor water temperatures at three locations for a period of 5 years to determine if the operation of crest gates causes an increase in the water temperatures in the reservoir when compared with upstream of the reservoir (WQ–01).
- Locate the powerhouse tailrace so that it discharges to and circulates water in the plunge pool downstream of Similkameen Falls, preventing stagnation and consequently water quality degradation of the pool habitat (WQ–02 and FISH–09).
- Provide aeration in the powerhouse draft tubes during low flow summer months and monitor for the first 5 years to determine the optimum time to provide aeration (WQ–03).
- Monitor total dissolved gas (TDG) and DO at the project intake and in the pool below Similkameen Falls for a period of 5 years to assess TDG and DO under project operations (WQ–04).
- Design a broad, shallow intake structure and channel to minimize sediment disturbance in the reservoir near the intake (WQ–05).
- Develop and implement at project initiation a Spill Plan to reduce potential effects from accidental spills when heavy machinery is operating near the river and reservoir (WQ–07).

Aquatic Resources

- Implement the Blasting Plan and use best management practices (BMPs) to avoid and minimize the potential effects on aquatic resources, including federally listed or sensitive species (FISH–01).
- Place two clusters of boulders in riffles or in plane-bed sections of the Similkameen River upstream of the reservoir to improve mountain whitefish habitat and recreational fisheries (FISH–02).
- Ensure that logs and other large woody debris can pass over the dam spillway during the annual flood and, if needed, transport some large woody debris around the dam and place it in the river downstream of the dam to provide fish habitat (FISH–03).
- Design the intake trashrack with 1-inch bar spacing so that smaller fish would be able pass safely through the trashrack and larger fish would be discouraged or prevented from passing through the trashracks and turbines (FISH–04).
- Monitor seasonal variation in entrainment susceptibility; observe trauma and mortality caused by entrainment, and monitor reservoir fish populations to relate the entrainment observations with the fish distribution and abundance in the reservoir (FISH–05).
- Install tailrace barrier nets in the powerhouse draft tubes to prevent fish in the tailrace from swimming upstream into the draft tubes during low flows and an inspection and maintenance plan to ensure that the tailrace barrier operates effectively (FISH–06).
- Monitor barrier nets with video cameras to observe if adult salmonids are able to enter the draft tubes past the barrier nets (FISH–07). Develop and implement a written operation plan, a post construction evaluation and monitoring plan, and an inspection and maintenance plan.[7]

[5] A perfectly constant water level would be difficult to achieve because natural events, such as wave action, would likely cause slight fluctuations in the reservoir surface elevation regardless of operational controls.

[6] We used Okanogan PUD's classification of their environmental measures presented in the license application, and they are indicated in parentheses after each measure.

[7] Okanogan PUD proposes to develop and implement the recommended-written operation plan for the tailrace barrier (April 19, 2010) from

• Operate the project in a run-of-river mode so that there are no detectable changes in flows below Similkameen Falls (FISH–08). Avoid flow fluctuations that might affect downstream resources by complying with ramping rate restrictions as recommended by resource agencies.[8] Monitor ramping rate compliance utilizing an existing Washington DOE gage on the Similkameen River.

• Design and place the tailrace to avoid effects on fish that use the plunge pool below Similkameen Falls (FISH–09 and WQ–02).

• Enhance an existing side channel to improve spawning, rearing, and summer thermal refugia downstream of the powerhouse tailrace (FISH–10).

• Implement a gravel supplementation program to increase the amount of gravel in the river downstream of Enloe dam and improve spawning habitat (FISH–11).

• Develop a biological review process, including a Biological Resource Program, and consultation with the Technical Review Group (TRG) comprising the Colville, BLM, Washington DOE, Washington DNR, NMFS, FWS, and Washington DFW (FISH–12).

• Develop a fisheries monitoring database for organizing and storing monitoring data related to aquatic resources (FISH–13).

Terrestrial Resources

• Implement the Vegetation Plan to minimize effects on riparian and wetland vegetation, including goals, the species to be used, methods, and benchmarks of success for botanical resources (BOTA–01).[9]

• Plant riparian vegetation along the west and east banks of the reservoir shoreline to mitigate the temporary loss of habitat while fringe riparian vegetation establishes along the new water line (BOTA–02).

• Return the existing shoreline road to natural conditions to improve wildlife habitat along the reservoir and eliminate the current interruption between the shoreline and upland habitat (BOTA–03, also analyzed as part of REC–13).

• Plant woody riparian species in the riparian area along the abandoned road corridor (BOTA–04).

• Plant woody riparian vegetation along the east and west banks of the reservoir downstream of Shanker's Bend and upstream of the reservoir (BOTA–05).

• Install grazing control measures, including fencing, to protect riparian plantings and sensitive areas from cattle grazing (BOTA–06, also analyzed as part of REC–1).

• Monitor restored areas annually for 5 years and then once again at year 8, and plant additional willows if performance criteria are not met; provide annual reports of the monitoring results to the U.S. Army Corps of Engineers (Corps) and Washington DOE (BOTA–07).

• Employ BMPs during construction to protect riparian and wetland vegetation, including measures such as flagging and temporarily fencing any wetland and riparian vegetation in the vicinity of the project that would reduce or avoid accidental impacts, and limiting construction and maintenance-related disturbance of sensitive habitats to the extent possible to protect these resources (BOTA–08).

• Develop and implement an environmental training program to inform employees and contractor employees who work on the project site or related facilities during construction and operation about the sensitive biological resources associated with the project area (BOTA–09).

• Provide a biological monitor to check construction sites on a weekly schedule to ensure that protected areas are not disturbed and that fencing and other control measures are intact (BOTA–10).

• Implement the Noxious Weed Control Program to control weeds along roads and construction sites (BOTA–11).

• Survey disposal sites and control noxious weeds by implementing control measures prior to spoil disposal (BOTA–12).

• Hydroseed disposal sites using native upland species, following completion of spoil disposal (BOTA–13).

• Strategically place and install the project transmission line to reduce the adverse effects on raptors and other birds (WILD–01).

• Concentrate construction activities to occur in summer and early fall to minimize effects on overwintering birds and bald eagles (WILD–02).

• Conduct pre-disposal site survey for wildlife and time the clearing of vegetation at spoil disposal sites to minimize wildlife impacts (WILD–03).

Threatened and Endangered Species

• Conduct surveys for Ute ladies'-tresses prior to, during, and postconstruction to either confirm that the species does not occur in the areas affected by the project or guide the development of avoidance or mitigative measures (BOTA–14).

Recreation and Land Use

• Implement the Recreation Management Plan, which includes measures for recreation and safety of and access to the project areas (REC–13).

• Revise and implement the Fence Plan in coordination with the Recreation Management Plan to include: (a) Installation of barricades and fencing on the east side of the dam and the area below the dam; (b) use of non-barbed wire at the recreation area; and (c) installation of a stock watering tank north of the proposed recreation site as an alternative source of drinking water for all grazing cattle with rights to this area (REC–01).

• Provide public access downstream of Enloe dam on the east bank by developing a trail to the river below the dam (REC–02).

• Transfer to Okanogan County ownership rights to the trestle bridge that is located on the west side of the river downstream of the dam with certain conditions (REC–03).[10]

• Improve the existing informal boat ramp located on the east bank upstream of the dam (REC–04).

• Clean up and restore wooded area on east bank of the reservoir (REC–05).

• Develop an interpretive publication, in collaboration with Okanogan County, the Greater Columbia Water Trail Steering Committee (Water Trail Committee), and other interested parties, that would include a map illustrating public access and recreation sites (REC–06).

• Remove existing trash and conduct annual cleanup activities within the wooded area on the east bank of the reservoir and along the Oroville-Tonasket Irrigation District (OTID) Ditch Road leading from the Loomis-Oroville Road to the dam site (REC–07).

• Develop a parking area and install a vault toilet, accessible to persons with disabilities, on the east bank and upstream of Enloe dam included in (Okanogan PUD, 2009b) (REC–08).

• Install picnic tables, at least one of which should incorporate universal design principles, near the parking area taking advantage of existing trees for shading (REC–09).

NMFS, Interior, and Washington DFW (February, 26, 2010).

[8] Okanogan PUD proposes to comply with recommended ramping rates (April 9, 2010) from NMFS, Department of Interior, and Washington DFW recommendations (February 26, 2010).

[9] The Vegetation Plan (BOTA–01) contains the measures BOTA–2 through BOTA–7, BOTA–11, REC–01, and AES–04.

[10] Land ownership rights were transferred to Okanogan County in 2007.

• Develop primitive campsites near the parking and picnic area (REC–10).

• At a minimum, install one interpretive sign near the parking and picnic area and one sign near the abutment of the old powerhouse access bridge, below Similkameen Falls (REC–11).

• Place an information board near Enloe dam to depict public access areas and information concerning visitor use of the project area (REC–12).

• Maintain the existing signs and system of safety cables and grab ropes above the dam, install dam safety/warning signs for boaters, and install a log boom across the powerhouse intake channel to protect boaters (SAFETY–01).[11]

• Coordinate with BLM and other land owners, as appropriate, to identify options for preventing public access to the old powerhouse (SAFETY–03).

• Develop and implement a Safety During Construction Plan and allow limited public access to the project during construction (SAFETY–02).

Aesthetic Resources

• Use visually-compatible colors and building materials for construction occurring on the east bank (AES–01).

• Consult with the Colville and other stakeholders during restoration activities (AES–02).

• Use non-reflective surfaces where possible during construction (AES–03).

• Grade and repair all slopes where buildings are removed and plant native grasses and other riparian vegetation (AES–04).

Cultural Resources

• Solicit a new owner for the existing historic powerhouse (HIST–01).

• If a qualified owner is not identified for the existing historic powerhouse, demolish the existing historic powerhouse (HIST–02).

• Install interpretive panels about the existing historic powerhouse (HIST–03).

• Review and reach agreement on the HPMP and incorporate information into a PA (HIST–04).

• Monitor shoreline areas to prevent effects on archaeological sites due to reservoir fluctuations (ARCH–01).

• Avoid known National Register-eligible archaeological sites to prevent effects during construction (ARCH–02).

• Monitor eligible sites during construction activities to avoid effects on these sites (ARCH–03).

• Develop and implement an inadvertent discovery plan, specifying required actions and procedures if a site is discovered during construction and including training staff and construction workers about the potential for discovery of archaeological deposits (ARCH–04).

• Determine if there would be effects on archaeological sites in the vicinity of recreational facilities (ARCH–05).

As we've said, on October 28, 2010, Okanogan PUD filed additional information regarding ongoing consultations with Washington DOE and Washington DFW for the 401 Water Quality Certification process (letter from Dan Boetter, Director, Regulatory and Environmental Affairs, Okanogan PUD, Okanogan, Washington, to Kimberly Bose, Secretary, FERC, Washington, DC, October 28, 2010). In this filing and for the bypassed reach, Okanogan PUD proposes to:

• Provide minimum flows of 30 cfs from mid-July to mid-September, and 10 cfs rest of the year to the pool below Enloe dam.

• Monitor DO and water temperature in the bypassed reach for a period of time postconstruction; and adopt an adaptive management program to enhance DO and water temperatures should monitoring indicate that water quality standards are not being met.

• Determine appropriate thresholds for downramping rates immediately downstream of Enloe dam based on monitoring and field observations prior to operations.

• Select an appropriate minimum flow release location in consultation with fisheries resource agencies (Washington DOE, Washington DFW, Interior, NMFS, BLM, and the Colville), and make appropriate project modifications to provide minimum flow releases.

In this draft EA, staff will consider measures in this filing as Okanogan PUD's minimum flow proposals, and will analyze their effects on environmental resources.

2.2.5 Modifications to Applicant's Proposal—Mandatory Conditions

To date, no mandatory conditions were submitted under sections 4(e) or 18 of the FPA, or section 401 of the CWA.

2.3 Staff Alternative

Under the staff alternative, the project would include the majority of Okanogan PUD's proposed measures, with the exception of placement of boulder clusters in the plane bed section of the Similkameen River upstream of Shanker's Bend and entrainment and resident fish monitoring, along with the following modifications and additions:

Geology and Soil Resources

• Develop and implement a Spoil Disposal Plan after consultation with BLM and other interested parties.

Water Quality

• Develop and file with the Commission, in consultation with the TRG, a water quality monitoring plan including: Selecting the monitoring locations; filing a report at the end of year 5 documenting the results of monitoring and recommendations for the need for continued monitoring development; and conducting water temperature, TDG, and DO monitoring for a period longer than 5 years if needed.

Aquatic Resources

• Revise Okanogan PUD's preliminary Blasting Plan to include preparing a final Blasting Plan after consultation with the TRG.

• Revise Okanogan PUD's proposed large woody debris transport plan to include consultation with the TRG to determine when such transport would be required, the methods to be used for collection and transport of the wood, and the best locations for release of the woody debris downstream of the dam.

• Revise Okanogan PUD's proposed side-channel enhancement plan to include consultation with the TRG to develop the side-channel enhancement plan and file the plan with the Commission, with copies to the agencies, at least 180 days prior to implementation. Implement the plan and incorporate the lands associated with the side channel enhancements in the project boundary (approximately 0.75 acre 5 miles downstream of the dam).

• Revise Okanogan PUD's proposed gravel supplementation program to include consulting with the TRG to develop the gravel enhancement plan.

• Revise Okanogan PUD's Spill Plan to include consultation with BLM and Washington DOE.

• Revise and file with the Commission Okanogan PUD's proposal to design a narrow-spaced intake trashrack to include consulting with Interior and Washington DFW during the final design of the intake structure and trashracks to ensure that fish protection features are included in the final design.

• Develop a project operations compliance and monitoring plan, in consultation with the TRG, to be filed for Commission approval.

Terrestrial Resources

• Revise the Vegetation Plan to file monitoring reports annually for 5 years

[11] All SAFETY measures were proposed by Okanogan PUD in the response to additional information request filed on February 27, 2009.

and in year 8, and provide these reports to the Commission, FWS, BLM, and Washington DFW, and filing for Commission approval, any proposals for further restoration measures.

• Retain dead trees along the reservoir unless they become a hazard and provide 10 artificial perch poles.

Threatened and Endangered Species

• Prepare a Ute ladies'-tresses survey plan after consultation with FWS, BLM, and Washington DFW, and if plant surveys identify the threatened Ute ladies'-tresses in areas that would be affected by the project, file for Commission approval, an additional plan developed, after consultation with FWS, BLM, and Washington DFW, to avoid or minimize adverse effects.

Recreation and Land Use

• Revise the proposed Recreation Management Plan (REC–13) in coordination with the Aesthetics Management Plan and the HPMP, and include consultation with stakeholders. Finalize and implement the interpretive publication as part of the Recreation Management Plan.

• Add to the Recreation Plan an established plow schedule to allow visitors winter access to project lands and waters.

• Develop and implement a recreation use monitoring plan to include consultation with BLM.

• Develop and implement a Fire Suppression Program in consultation with BLM.

• Revise the Safety during Construction Plan to include consultation with BLM and local emergency response agencies.

• Add approximately 5.0 acres to the project boundary incorporating the entire length of the public access road from the Loomis-Oroville Road to Enloe dam to ensure public access throughout the length of any license issued for the project.

• Develop a river access point at Miner's Flat and incorporate approximately 1 acre into the project boundary.

• Remove the one small, deteriorated building on Okanogan PUD land at the north end of the proposed Enloe dam recreation area.[12]

Aesthetics

• Revise the proposed Aesthetics Management Plan in coordination with the Recreation Management Plan and the HPMP to include consultation with the Colville, BLM, and other stakeholders.

• Develop specific approaches concerning the blending of the existing and proposed Enloe Project facilities into the existing landscape character.

• Include these measures at the laydown or construction material storage areas that have yet to be determined.

Cultural Resources

• Revise Okanogan PUD's May 2009 HPMP to include provisions for: (1) Further consideration of the potential effects of capping site 45OK532; (2) a description of the proposed side-channel enhancement site; (3) two separate defined APEs that delineate the proposed Enloe project and the proposed side-channel enhancement site; (4) consultation with the Cultural Resources Working Group (CRWG) regarding the resolution of adverse effects on the historic Enloe powerhouse; (5) re-evaluating the Oroville-Tonasket Irrigation Canal for National Register-eligibility; (6) completing determinations of eligibility for unidentified cultural resources on BLM lands; (7) periodic review of the HPMP; (8) a site monitoring program; (9) cultural interpretative and education measures; and (10) revising the APEs to accommodate modifications to the project boundary, if any.

2.4 Staff Alternative With Mandatory Conditions

To date, no mandatory conditions were submitted under section 4(e) or section 18 of the FPA, or section 401 of the CWA. NMFS and Interior, however, request reservation of authority under section 18.

2.5 Removal of Existing Hydroelectric Facilities Including Enloe Dam

BLM stated that it would require Okanogan PUD to remove the dam and all associated facilities from the public lands under the existing right-of-way permit if a license is not be issued. Removing Enloe dam would affect many resources. We discuss the effects on these resources in section 3.2.

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 (aquatic, recreation, etc.). 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* of the EA.[13]

3.1 General Description of The River Basin

Located in north-central Washington about 2 miles south of the Canadian border, the Enloe Project is situated in a narrow constriction of the Similkameen River Valley, about 3.5 miles northwest of the city of Oroville (figure 1). The project is located predominantly on land administered by the BLM. The Similkameen River is tributary to the Okanogan River just south of Oroville, Washington; the Okanogan in turn flows into the Columbia River east of Brewster, Washington. The Similkameen River drains the east slopes of the Cascade Mountains in northern Washington and southern British Columbia, Canada. The majority (79 percent) of the drainage basin lies within Canada.

Similkameen Falls is located about 370 feet below Enloe dam, and forms a 33-foot-long and 20-foot-high barrier impassible to anadromous fish. Above the dam lies a shallow reservoir with a mean depth of 8.4 feet at the existing dam crest elevation of 1,044.3 feet msl and a maximum depth of 55.6 feet (MaxDepth, 2006); the reservoir is filled with an accumulated sediment volume of approximately 2.43 million cubic yards (MaxDepth, 2006). The existing reservoir is approximately 2 miles long and averages about 250 feet in width.

Topography in the project vicinity has been significantly affected by glaciations and is moderately steep and rugged. In the lower part of the river canyon, steep slopes adjacent to the river are interspersed with relatively flat benches of alluvial or glacial origin. The upper portions of the river canyon are steep and rocky. The mountains of the Okanogan Highlands lie to the east and the North Cascades to the west. Elevations range from 1,000 feet at the mouth of the Similkameen River at Oroville to greater than 3,600 feet at the summits of surrounding mountains.

The climate in the lower Similkameen River Basin is typical of eastern

[12] Measures were proposed by Okanogan PUD in the response to additional information request filed on February 27, 2009.

[13] Unless otherwise indicated, our information is taken from the application for license for this project (Okanogan PUD, 2008a) and additional information filed by Okanogan PUD (2009a–d).

Washington, with cool, moist winters and hot dry summers. The Cascade Mountains act as a barrier to the movement of maritime and continental air masses, creating the generally dry conditions observed in the project vicinity. Average annual precipitation is approximately 11 inches. River flows peak in late spring to early summer when warm temperatures melt the extensive winter snowpacks at the higher elevations in the basin. Low flows occur in late-fall/mid-winter when cold temperatures minimize runoff.

3.2 Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR, section 1508.7), cumulative effect is the impact on the environment which 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 other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application, written and oral comments from scoping, other filings related to the project, and preliminary staff analyses, we have identified water quantity and water quality, aquatic resources including federally listed threatened and endangered fish species, as resources that could be cumulatively affected by the proposed project in combination with other actions and other hydroelectric development on the Similkameen River.

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. For water resources and aquatic resources, including federally listed threatened and endangered fish species, we have identified the Similkameen River Basin as our geographic scope of analysis.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis in the EA includes a discussion of past, present, and future actions and their effects on these resources. Based on the potential term of a license, we will look 30 to 50 years into the future, concentrating on the effect on the 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.

During scoping, Washington DFW, FWS, EPA, BLM, Park Service, U.S. Bureau of Indian Affairs, and CRITFC requested the Commission to consider the effects of the proposed Shanker's Bend Project (Project Number P–12804) in our cumulative effects analysis because it would be located upstream of the Enloe Project. Washington DFW stated that the Shanker's Bend Project is not a run-of-river project; therefore, the Enloe Project would not be a run-of-river project either, and would benefit from the analysis of the Shanker's Bend Project. FWS requested that proposed project operations of the Enloe Project include an analysis of how the proposed Shanker's Bend Project would alter the project operations as defined in the final license application. BLM understands that the Shanker's Bend Project is currently under consideration/study and may be operated in conjunction with Enloe dam; it recommended that the cumulative effects on resources and recreation uses be analyzed. BLM also recommended that the Commission analyze the cumulative effects of other dams operated down-river. CRITFC stated that the Shanker's Bend Project is a "reasonably foreseeable action" and that the Commission must consider a cumulative effects analysis of the Shanker's Bend Project with the Enloe Project.

The Commission issued a preliminary permit to the Okanogan PUD for the Shanker's Bend Project in 2008. The purpose of a preliminary permit is to preserve the right of the permit holder for a period of three years to have the first priority in applying for a license for the project that is being studied. Because a permit is issued only to allow the permit holder to investigate the feasibility of a project while the permittee conducts investigations and secures necessary data to determine the feasibility of the proposed project and to prepare a license application, it grants no land-disturbing or other property rights. Until such time as an application for license is filed with the Commission, there is no project proposal to consider. Whether Okanogan PUD decides to file a development application in the future and whether the Commission would issue a license for this project is speculation and not a reasonably foreseeable action at this time.

Dam Removal Alternative

BLM stated that it would require Okanogan PUD to remove the dam and all associated facilities from the public lands under the existing right-of-way permit if a license is not issued. Removing Enloe dam would affect many resources.

Effects on Water Quality

Approximately 2.43 million cubic yards of sediment are stored behind Enloe dam (MaxDepth, 2006). Much of this sediment is contaminated with high levels of arsenic, cadmium, copper, and other metals. Removal of the dam would release these contaminated sediments to the Similkameen and Okanogan rivers and eventually the Columbia River. Dredging and disposing of the sediments from the reservoir prior to dam removal risks resuspension and transport of some of these sediments to downstream areas. Even if the sediments were dredged prior to dam removal, significant amounts of sediment could remain on the reservoir bottom and would eventually reach the river and be transported downstream.

Effects on Aquatic Resources

The release of the contaminated sediments currently stored behind Enloe dam could have substantial effects on spawning habitat, eggs, fry, juvenile and adult anadromous and resident fish. This effect could seriously damage Chinook salmon essential fish habitat (EFH) and UCR steelhead critical habitat. The duration of the effects of this release of sediments would depend largely on flow and volume of material captured in the channel as bedload. Equilibrium would eventually be achieved, and removing Enloe dam would eventually provide for the free flow of gravel, large woody debris, and sediments downstream of the current dam location. Increased gravel input below Similkameen Falls would improve the spawning habitat for anadromous fish. Increased input of large woody debris downstream of the falls would also benefit anadromous and resident fish by providing habitat structure. Dam removal would also affect the nature of the current reservoir by returning it to a riverine state. Water velocity in the reservoir area would increase, while water temperature may be slightly cooler. Slower water habitats along the edges of the reservoir would disappear as the water recedes into a more defined channel. Fish species composition would shift, as the

available habitat may select for fish that prefer faster moving, cooler water.

Dam removal would have no effect on anadromous fish passage in the Similkameen River. There are no anadromous fish found directly downstream of the dam due to the presence of Similkameen Falls, which acts as a natural barrier to anadromous fish passage. If the dam were removed, resident fish would be able to move freely from the current reservoir reach, downstream to the rest of the river.

Effects on Terrestrial Resources

The change in water surface elevation with dam removal would result in the loss of existing wetland and riparian habitat along the reservoir. The death of large trees in the existing riparian forest community would provide cavities and snags that would be valuable wildlife habitat components. Over time, riparian and wetland vegetation would re-colonize the edge of the river, replacing the lost habitat.

The decrease in the water surface elevation would likely make the existing potential Ute ladies'-tresses habitat along the reservoir too dry to support the plant. New potential habitat for this species would likely be created, but the extent of the new habitat is unknown.

Effects on Recreation

Removing Enloe dam would change the recreational opportunities associated with the site. Returning the reservoir above the dam into a free-flowing river would affect a variety of recreation opportunities including: Fishing, boating, hiking, camping, and wildlife watching. Dam removal will change angling opportunities by changing fisheries habitat from reservoir to riverine and the associated fish species available to anglers. Similarly, some boaters seek flat water experiences (motor or paddle) while others prefer whitewater. Opportunities to engage in flat water experiences are available at nearby Lakes Wannacut, Palmer, and Osoyoos. Hiking and camping experiences are influenced by nearby water bodies through the sounds of rushing water or the opportunity to swim in a reservoir. Additionally, the flora and fauna associated with the site would change, thus modifying the species available for nature study.

Effects on Aesthetics Resources

Removal of Enloe dam would change the aesthetic character associated with the site. The current reservoir lakebed would be dewatered, changing the character of the former lakebed to a vegetative environment with a free-flowing river. Fall flows would remain at the falls. This new view would be seen from the Loomis-Oroville road and the Pacific Northwest National Scenic Trail (Scenic Trail).

Effects on Cultural Resources

Removing the National Register-listed Enloe dam would result in an adverse effect on this historic property. Additionally, removal of the dam could result in the exposure of currently inundated and as yet unidentified cultural sites, including properties of traditional religious and cultural importance to the Colville. This action could expose these resources to the public, resulting in illicit artifact collection and site vandalism.

Effects on Socioeconomics

Dam removal would likely result in a negligible effect on the recreation and tourism industry in Okanogan County. Currently, fishing occurs primarily in the lower reaches of the Similkameen River, below the Enloe dam. Creation of aesthetic and recreation resources due to a shift from a reservoir to a riverine environment would indirectly affect recreational use of the project resources and associated expenditures (such as, a fee for a fishing license) and therefore, the local economy should continue to benefit from these expenditures.

With dam removal, there would be no loss of property value to residents because the majority of land ownership within the Enloe Project boundary is administered by federal or State agencies and there are no residents that border the Enloe dam.

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 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 EA. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

The complex structure and lithology along the Similkameen River above and below Enloe dam reflect its position at the boundary of several distinct physiographic and lithological regions. The dam is located within the Cordilleran fold and thrust belt (Bayer, 1983) of northwestern North America. In this region, successive episodes of accretion, volcanic-arc mountain building, and back-arc deposition have created a complex physiography.

Enloe dam is situated on the Similkameen River near the boundary of the Cascade Range and Columbia mountains physiographic provinces where they converge around the 49th parallel, separating the Canadian Interior plateaus from the Lava plateaus of eastern Washington and Oregon, western Idaho, and northern California.

Geology

Along the narrow valley section of the Similkameen River downstream of Palmer Lake and upstream of Enloe dam, the uplands are composed primarily of Triassic-Permian metasedimentary and metavolcanic rocks of the Kobau Formation, interspersed with Jurassic metavolcanic, intrusive, and sedimentary rocks, Eocene conglomerate and Eocene intrusive dacite. Much of the valley and sideslopes are mantled in Quaternary glacial drift. The complicated structure is the result of late Triassic or early Jurassic accretion of Paleozoic and Mesozoic volcanic archipelagos accompanied by regional metamorphism and plutonism, subsequent overlayering of late Cretaceous and early Tertiary volcanic and sedimentary rocks, and Quarternary erosion and deposition resulting from continental glaciation.

In the immediate vicinity of the impoundment, highly deformed Triassic/Permian metamorphic rocks of the Kobau and Spectacle formations are unconformably overlain by Jurassic/Cretaceous metaconglomerate and metavolcanic rocks of the Ellemeham Formation. These are in turn again unconformably overlain by Eocene sandstone and conglomerate, and the latter are again unconformably overlain by Quaternary glacial drift, colluvium, and alluvial deposits.

Within the impoundment itself, from Shanker's Bend downstream to approximately 1,600 feet above the dam, the Similkameen River lies at the boundary of the Kobau and Ellemeham formations (between 1,600 feet above and 1,000 feet below the dam). The stretch of the river flows over Eocene sandstone and conglomerate. Enloe dam is located above the falls on resistant Eocene granitic-clast conglomerate. Downstream of the dam and falls, the river again flows over Triassic/Permian metamorphic rocks of the Kobau and Spectacle Formations.

Soils

Most of the soils present within or adjacent to the proposed project boundary are classified as Nighthawk loam or Nighthawk extremely stony loam. Ewall loamy fine sand and Lithic Xerochrepts–Nighthawk complex soils and riverwash and rock outcrop areas are also present within or adjacent to the project boundary.

Nighthawk loam soils are formed in glacial till deposited over shale and are present just upstream of the dam and upstream of Shanker's Bend. These soils are deep and well drained. Nighthawk loam soils with 3 to 8 percent slopes are characterized by slow runoff and present a slight erosion hazard. Nighthawk loam soils with 8 to 15 percent slopes are characterized by medium runoff and present a high to very high erosion hazard.

Nighthawk extremely stony loam soils are generally formed in glacial till and are located adjacent to the dam and powerhouse and a portion of Shanker's Bend. These soils are deep and well drained. Nighthawk extremely stony loam soils with 8 to 25 percent slopes are characterized by medium runoff and present a high to very high erosion hazard. When slopes reach 25 to 65 percent, these soils are characterized by rapid to very rapid runoff and present a high to very high erosion hazard.

Ewall loamy fine sand soils are formed in glacial outwash sand and are located in a small area immediately downstream of Shanker's Bend. These soils are deep and excessively drained. Ewall loamy fine sand soils with 0 to 15 percent slopes are characterized by slow runoff, and present a slight erosion hazard and a high soil-blowing hazard.

Lithic Xerochrepts soils are generally shallow and well drained and are located downstream of the dam. Lithic Xerochrepts-Nighthawk complex soils with 15 to 45 percent slopes are characterized by medium runoff and present a moderate erosion hazard.

Areas classified as riverwash and rock outcrops are also present within or adjacent to the project boundary. Riverwash consists of coarse sand and gravelly alluvium. Rock outcrop areas contain little or no shallow soil material.

Geologic Hazards

Enloe dam is located in an area of historically low seismicity. Peak ground acceleration with a 2 percent probability of occurrence in 50 years is approximately 0.16 times the force of gravity (g) and peak ground acceleration with a 10 percent probability of occurrence in 50 years is approximately 0.07 g (U.S. Geological Survey (USGS), 2002). Localized faults have been mapped in upland areas adjacent to Similkameen Valley. An active fault is present in the conglomerate bedrock approximately 100 feet downstream of the proposed tailrace outlet. The fault does not displace overlying glacial drift, which indicates that it has not been active in more than 10,000 years.

No significant historical earthquakes (magnitude 5.5 or intensity VI or larger) have been recorded within 50 miles of the dam since 1568 (USGS–NEIC, 2007 a, b).

During geological field mapping conducted in December 2006, some seepage was detected along joints and bedding planes in the conglomerate and sandstone that form the east abutment of the dam (Christensen Associates, 2007). Okanogan PUD proposes to grout and stabilize these areas during the construction of proposed facilities.

Some of the soils adjacent to the Similkameen River present high to very high erosion potential. Nighthawk extremely stony loam soils that occur on slopes in excess of 8 percent have a high to very high erosion hazard. Nighthawk extremely stony loam soils are present upstream of Shanker's Bend, adjacent to portions of Shanker's Bend, and on either side of the river adjacent to the dam, and proposed intake location. Landslide or mass wasting hazards are most likely to occur in these areas; however, no signs of recent instability were noted during the December 2006 geological field investigations (Christensen Associates, 2007).

3.3.1.2 Environmental Effects

Okanogan PUD's proposed land-disturbing activities associated with the construction of project facilities (new crest gates on Enloe dam, new east-bank approach channel, new intake structure, new intake canal, new penstock intake, new penstocks, new powerhouse, new tailrace channel, a short section of new road, modifications to existing project roads, and improvements to existing recreation areas) could cause erosion and sedimentation.

Okanogan PUD proposes to develop and implement the ESCP (WQ–06) to minimize the effects of land-disturbing activities associated with construction of new facilities, as well as modifications and improvements to existing facilities. The plan would also be implemented during project operation and maintenance. Okanogan PUD also proposes to develop and implement the CSMP (WQ–08) to minimize sediment disturbance and maximize sediment containment during construction. In response to agencies' comments and recommendations, Okanogan PUD developed a Spill Response Plan and a Storm Water Pollution Prevention Plan (see section 3.3.2.2, *Water Quality*). The resource agencies recommend that the sediment excavated for project construction be tested for arsenic, copper, cadmium, zinc, and lead; and that the sediments be stored on site until test results are known so that sediments can be disposed of properly.

BLM recommends that Okanogan PUD develop and implement a Spoil Disposal Plan prior to any construction activities that may affect the BLM-administered public lands. The plan would address disposal and/or storage of waste soil and/or rock materials (spoils) generated by road maintenance, slope failures, and construction projects. A Spoil Disposal Plan would include provisions for the following: (1) Identifying and characterizing the nature of the spoils in accordance with applicable BLM regulations; (2) identifying sites, including locations of the public lands, for the disposal and/or storage of spoils so contamination of water by leachate and surface water runoff can be prevented; and (3) developing and implementing stabilization, slope reconfiguration, erosion control, reclamation, and rehabilitation measures.

Our Analysis

As we've said, land-disturbing activities associated with project construction, operation and maintenance, and soils within the project area are susceptible to soil erosion and sedimentation. Excavated materials could possibly contain higher levels of arsenic, copper, cadmium, zinc, and lead than is acceptable under the criteria of the U.S. EPA's Maximum Contaminant Level.

Okanogan PUD's proposal to finalize and implement the ESCP (WQ–06) and the CSMP (WQ–08) would lessen the potential effects associated with land-disturbing activities during project construction, modifications, and improvements of project facilities, as well as during project operation and maintenance.

Our analysis of the Spill Response and Storm Water Pollution Prevention Plans are discussed in section 3.3.2.2, *Water Quality*.

BLM recommends that Okanogan PUD consult with BLM for the development and implementation of a Spoil Disposal Plan prior to any construction activities that may affect the BLM-administered public lands. This plan would ensure that there would be little or no effects from

excavated materials on water quality or the surrounding environment within the project boundary.

3.3.2 Water Quantity and Quality

3.3.2.1 Affected Environment

The drainage area of the Similkameen River above Enloe dam is approximately 3,575 square miles most of which is in British Columbia. The headwaters of the Similkameen River Basin occur in rugged terrain along the international boarder and to the north. Much of the upper basin is used for timber harvest, mining, and grazing. The river valley widens near Princeton, British Columbia. Irrigation of agricultural land is a primary water use upstream of Nighthawk, Washington, located about 9 miles upstream of the project. Existing uses in Canada include aquatic and wildlife habitat, stock watering, domestic water supply, agriculture and mining.

Water Quantity

On average approximately 78 percent of the annual flow on the Similkameen River occurs from April through July (table 2). Minimum flows occur between late summer (August) and stay low through early spring (March) until the snowmelt season begins in April, peaking in late May or early June. The maximum average monthly flow was 24,900 cfs in June 1972, while the minimum average monthly flow was 191 cfs in September 2003.

TABLE 2—SUMMARY OF SIMILKAMEEN RIVER FLOWS AT THE USGS NIGHTHAWK GAGE NO. 12442500, 1929–2005

(Source: Okanogan PUD, 2008a)

Month	Mean	Median	Maximum daily	Minimum daily
October	697	576	8,430	161
November	938	681	14,400	160
December	798	576	12,400	120
January	659	540	5,270	120
February	682	551	7,790	120
March	746	600	5,260	290
April	2,086	1,390	26,400	297
May	2,086	1,390	26,400	539
June	8,597	7,580	44,800	1,160
July	2,965	2,220	15,800	408
August	916	764	3,770	195
September	596	514	2,430	164

Note: The Nighthawk gage is located about 7 miles upstream of the project with a drainage area of about 3,550 square miles.

The maximum recorded average daily flow was 44,800 cfs on June 1, 1972, when the peak instantaneous flow was estimated to be 45,800 cfs at a stage height of 18.0 feet above the approximate channel bottom. The minimum recorded daily flow was 65 cfs on January 3, 1974; this abnormally low flow was attributed to ice effects.

The mean annual flood (at the Nighthawk gage), between 1929 and 2005, was 16,100 cfs. Annual maximum mean daily discharges range from a low of 4,590 cfs (June 8, 1941) to a high of 44,800 (June 1, 1972). The water level recorded was 13 feet above the spillway crest at Enloe dam during the 1972 flood. The calculated return period of the 1972 flood is approximately 180 years.

Annual instantaneous peak flows at the Nighthawk gage have occurred almost exclusively (except on October 21, 2003) during spring and early summer for the period of record. The earliest recorded peak event occurred on April 26, 1934, while the latest occurred on June 23, 1967. The mean/median peak flow day for the period of record was May 28, although for the last 20 years (1987–2006), the mean/median peak flow day occurred about one week earlier (May 22). However, winter floods associated with the inland penetration of coastal storms have occasionally been of similar magnitude to these spring and early summer freshets. The winter floods, although less common, are usually associated with ice flows and snowmelt runoff.

Certified water rights on the Similkameen River are listed in table 3. Okanogan PUD holds senior water rights on the river, a 1,000-cfs water right with a priority date of 1912 for power generation purposes. The proposed project maximum hydraulic capacity is 1,600 cfs. Thus, Okanogan PUD would need to obtain an additional 600-cfs water right for non-consumptive use in order to divert the maximum hydraulic capacity for the project.

TABLE 3—SIMILKAMEEN RIVER WATER RIGHTS

(Source, Okanogan PUD, 2008a)

Document No.	Status	Priority (year)	Flow (cfs)	Acre-feet/year	Purpose	Acres irrigated	Owner
CCVOL1P243	Certificate (Change)	1912	1,000		PO		Okanogan PUD
S3–22053C	Certificate	1973	1.5	372	IR, SW	80	Private
S4–26618C	Certificate	1980	1	202	IR, SW	50	Private
SWC00723	Certificate	1930	0.5	—	IR	12	Private
SWC03557	Certificate	1948	0.05	—	IR	7.5	Private
SWC06242	Certificate	1955	0.05	—	DS, IR	3	Private
SWC09018	Certificate	1955	2	400	IR	100	Private
SWC09834	Certificate	1966	1.4	280	IR	70	Kernan Farms

TABLE 3—SIMILKAMEEN RIVER WATER RIGHTS—Continued

(Source, Okanogan PUD, 2008a)

Document No.	Status	Priority (year)	Flow (cfs)	Acre-feet/year	Purpose	Acres irrigated	Owner
Total of all Certificates:			6.5	1,254		322.5	

Notes: DS—Domestic
IR—Irrigation
SW—Stock water
PO—Power

Enloe reservoir occupies a narrow, channelized basin and has a very high inflow/volume ratio; therefore, the reservoir is more river-like than lake-like in character. The mean hydraulic residence time is estimated to be about 2.4 hours for the mean annual flow of 2,290 cfs, 45 minutes for the mean annual peak flow of 16,100 cfs, 7.3 hours for the mean September flow of 596 cfs, and more than 20 hours for flows less than 200 cfs (table 4).

TABLE 4—ENLOE RESERVOIR CHARACTERISTICS AT EXISTING AND PROPOSED OPERATIONS AND SPILLS

(Source: Okanogan PUD, 2008a)

Location	Reservoir elevation (feet msl)	Reservoir length (miles)	Reservoir shoreline length (miles)	Reservoir surface area (acres)	Reservoir mean depth (feet)	Reservoir maximum depth (feet)	Reservoir volume (acre-feet)
At existing dam crest elevation	1,044.3	2.0	4.1	60.1	8.4	54.3	507
At mean annual flow of 2,290 cfs	1,046	2.1	4.2	67.1	9.1	56.0	613
During proposed low-flow project operations	1,048.3	2.2	4.8	76.6	10.1	58.3	775
During spill periods	1,050.3	2.3	4.9	88.3	10.6	60.3	938

Most of the bed-surface substrate is medium sand, with a typical (median) diameter of 0.4 millimeter (mm); gravel is present at the upstream end of the reservoir near Shanker's Bend and at depth within the accumulated sediment. The volume of stored sediment is estimated to be around 2.4 million cubic yards.

Groundwater in this sub-basin is primarily supplied from glacial and alluvial deposits in the lower valley areas. The Similkameen River once flowed southward through the valley now occupied by Palmer Lake and Sinlahekin Creek. During the last glaciation, the river was rerouted through several temporary channels until it finally settled into its current channel as the glacier retreated. Glacial and alluvial deposits in the original channel and the temporary channels are several hundred feet thick with moderate to high yield aquifers. The alluvial and glacial deposits are composed largely of fine sand, silt, and clay, with some thin lenses of coarse sand and gravel. Permeability and yields can be quite high.

In places where there is a lack of glacial or alluvial deposits, groundwater is scarce. Subsurface rock consists of metamorphic, granitic, and consolidated sedimentary rock with low permeability and porosity.

During low flow periods, very little flow is added to the river between the USGS Nighthawk gage (RM 15.8) and the Washington DOE flow gage at RM 5.0, indicating that groundwater discharge is not a significant contributor to flow in the lower Similkameen River. The City of Oroville withdraws its municipal water supply from a well field located at the confluence of the Similkameen and Okanogan rivers. The wells are considered to be in continuity with the Similkameen River. Groundwater would not be affected by the project regardless of its location relative to the river or degree of continuity because the project would operate in a run-of-river mode and would not affect flows or recharge.

Water Quality

This section describes existing water quality in the lower Similkameen River and focuses on water quality characteristics that could be influenced by project construction and operation: Temperature, DO concentration, total dissolved gas concentration, and contaminants associated with river sediments.

Water Temperature

Water temperatures in the Similkameen River upstream of the project can exceed freshwater aquatic life criteria during the summer months, and water temperatures generally increase from upstream to downstream. Okanogan PUD conducted water temperature monitoring in the project area from late spring through early fall of 2006 to characterize potential project effects on the water temperature regime. The monitoring study was designed to measure changes in water temperatures in the Similkameen River as it flowed through the project area.

One of the designated uses for the Similkameen River is salmonid spawning, rearing, and migration. The aquatic life maximum water temperature criterion set by Washington DOE to protect this use is 17.5 degrees Celsius (°C), measured by the 7-day average of the daily maximum temperatures (7-DADMax). When a water body's temperature is warmer than the criterion and that condition is due to natural conditions, human actions (considered cumulatively) may not cause the 7-DADMax temperature of that water body to increase more than 0.3 °C. In applying this standard to hydroelectric projects, Washington DOE has interpreted natural conditions to be

the water temperature regime before construction of any dams or other human influences.

Washington DOE has identified the Similkameen River below Enloe dam as a water body requiring special protection for salmonid spawning and incubation (Okanogan PUD, 2008a). This special criterion identifies a maximum 7-DADMax temperature of 13 °C at the initiation of spawning for salmon and at fry emergence for salmon and trout. A maximum 0.3 °C increase also applies to the seasonal criteria for spawning and incubation. This requirement is applied to the Similkameen River from February 15 through June 15.

The 2006 monitoring results showed that the Similkameen River exceeded the 17.5 °C criterion both upstream and downstream from Enloe dam from late June through mid-September, with additional exceedances in late-September (figure 2). The highest temperature of 26.9 °C was recorded both at China Rock (RM 12.2) upstream from the project site, and at the bridge in Oroville (RM 5.3) downstream from the project site.

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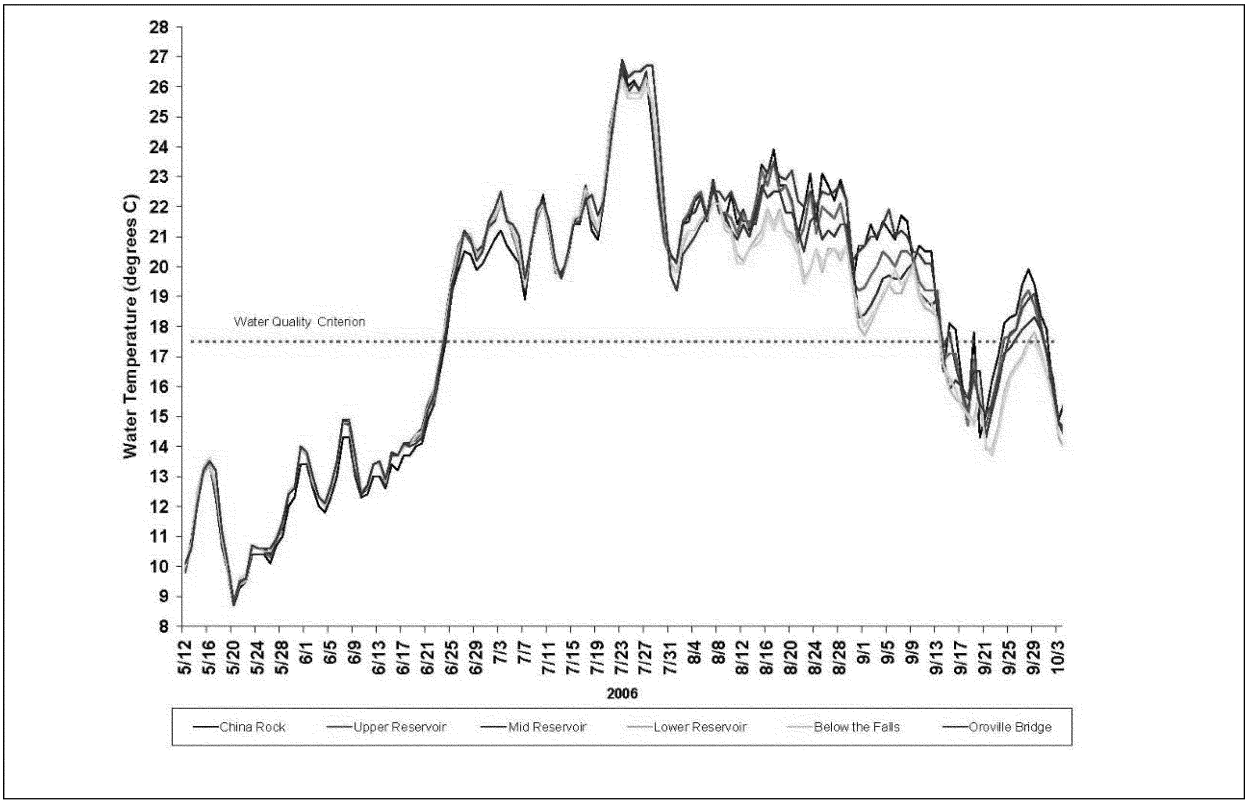

Figure 2. Daily maximum temperatures at the 2006 monitoring locations (Source: Okanogan PUD, 2008a).

Comparisons of 7-DADMax temperatures at different monitoring stations indicate that water temperatures did not increase through the project area by more than 0.3 °C at any time during the 2006 monitoring season, and all stations showed a similar trend in temperatures. The 7-DADMax temperatures decreased after August 4, although remained above the 17.5 °C criterion for most of the remainder of the monitoring period.

Figure 3 plots the 7-DADMax temperatures at the upper end of the reservoir (RM 10.3) and the lower end of reservoir (RM 9.1).

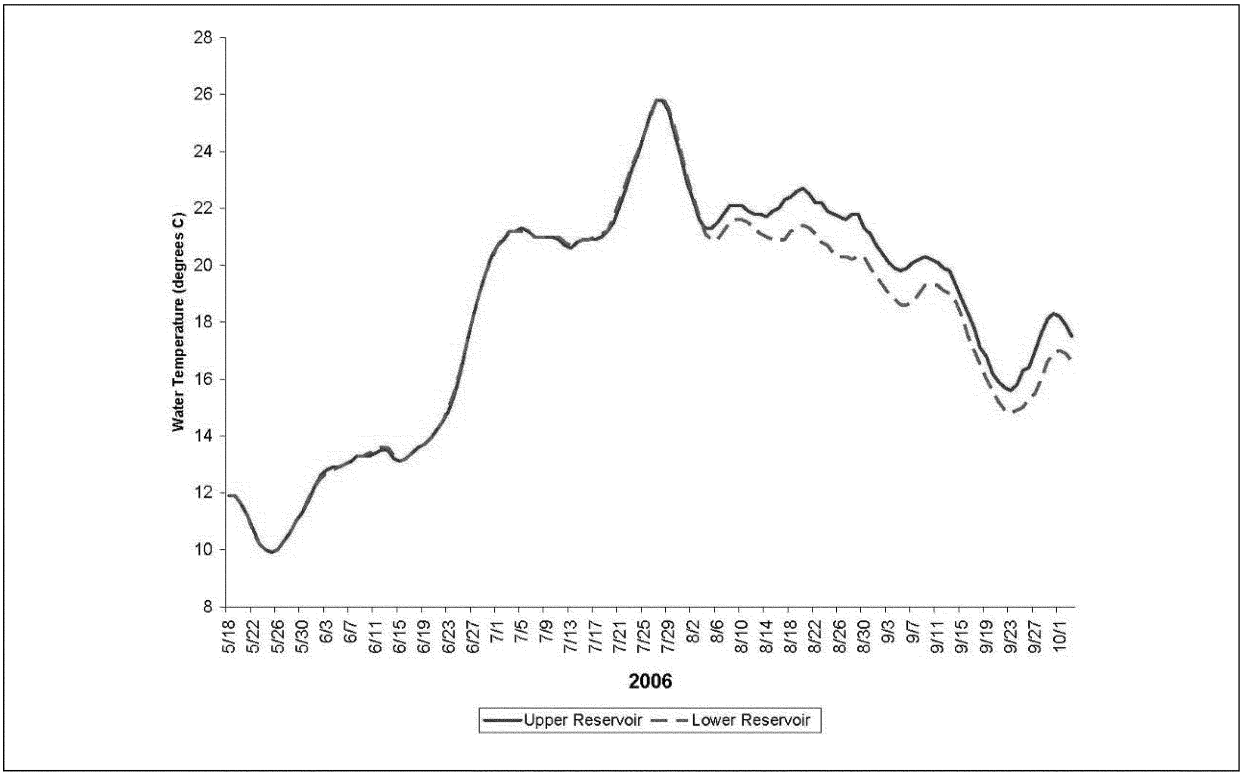

Figure 3. 7-DADMax temperatures in the lower end of the Enloe reservoir (RM 9.1) and at the upper end of the reservoir (RM 10.3) (Source: Okanogan PUD, 2008a).

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Dissolved Oxygen

The Water Quality Standards for Surface Waters for Washington state that the 1-day minimum DO concentration for salmonid spawning, rearing, and migration is 8.0 milligram per liter (mg/L) (Chapter 173–201A Washington Administrative Code). When a water body's DO concentration is lower that this criterion and that condition is due to natural conditions, human actions considered cumulatively may not cause the concentration to decrease more than 0.2 mg/L.

Okanogan PUD measured DO profiles on September 14 and 15, 2006, in the vicinity of Enloe dam. All measurements were above the 8.0 mg/L minimum water quality standard. As expected, the DO concentrations were higher where colder water was encountered in the morning hours below the dam and at China Rock upstream of the reservoir. Warmer water and lower DO concentrations were measured in the afternoon hours in the reservoir pool above the dam.

Total Dissolved Gases

The Water Quality Standard for Surface Waters for Washington State requires that TDG shall not exceed 110 percent of saturation at any point of sample collection (Chapter 173–201A Washington Administrative Code). The TDG criteria contained in the standards do not apply when the stream exceeds the 7-day, 10-year frequency flood. The standards provide allowances for the criteria to be adjusted to aid fish passage over hydroelectric dams when consistent with a Washington DOE approved gas abatement plan. However, this allowance does not apply to the Enloe Project because it would not provide spill to aid fish passage.

TDG concentrations measured between May 26 and 30, 2006, were below the 110 percent saturation water quality criterion in the lower reservoir (RM 9.1) and between Enloe dam and the falls (RM 8.9), but exceeded the criterion below the falls (RM 8.8) and below the railroad trestle at the mouth of the canyon downstream from the project area (RM 6.7). Flows ranged between 10,700 cfs at Nighthawk and 12,100 cfs at Oroville on May 26, 2006, to 8,780 cfs at Nighthawk and 9,640 cfs at Oroville on May 30, 2006. TDG levels increased by 3 to 7 percent of saturation after flowing over Enloe dam but remained below the water quality criterion, with mean hourly TDG levels ranging from 106.1 to 108.7 percent of saturation between the dam and the falls.

TDG increased substantially after flowing over the falls, increasing by an additional 12 to 14 percent of saturation. Downstream of the falls, mean TDG levels ranged from 118.5 to 120.7 percent of saturation. This TDG increase below the falls is due to the additional turbulence caused by the falls and the plunging flow into a deep pool where the increased pressure causes bubbles to dissolve. Near the railroad trestle located about 2.2 miles downstream of the falls, the mean TDG saturation was slightly lower (115.3 to 116.2 percent of saturation), but still remained above the criterion. Table 5 provides the results of Okanogan PUD's TDG sampling.

A generalized longitudinal profile adapted from a 1934 USGS survey indicates that the river drops 46 vertical feet in the 1.6-mile reach upstream from the dam. This steep gradient suggests that historically turbulent flows in the reservoir reach before impoundment likely created aeration and may have contributed to increased TDG saturation above the 110 percent criterion during high flows. Thus, TDG saturation above 110 percent was likely a naturally occurring condition below the falls before the dam was built.

Contaminated Sediments

Contamination from historical mining operations in the Similkameen River watershed has resulted in arsenic concentrations exceeding water quality criteria in samples from Chopaka Bridge in British Columbia (RM 36.1) and Oroville, Washington (RM 5.0) (Peterschmidt and Edmond, 2004; Johnson, 2002). Washington DOE has completed a total maximum daily load (TMDL) evaluation and prepared a draft plan to address the arsenic contamination. The loading capacity for the river was set equal to the natural background concentration of arsenic (i.e., 0.4 to 0.6 microgram per liter total recoverable arsenic), because arsenic levels naturally exceed water quality criteria. The greatest amount of arsenic loading identified by the TMDL evaluation was caused by resuspension of sediments in the vicinity of Palmer Creek at RM 20, approximately 10 miles upstream from the project area.

TABLE 5—SUMMARY OF TOTAL DISSOLVED GAS MEASUREMENTS NEAR ENLOE DAM FROM MAY 26–30, 2006

[Source: Okanogan PUD, 2008a]

Time and location	One-hour mean TDG saturation (percent)			
	May 26 and 27	May 28	May 29	May 30
a.m.:				
Lower reservoir	103.4	101.9	102.0	101.1
Between dam and the falls	107.6	.....	106.2	106.8
Below the falls	129.7	119.6	118.9	118.5
Below railroad trestle	116.2	115.9	115.6	115.3
p.m.:				
Lower reservoir	102.0	103.3	103.3	102.5
Between dam and the falls	108.7	.....	106.1	106.8
Below the falls	120.7	120.6	120.0	119.4
Below railroad trestle	116.2	116.1	115.8	116.0

An analysis of shallow sediment core samples for trace metals, performed for the Colville, confirmed arsenic contamination in the Similkameen River and Palmer Creek upstream from Nighthawk, Washington. Copper also exceeded a Colville sediment quality standard in several samples, and cadmium exceeded the standard in one sample.

There are no established state regulatory criteria for chemical contaminants in freshwater sediments; however, several sediment quality values have been used to indicate potential toxic effects to aquatic life. The current Colville Tribal Code contains sediment cleanup levels both for the protection of human health and for the protection of sediment-dwelling organisms. The Colville adopted cleanup screening levels for eight metals, including arsenic, cadmium, and copper. Washington DOE also set non-regulatory sediment quality values and cleanup screening levels for freshwater sediment (Michelson, 2003, in Okanogan PUD, 2008a). Okanogan PUD collected sediment samples in 2007 that were analyzed for pesticides, arsenic, cadmium, and copper. The sample results, along with the Colville criteria and Washington DOE non-regulatory sediment quality values are presented for comparison in table 6.

TABLE 6—SUMMARY OF PRELIMINARY ENLOE DAM SEDIMENT TRACE METALS RESULTS

[Source: Okanogan PUD, 2008a, as modified by staff]

PMX sample ID	River mile (RM)	ARI sample ID	Depth (feet)	Milligrams per kilogram (mg/kg)		
				Arsenic	Cadmium	Copper
Shallow Core Samples:						
EDSG01	10.6	07–16068–LK08A	0 to 1	15.7	[a] 0.3U	22.3
EDSG02	10	07–16069–LK08B	0 to 1	23.5	0.3U	33.3
VanVeen Grab Samples:						
EDSG03	9.4	07–16070–LK08C	0 to 0.5	11.2	0.2	18.4
EDSG05	9.0	07–16071–LK08D	0 to 0.5	20.4	0.3U	27.9
EDSG06	9.0	07–16072–LK08E	0 to 0.5	10.0	0.3U	17.1
EDSG08 [b]	9.0	07–16073–LK08F	0 to 0.5	9.2	0.3U	17.2
Freeze Core Samples:						
EDSC04–0–4	9.0	07–16099–LK13A	0.0 to 5.0	8.8	0.2U	16.3
EDSC04–4–8	9.0	07–16100–LK13B	5.0 to 6.6	29.3	0.4	47.5
EDSC04–8–12	9.0	07–16101–LK13C	6.6 to 8.0	10.3	0.2U	16.2
EDSC08–0–4 [c]	9.0	07–16102–LK13D	0.0 to 5.0	7.0	0.2U	13.6
EDSC08–8–12 [d]	9.0	07–16103–LK13E	6.6 to 8.0	8.6	0.2U	16.0
Surface Grab Samples Below Enloe Dam (RM 8.9):						

TABLE 6—SUMMARY OF PRELIMINARY ENLOE DAM SEDIMENT TRACE METALS RESULTS—Continued

[Source: Okanogan PUD, 2008a, as modified by staff]

PMX sample ID	River mile (RM)	ARI sample ID	Depth (feet)	Milligrams per kilogram (mg/kg)		
				Arsenic	Cadmium	Copper
07–16081–LK11A	8.7	SR–1	0.0 to 0.1	24.8	0.3	31.8
07–16082–LK11B	8.2	SR–2	0.0 to 0.1	9.3	0.3U	16.0
07–16083–LK11C	7.6	SR–3	0.0 to 0.1	10.6	0.2U	15.9
07–16088–LK11H[e]	7.6	SR–8	0.0 to 0.1	10.4	0.3U	14.4
07–16084–LK11D	6.8	SR–4	0.0 to 0.1	9.1	0.3U	15.1
07–16085–LK11E	6.6	SR–5	0.0 to 0.1	8.2	0.3U	12.8
07–16086–LK11F	6.1	SR–6	0.0 to 0.1	9.5	0.3U	15.1
07–16087–LK11G	5.7	SR–7	0.0 to 0.1	13.1	0.3U	17.3
Freshwater Sediment Quality Values:						
Sediment Quality Standard[f]				20	0.6	80
Cleanup Screening Level[f]				51	1	830
Cleanup Screening Level[g]				9.79	0.99	31.6
Probable Effect Concentration[h].				33	4.98	149

Notes:
[a] Results with "U" were not detected in the sample at the accompanying detection limit.
[b] Duplicate of EDSG06.
[c] Duplicate of EDSC04–0–4.
[d] Duplicate of EDSC04–8–12.
[e] Duplicate of SR–3.
[f] Michelsen, 2003.
[g] Colville, 2003.
[h] MacDonald *et al.,* 2000.

Cadmium was detected in 3 of 15 samples, but in all cases was below the Colville criterion and Washington DOE sediment quality values (table 6). Pesticides were not detected in any sample.

Copper was detected in all samples, and in all cases was below sediment quality values. Three samples exceeded the Colville copper criterion, but were below the sediment quality standard proposed by Michelsen (2003).

Arsenic exceeded the Colville criterion in 11 of the 15 samples; and 4 of 15 exceeded Washington DOE's lower sediment quality value. All arsenic concentrations were below levels known to cause adverse effects; however, several of the arsenic concentrations were in the range where there could be a potential for adverse effects. Samples from the 2007 study contained higher concentrations of each trace metal than corresponding samples from the 2002 study (Johnson, 2002). This was likely due to the 2007 sediment samples containing more fine organic particles mixed with the sand and silt.

Fine organic particles were most evident in the 2007 study in a freeze core sample taken from between 5.0 and 6.6 feet deep near the site of the new intake structure. This sample had a darker color, finer texture, an organic odor, visible organic material in various stages of decomposition, and higher concentrations of arsenic and copper. This core sample was collected from the area of the reservoir where buried sediments are most likely to be disturbed during project construction. To a lesser degree, deposits of fine organic material were observed in a patchy distribution in areas throughout the reservoir and on sandbars downstream from Enloe dam.

In addition to the analysis of contaminant concentrations in the sediment, the same contaminants were analyzed in the water column using the Dredging Elutriate Test to mimic water column concentrations that could occur if sediments were disturbed by dredging (table 7). As with the bulk sediment samples, pesticides were not detected in any elutriate sample. Cadmium was detected at the detection limit in several samples, but was well below the water quality criteria in all samples. Arsenic was detected in all samples, but was also well below the water quality criteria. Copper was detected in all samples, and exceeded both chronic and acute criteria in 5 of the 8 primary samples. All elutriate samples exceeded the arsenic and copper concentrations in the ambient water sample from mid-reservoir.

TABLE 7—SUMMARY OF PRELIMINARY ENLOE DAM SEDIMENT ELUTRIATE RESULTS

[Source: Okanogan PUD, 2008a]

PMX sample ID	ARI sample ID	Depth (feet)	Microgram per liter (μg/L)		
			Arsenic	Cadmium	Copper
Shallow Core Samples:					
EDSG01	07–16494–LK86A	0 to 1	12.5	0.2	12.1
EDSG02	07–16495–LK86B	0 to 1	29.1	0.2	28.2
VanVeen Grab Samples:					
EDSG03	07–16496–LK86C	0 to 0.5	5.6	[a] 0.2U	4.6

TABLE 7—SUMMARY OF PRELIMINARY ENLOE DAM SEDIMENT ELUTRIATE RESULTS—Continued

[Source: Okanogan PUD, 2008a]

PMX sample ID	ARI sample ID	Depth (feet)	Microgram per liter (μg/L)		
			Arsenic	Cadmium	Copper
EDSG05	07–16497–LK86D	0 to 0.5	20.9	0.2	28.1
EDSG06	07–16498–LK86E	0 to 0.5	7.5	0.2U	9.9
EDSG08 [b]	07–16499–LK86F	0 to 0.5	6.4	0.2U	6.5
Freeze Core Samples:					
EDSC04–0–4	07–16099–LK13A	0.0 to 5.0	5.3	0.2U	4.7
EDSC04–4–8	07–16100–LK13B	5.0 to 6.6	53.6	0.2	52.2
EDSC04–8–12	07–16101–LK13C	6.6 to 8.0	6.3	0.2U	4.6
EDSC08–0–4 [c]	07–16102–LK13D	0.0 to 5.0	5.1	0.2U	3.4
EDSC08–8–12 [d]	07–16103–LK13E	6.6 to 8.0	7.7	0.2U	6.2
Ambient Water Sample:					
07–16054–LK07A	EDW01	3.5	3.6	0.2U	0.9
Water Quality Criteria:					
Acute, aquatic life			360	[e] 1.82	[e] 9.2
Chronic, aquatic life			190	[e] 0.64	[e] 6.5

Notes:
[a] Results with "U" were not detected in the sample at the accompanying detection limit.
[b] Duplicate of EDSG06.
[c] Duplicate of EDSC04–0–4.
[d] Duplicate of EDSC04–8–12.
[e] Criteria adjusted for 52 mg/L hardness (Washington DOE, 2005).

3.3.2.2 Environmental Effects

Water Quantity

The existing dam has an uncontrolled spillway that passes all inflow. Okanogan PUD proposes to install new crest gates on the dam and install an intake channel adjacent to the dam crest to divert river flows to a new powerhouse and tailrace that would return flows to the Similkameen River approximately 480 feet downstream of the dam. The tailrace would discharge downstream of the falls, which is located approximately 370 feet downstream of the dam. Okanogan PUD proposes to operate the project in a run-of-river mode with no water storage for hydropower purposes; however, it has agreed to comply with interim ramping rate recommendations by Interior, Washington DFW, NMFS, and American Rivers *et al.* (see section 3.3.3.2, *Aquatic Resources, Environmental Effects*).

Okanogan PUD proposes to provide minimum flows of 10 or 30 cfs in the 370-foot-long bypassed reach. American Rivers *et al.* recommends flow releases to the bypassed reach to adequately protect aquatic resources in the river and other designated beneficial uses in accordance with Washington state law for the Similkameen River.[14] According to the code, this would consist of a minimum flow of 400 cfs during winter months up to a high flow of 3,400 cfs in the late spring/early summer.

Our Analysis

Because the project would operate in a run-of-river mode with only minor flow variation caused by ramping rate restrictions, there would be no effect on the flow regime downstream of the project, compared to historical conditions. The issue of minimum flow releases for the bypassed reach is discussed below in this section and in sections 3.3.3.2, *Aquatic Resources, Environmental Effects,* and 3.3.7.2, *Aesthetic Resources, Environmental Effects.*

Water Quality

Water Temperature (WQ–01)

Okanogan PUD proposes to operate the crest gates to maintain the reservoir levels between elevation 1,048.3 feet and 1,050.3 feet msl 99 percent of the time. The proposed crest gate operation would result in a small increase in the reservoir surface area (less than 12 percent) and larger increases in reservoir average depth (20 percent) and volume (21 percent) up to 10 months a year and may affect water temperature in the project reservoir. Okanogan PUD proposes to monitor water temperature at three locations for 5 years to determine if the crest gate operation causes an increase in the 7–DADMax water temperature in the reservoir compared to the river upstream of the reservoir.

Interior, NMFS, and American Rivers *et al.* comment that increased reservoir size and area would result in more exposure to the sun, which would result in higher water temperatures above the dam and downstream of the dam, potentially affecting anadromous fish habitat. Interior recommends a study of the effects of the Enloe Project on water temperature. NMFS recommends that water temperatures be monitored for 5 years with annual reporting, and American Rivers *et al.* requests more information about the effects of the project on temperature and water quality.

The British Columbia Ministry of Environment (Ministry of Environment) comments that the project would not adversely affect water temperature in Canadian waters and that water quality standards would not be compromised as a result of project operations. The Ministry of Environment supports Okanogan PUD's measures to monitor water temperature in the reservoir and compensate for the potential decrease in production by including habitat enhancements, tailrace relocation, and entrainment studies.

[14] Washington Administrative Code WAC 173–549–020 *Establishment of minimum instream flows.*

Our Analysis

Results of vertical temperature profile measurements (September 14 and 15, 2006) show that water temperature varied less than 0.6 °C from near surface to near bottom of the existing reservoir, indicating virtually no stratification in the reservoir during late summer (Okanogan PUD, 2008a). Comparisons of 7-DADMax temperatures indicated that water temperatures did not increase through the project area by more than 0.3 °C at any time during the 2006 monitoring study (see figure 2), and decreased throughout the project area after reaching peak levels in late July. Based on these results, it appears that solar radiation did not warm the existing reservoir pool any more than the relatively shallow river reaches, with similar temperature patterns among all stations. Substantial warming probably did not occur because the existing reservoir is narrow and river-like in character. The proposed project would increase the reservoir surface area by about 27 percent, comparing the existing reservoir at dam crest elevation to the proposed reservoir level during low-flow operations (see table 4). The actual increase in area would be from 60 to 76 acres, and the reservoir would remain a relatively small, narrow reservoir, unlikely to experience significant additional solar warming. In addition, the reservoir mean depth and volume would increase (table 4), which would act to counter any solar warming, in that more heat input would be required to effect a change in temperature. Okanogan PUD also proposes planting riparian vegetation along the reservoir to provide shading (discussed in section 3.3.4.2, *Terrestrial Resources*). Additional shading would reduce the amount of surface water exposed to solar warming. All these factors would act to minimize any heat gain and prevent any increase in water temperatures during the summer low-flow months. The greatest increase in reservoir size would occur during high-flow spill periods (table 4), but reservoir residence time would be short (only 45 minutes at the mean annual peak flow of 16,100 cfs), so there would be little opportunity for solar warming, even if warm, sunny conditions occurred during high-flow periods, which is not common.

Studies conducted in the Similkameen River downstream of the dam indicate that water temperatures naturally increase during the summer with potential for lethal effects on salmonids (Okanogan PUD, 2008a). Based on our analysis, we conclude that construction and operation of this run-of-river hydroelectric project would have little effect on the existing water temperature pattern in the river, or affect compliance with water quality standards for water temperature.

Okanogan PUD would monitor water temperature for at least the first 5 years following license issuance to determine if the proposed increase in reservoir elevation and surface area are having an influence on water temperature in the reservoir and Similkameen River downstream of the dam. This measure would provide a water quality benefit. Development of the monitoring sites would be done after consultation with the TRG. The annual data resulting from this study could be used for adaptive management purposes and to design any required mitigation for any adverse effects on water temperature that may be observed. It would be appropriate for the Okanogan PUD to file a report with the Commission at the end of five years evaluating the need for continued monitoring and/or measures would ensure that the water quality is maintained at a level that will support aquatic resources at the project.

Dissolved Oxygen (WQ–02 Through WQ–04)

Okanogan PUD proposes to inject air into the turbine draft tubes to increase DO in the plunge pool/tailrace, which may be used by anadromous fish as a holding pool and thermal refugia during the critical summer season (figure 4). The aeration vents would not be used during high spring flows when high TDG is a concern and DO concentrations are not low. Okanogan PUD would monitor DO levels during the first 5 years of project operations to determine the optimal time after high flows have receded in the early summer to provide aeration in the draft tubes.

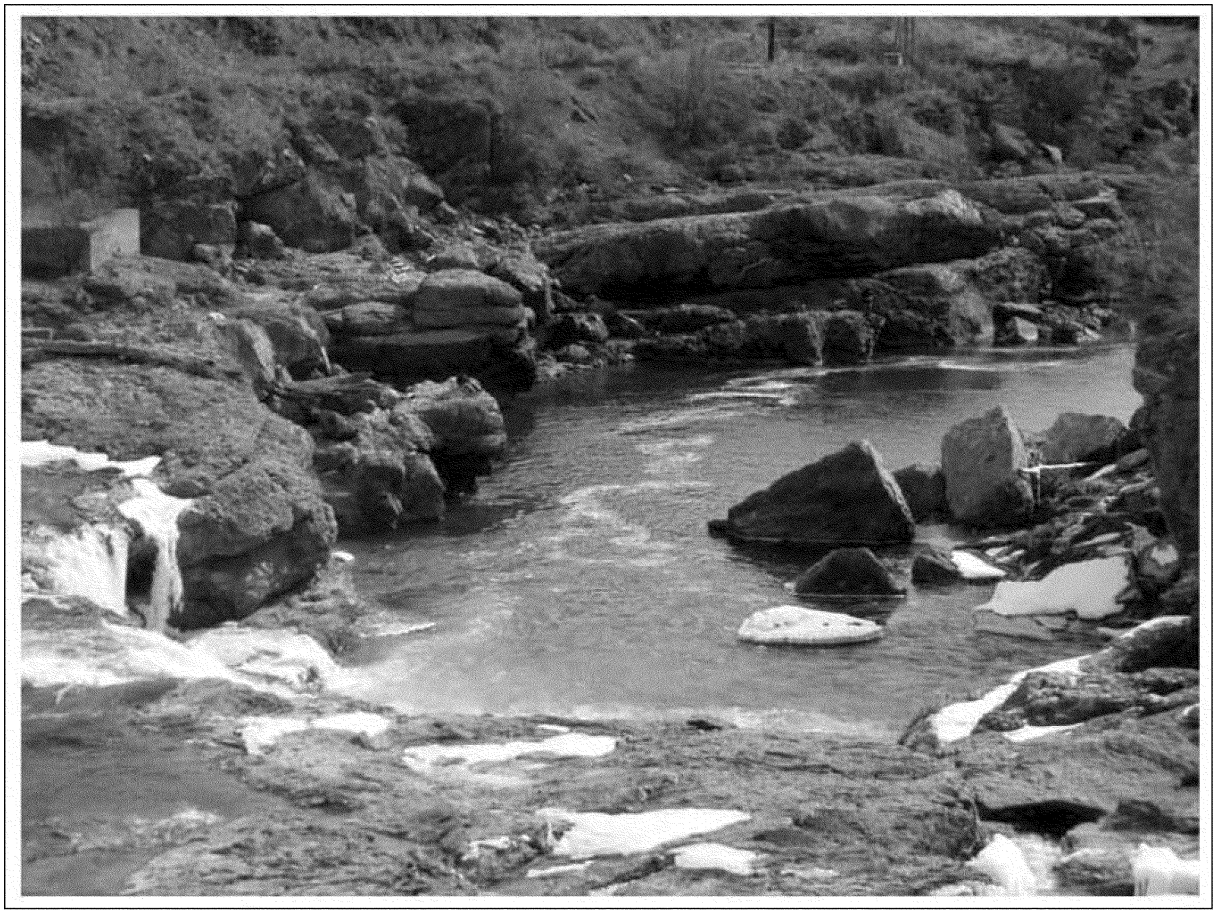

Figure 4. Plunge pool below Similkameen Falls (Source: Okanogan PUD, 2009c).

Okanogan PUD proposed to locate the project tailrace so that the discharged water circulates in the plunge pool below the falls. The average annual tailrace flows, as simulated by Okanogan PUD, would be similar in wet and normal water years (table 8).

NMFS recommends that at the start of project operations, Okanogan PUD should monitor DO concentrations at the powerhouse intake and below the falls and continue monitoring for the term of the license.

TABLE 8—SIMULATED AVERAGE ANNUAL TAILRACE FLOW FOR THREE NORMAL AND THREE WET WATER YEARS

[Source: Okanogan PUD, 2009c]

Normal years	Tailrace flow (cfs)	Wet years	Tailrace flow (cfs)
1989	842	1991	1,406
1993	896	1996	1,298
2000	1,051	1997	1,066

Our Analysis

During the warm summer months, DO is naturally low in the Similkameen River. DO levels upstream and downstream of the project can drop below 8 mg/L, which is the minimum state standard set to protect salmonid fisheries. Currently, water passing over Enloe dam goes over the falls, which increases the DO concentration by about 1 mg/L, although this may vary depending on river flow and water temperature. Under Okanogan PUD's proposal, water that is diverted for generation would be routed around the falls and would not be naturally aerated as now occurs. Okanogan PUD's proposal for draft tube aeration would ensure protection of DO, despite loss of aeration by diverting flows into the powerhouse rather than over the falls. Monitoring below the powerhouse would assess the effectiveness of this measure and would ensure that water discharged to the project tailrace would meet state standards of 8 mg/L DO or higher at all times.

Discharging powerhouse flows into the plunge pool would provide circulation to prevent stagnation and water quality degradation during the low flow summer months. The circulation pattern in the plunge pool may change as the tailrace flows would enter the pool approximately 90 feet downstream from the falls at an angle. However, this change in pattern should not affect water quality or substantially

affect fish distribution in the pool. During high flow periods when water is passing over the dam and the falls, as well as through the powerhouse, flow patterns in the plunge pool would be more similar to current conditions, although there would be some reduced flow over the falls, and thus potentially reduced TDG levels. DO levels would be high during high-flow periods and heavy spillage over the dam and falls.

Okanogan PUD's proposal to monitor DO levels during the first 5 years of project operations to determine the optimal time—after high flows have receded in the early summer—to provide aeration in the draft tubes would not meet the NMFS recommendation to monitor DO over the term of the license.

Monitoring DO during the first 5 years of operation would provide good information on possible project effects on DO, but if water quality standards are not met regularly, additional monitoring and alternative measures may provide additional useful information. Consultation with the TRG as to the need for an extension of the monitoring period, as well as in determining the location of the DO monitoring sites would ensure the proposal addresses the concerns of the agencies and the Commission.

Total Dissolved Gases (WQ–02 and WQ–04, FISH–09)

TDG concentrations measured between May 26 and May 30, 2006, were below the 110 percent saturation water quality criterion in the lower reservoir (RM 9.1) and between the dam and the falls (RM 8.9), but exceeded the criterion below the falls (RM 8.8) and below the railroad trestle at the mouth of the canyon downstream from the project area (RM 6.7). TDG concentrations increased substantially—an additional 12 to 14 percent of saturation—in water flowing over the falls. The increase in TDG below the falls is due to the additional turbulence caused by the falls and plunging flow into a deep pool where the increased pressure causes air bubbles to dissolve into solution.

Resident and anadromous fish can be negatively affected by supersaturated TDG levels. The tolerance of anadromous salmon and steelhead to TDG supersaturation varies greatly by life stage. Eggs appear to be quite resistant to high TDG levels, while yolk-sac fry are particularly vulnerable (Weitkamp and Katz, 1980). Juvenile fish appear more sensitive to TDG saturation with increasing size.

Okanogan PUD proposes to divert water from the reservoir, through the turbines, and discharge flows downstream of the falls into the plunge pool. Okanogan PUD would monitor TDG concentrations at the project intake and in the plunge pool below the falls for a 5-year period after license issuance to determine the effects of the proposed operations on TDG levels at these locations.

NMFS concurs with the proposal and adds that Okanogan PUD should maintain the ability to monitor TDG for the term of the license.

The Ministry of Environment comments that TDG levels are expected to decrease as a result of project operations, which may benefit downstream salmonids. American Rivers *et al.* requests more information about potential water quality effects, including potential effects on TDG during times of higher water temperatures.

Our Analysis

Water diverted for power production would be discharged into the plunge pool below the falls and would reduce spillage and plunging flows over the falls, in turn decreasing TDG levels. Some flows would continue over the falls when inflow to the reservoir exceeds 1,600 cfs and excess flow is spilled over the dam. During these conditions, powerhouse operation would continue and would act to reduce TDG concentrations downstream of the falls. The beneficial reduction in TDG would be directly related to the proportion of river flow that is diverted through the powerhouse. For normal water years, substantial reductions in TDG would be expected during all but a few days around the annual peak flow. The recently proposed minimum flow releases of 10 or 30 cfs from the dam would maintain a small flow release over the falls during periods when most of the river flow is diverted for power generation. This volume of flow, however, would be much lower than flows that now occur over the falls (see table 2), so there still would be reductions in TDG compared to existing conditions.

Normal turbine operation would not increase TDG except when air is introduced in the turbine draft tube to protect DO concentrations downstream during the summer months (see below). However, this would typically occur after high flows have receded and high TDG is no longer a concern.

Any changes in TDG levels would have the potential to affect resident juvenile UCR steelhead and other species in the plunge pool and in the lower Similkameen River year-round. Okanogan PUD proposes to monitor TDG at the powerhouse intake and in the plunge pool below the falls for a period of 5 years. These data would be used to monitor the effects of the project on TDG levels and to determine if alternative measures are needed. This measure would provide a water quality benefit; however, it would be appropriate for the Okanogan PUD to file if a report with the Commission at the end of five years evaluating the need for continued monitoring and/or measures would ensure that the water quality is maintained at a level that will support aquatic resources at the project.

It would also be appropriate for Okanogan PUD to select the sites for TDG monitoring in consultation with the TRG.

Sediment Management (WQ–05 and WQ–08)

A 2007 licensing study that included sediment elutriate analyses indicated that water quality standards for copper could be exceeded if sediment is disturbed during proposed project construction and operation (Okanogan PUD, 2008a). The shallowest part of the reservoir is adjacent to the proposed intake location, and there is concern that sediment in this location could be mobilized during excavation of the intake channel and by project operations. Okanogan PUD proposes to excavate as much of the intake channel as possible in the dry, because underwater excavation poses the greatest risk of mobilizing sediment. To contain any resuspended sediments that may occur, Okanogan PUD proposes to install a floating silt barrier to contain sediments around construction areas.

As we've said in section 3.3.1, *Geology and Soils Resources,* Okanogan PUD also proposes other measures to mitigate any effects of erosion and sediment mobilization during construction. Excavated material would be placed in a lined stockpile and tested for arsenic, copper, cadmium, zinc, and lead. Okanogan PUD would develop a sampling and analysis plan based on the chemical characteristics of representative samples from established stockpiles, and the results would be compared with relevant state criteria to determine if materials could be disposed of onsite, in a licensed solid waste landfill, or in a landfill licensed for the disposal of state-designated dangerous waste.

Okanogan PUD also proposes a Vegetation Plan that would include hydroseeding of the disposal sites, in addition to the seeding and other methods that would be used to revegetate all areas of exposed soil as per the site revegetation requirements.

Washington DOE recommends that the sediment excavated from the intake channel entrance be tested for arsenic, copper, cadmium, zinc, and lead, and the results compared to the MTCA Method A water quality criteria of the EPA's Maximum Contaminant Level. Washington DOE also recommends storing excavated material onsite until it is characterized, then dispose of it in an appropriate manner based on analysis results and including a sampling and analysis plan.

In response to the agency comments and recommendations, Okanogan PUD proposes to develop a Spill Response Plan and a Storm Water Pollution Prevention Plan to be filed with the Commission within one year of license issuance. The Spill Response Plan would be implemented at the beginning of project construction.

Our Analysis

Project construction has the potential to resuspend sediments during excavation of the intake channel and installation of other project facilities. This construction and any reservoir erosion due to fluctuating water levels could cause short-term turbidity plumes, release of contaminated sediments, and downstream sedimentation.

To avoid resuspension of sediments to the extent possible, Okanogan PUD would conduct as much of the excavation in the dry as possible. To avoid mobilizing resuspended sediments downstream of the reservoir during any instream excavations, Okanogan PUD would place a floating silt barrier to contain suspended sediments. We expect Okanogan PUD's other proposed measures, including the Spill Response Plan, the Storm Water Pollution Prevention Plan, testing excavated materials for arsenic, copper, and cadmium contamination, and employing BMPs, would reduce the risk for short-term degradation of water quality and aquatic habitat during construction, including critical habitat for UCR steelhead and EFH for Chinook salmon.

To estimate the likelihood of sediment transport occurring during project operations, Okanogan PUD constructed a two-dimensional hydraulic model of the reservoir using the program River 2D.[15] Models were developed for combinations of flow and forebay geometry, including: 2,200 cfs under existing and proposed conditions; 10,200 cfs under existing conditions; and 16,100 cfs under existing and proposed conditions. The modeled range of flows spans the range of flow magnitudes over which the 1–D impoundment hydraulic model predicted a transition from potential deposition to potential erosion. The model incorporates two assumptions: (1) Horizontal flow direction would not change with changes in bed topography, and (2) threshold velocities do not change with depth.

The volume and weight of potential erosion/deposition were estimated for each flow condition, assuming a characteristic grain size of approximately 0.6 mm, an erosion/transport threshold of 1 foot per second and a deposition threshold of 0.1 foot per second, and a constant bulk density of sand equal to 100 pounds per cubic foot. The results of the River 2D model are consistent with the expectation that the addition of the intake channel would change flow velocities within the reservoir near the intake. The intake channel causes the flow to veer southeast toward the intake at both 2,200 and 16,100 cfs.[16] The model also indicates that increased velocities would be likely just upstream of the pinch point that defines the upstream end of the forebay (the lower end of the reservoir immediately adjacent to the intake channel). The model predicts very high velocities in the intake channel at both modeled flow volumes, indicating that sediment transport and potential erosion would likely occur under the proposed operations.

The results of this model-based analysis suggest that the Enloe reservoir currently undergoes an annual cycle of erosion and deposition, and that the additional erosion and sediment deposition that would occur at relatively low flows due to project operations would be minimal, compared to the amount of erosion and deposition that occurs every year during peak flows. At higher flows, the additional erosion and deposition under proposed operations would also be minor.

Okanogan PUD acknowledges uncertainties associated with this analysis ; however, the general pattern shown by the model is probably reasonable. Sediment builds up in the forebay during relatively low flow portions of the year and is largely flushed out during annual peak flows. This general pattern would likely continue during proposed project operations, with increased levels of erosion and decreased levels of deposition occurring in the lower end of the reservoir near the dam and intake channel. The predicted small increases in reservoir erosion and decreases in deposition during proposed project operations indicate that some sediment deposition (sand and silt) would increase in the lower gradient reach of the lower Similkameen River (RM 0–4.7) (Okanogan PUD, 2008a). Increased deposition of fine sediment would modify aquatic habitat if measurable deposition was to occur, and could result in downstream contamination if the reservoir sediment transported downstream of the falls is contaminated. That potential, however, seems unlikely, because the River 2D model did not predict a significant increase in erosion, which would be required to mobilize contaminated sediment that has been deposited in the reservoir for many years. The mound of sediment observed in the lower end of the reservoir during low-flow bathymetric surveys is likely a transient feature that does not contain legacy sediments from early in the impoundment's history, and thus would not contain high contaminants levels (Okanogan PUD, 2008a).

Increased deposition of fine sediment in the lower Similkameen River could have a negative effect on the spawning and rearing areas used by anadromous salmonids and affect water quality for other downstream beneficial uses. The potential effects on listed species are discussed in section 3.3.5, *Threatened and Endangered Species.*

Spill Plan (WQ–07)

Okanogan PUD proposes to develop and implement a Spill Plan including spill prevention, containment, and clean-up plan at project initiation to reduce potential effects of accidental spill.

BLM recommends Okanogan PUD develop and implement, after consultation with the BLM, a hazardous substances plan (essentially same as Spill Plan) for oil and hazardous substance storage, spill prevention, and clean up prior to any activity that may affect the BLM-administered public lands. BLM recommends the plan address both construction and ongoing operations and maintenance of the proposed Enloe Project. At a minimum, the plan would: (1) Outline Okanogan PUD's procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities; (2) outline Okanogan PUD's procedures for timely identification and remediation of spills, including procedures in the event that

[15] The River 2D model, methods, and results are detailed in Okanogan PUD (2008a), appendix e.2.3, section 4.2.6.

[16] The median annual flood discharge that would occur on average once every 2 years is 16,100 cfs.

personnel are not present on-site 24-hours a day; (3) identify and maintain a cache of spill cleanup equipment sufficient to contain any spill from the proposed Enloe Project; (4) call for Okanogan PUD to provide BLM with a report specifying the location of spill clean-up equipment on the BLM-administered public lands and the location, type, and quantity of oil and hazardous substances stored in the proposed Enloe Project area; and (5) require that Okanogan PUD inform BLM immediately as to the nature, time, date, location, and action taken for any spill affecting the BLM-administered public lands.

Our Analysis

In accordance with 40 CFR 112.1 of the EPA's regulations, a spill prevention control and countermeasure plan is required to be in place for any facility where unburied storage capacity exceeds 1,320 gallons of oil or a single container has a capacity in excess of 660 gallons. In addition to the on-site storage of lubricants and other oil products, transformers are likely oil-cooled and would be of sufficient capacity to exceed the 1,320 gallon threshold that would require a plan. The Spill Plan proposed by Okanogan PUD and further described by BLM would provide a quick reference to procedures and notifications in case of oil spills to reduce the possibility of oil or other hazardous substances reaching the BLM-administered land and the Similkameen River if a spill occurs. Development and implementation of the Spill Plan after consultation with BLM and Washington DOE would minimize the potential for petroleum products to enter the project waters in the event of a spill.

Minimum Flow Proposal

As we previously described in sections 1.3.2 and 2.2.4, by letter filed October 28, 2010, Okanogan PUD proposes minimum flows for the bypassed reach immediately downstream of Enloe dam. Okanogan PUD also proposes: A monitoring program for DO and water temperature for the bypassed reach for a period of time postconstruction; an adaptive management program to enhance DO and water temperatures should monitoring indicate that water quality standards are not being met; determining critical flow thresholds for downramping rates based on monitoring and field observations prior to operations; and determining a means for releasing minimum flows at Enloe dam.

Our Analysis

Okanogan PUD's proposal would provide a minimum flow of 30 cfs from mid-July to mid-September, and 10 cfs the rest of the year into the bypassed reach.

Providing a minimum flow of 10 and 30 cfs would ensure that some flow is passing over Enloe dam and falls at all times, even during the lowest flow months of the year when the project hydraulic capacity would allow diversion of the entire river flow for power generation. Effects on water quality would be related to potential changes in DO levels and water temperature. As we previously discussed, DO levels in the Similkameen River do not always meet the state standard of a minimum of 8 mg/L under existing conditions, although the falls act to aerate flows passing over them. Diversion of most of the river flow through the powerhouse during lower flow periods would reduce the aeration effect that now occurs over the falls. A study conducted by Okanogan PUD found that under current conditions, DO levels of water plunging over the falls increase by approximately 1.0 mg/L.[17] Maintaining some flow in the bypassed reach and over the falls would continue to provide some natural aeration in this project reach, although flows of 10 and 30 cfs are relatively low and may not contribute substantially to aeration below the project tailrace. Okanogan PUD's proposal to aerate the water in the project draft tubes would be able to increase DO levels by 1.0 mg/L or more and would be able to offset the loss of this natural increase in DO.

Water temperatures in the Similkameen River upstream and downstream of the project area are marginal for salmonid habitat under existing conditions, and often exceed state standards for salmonid spawning, incubation, and rearing. Effects of the proposed minimum flow on water temperature could occur by passage of a relatively low flow (10 and 30 cfs) in the bypassed reach, exposing it to solar radiation and warming during the summer months, further reducing the suitability of salmonid habitat in the river. On November 10, 2010, Okanogan PUD filed an analysis of the effects of the proposed minimum flow on water temperature, which concluded that the passage of that flow through the bypassed reach would not result in a measurable increase in water temperature at the base of the falls, even under the lowest river flow conditions.[18] Okanogan PUD, however, also concluded that a temperature increase of 0.5 to 1.0 °C could occur in the bypassed reach if the proposed minimum flow was allowed to pass over the entire face of Enloe dam in a thin sheet flow.[19] Passing the minimum flow through a pipe or a smaller gate to the base of the dam instead of providing it as a sheet flow over the dam could prevent this temperature increase. We find Okanogan PUD's analysis reasonable and we agree that passing this minimum flow would likely have a minor effect on water temperature downstream of the falls, assuming that the minimum flow is provided via a pipe or small gate at the dam.

Okanogan PUD's proposal for DO and temperature monitoring for a period of time postconstruction would allow for a characterization of the water quality in the bypassed reach under the proposed minimum flows of either 10 or 30 cfs. Consultation with the TRG to determine the length of DO and temperature monitoring in the bypassed reach, and adaptive management could help to develop means to protect water quality in this reach.

Similarly, Okanogan PUD had previously proposed to implement the ramping rates recommended by the resource agencies downstream of the tailrace. Additionally, they have proposed to identify critical flow thresholds for downramping rates in the bypassed reach to protect aquatic resources in the bypassed reach during project start-up and shutdown. The topography of the bypassed reach is such that there are areas where fish would likely be stranded if spillage over the dam is reduced at a rate that does not allow fish to successfully vacate these areas. The best way to determine these critical flow thresholds would be by field observations as proposed.

Okanogan PUD provided preliminary designs for alternative minimum flow release structures and stated that the preferred option would be a gate and release pipe using one of the two existing penstock intakes from the abandoned hydro station at the dam. This would minimize the potential for water temperature increases in the minimum flow releases. Okanogan PUD stated, however, that it and the resource agencies have not yet come to agreement on the final design of the flow release structure, and it proposes further consultations with the agencies to finalize the design. We agree that a flow

[17] See Okanogan PUD letter filed on November 10, 2010.

[18] See Okanogan PUD letter filed on November 10, 2010.

[19] State water quality standards are that a water temperature increase should not exceed 0.3 °C.

release structure consisting of a gate and pipe using one of the former penstock intakes would be the best option, because it would minimize any potential water temperature increases, would allow placement of the flow discharge at a point below the dam that would provide the greatest environmental benefit, and would provide the best control of the flows to be released. We also agree that the final design of this structure should be developed in consultation with the resource agencies (Washington DOE, Washington DFW, FWS, NMFS, BLM, and the Colville), prior to filing the design with the Commission for approval.

3.3.2.3 Cumulative Effects

Historical land use in the Similkameen River drainage includes a legacy of mining, timber harvest, grazing, and agriculture. Commercial mining has probably had the greatest impact on the Similkameen River water quality. One of the largest mines in the area was the Kaaba-Texas Mine, located several miles upstream of Enloe reservoir near the community of Nighthawk. The mine operated from the late 1890s until 1954 and discharged tailings directly into the Similkameen River until 1946. In 1999, the EPA removed and disposed of approximately 81,000 cubic yards of contaminated mine tailings from the mine site.

Today the dominant land use is agriculture, grazing, and recreation. A number of orchards, vineyards and a public golf course are located along the Loomis-Oroville Road. The area is unfenced open range generally leased for grazing.

The water quality of the Similkameen River has improved since the commercial mining has been discontinued in the drainage area above the project, and with the EPA efforts to remove contaminated mine tailings at the Kaaba-Texas Mine. However, much of the sediment contained in Enloe reservoir was deposited when upstream mining activities were active, and contains some arsenic, copper, and cadmium.

The construction and operation of the project could result in a number of effects that when added to conditions already present in the basin, could have negative environmental effects. Project construction of the intake channel has the potential to remobilize contaminated sediments. Petroleum products stored and used during construction and during project operations could be released to project waters. The increase in reservoir surface area increases the potential for slightly higher water temperatures in the reservoir. Erosion from project construction could cause increased turbidity and sedimentation. Measures proposed by Okanogan PUD and additional staff recommended measures, however, would minimize the effects on water quality and the potential for cumulative effects during the construction and operation of the proposed project.

3.3.3 Aquatic Resources

3.3.3.1 Affected Environment

The fisheries resources information presented in this section is a combination of recent and historical reports produced by state and federal resource agencies; investigations by universities and consulting groups; literature reviews; file materials from state and federal agencies; and ongoing studies. These materials were supplemented by information from Okanogan PUD studies that were conducted in consultation with NMFS, FWS, Washington DFW, Washington DOE, and the Colville from 2005 through 2008.

The Similkameen River is approximately 72 miles long and originates in the Cascade Mountains of British Columbia, Canada. The 27-mile reach of the Similkameen River between the U.S./Canadian border and the Okanogan River flows through semi-arid mountainous terrain. The licensing study area extends from the confluence of the Similkameen and Okanogan Rivers upstream to Shanker's Bend at RM 10.1. Enloe dam is located immediately upstream of the Similkameen Falls,[20] about 8.8 miles upstream from the confluence with the Okanogan River. Enloe dam is approximately 18 miles downstream of the U.S./Canadian border.

Downstream of the Dam

The river below the falls is divided into three reaches based on habitat conditions and channel morphology. Reach 1 (RM 0–4.7) is a low gradient (<0.1 percent), braided channel. The dominant substrates are cobble and gravel with areas of sand and boulders. The majority of salmonid spawning occurs in this reach, although gravel is relatively scarce—limiting the amount of spawning habitat. Reach 2 (RM 4.7–7.1) has a wider active channel than reach 1 and a few side channels. The gradient is low to moderate (0.1 to 2 percent; average 0.4 percent). The substrates are cobble, sand, and boulders. Reach 3 (RM 7.1–8.8) is a canyon reach. The channel gradient in reach 3 averages greater than 2 percent. Although the dominant substrate is bedrock, sand deposits occur in the center of the channel.

The Similkameen River supports anadromous and resident fishes below the falls. Native species in the lower river include summer-run Chinook salmon, sockeye salmon, UCR steelhead, bridgelip sucker, largescale sucker, mountain whitefish, longnose dace, northern pikeminnow, redside shiner, rainbow trout, and unidentified sculpin species (table 9). Non-native species include common carp, largemouth and smallmouth bass, and black crappie. The relative abundance (percent composition) of these species is shown in table 10.

TABLE 9—NATIVE AND NON-NATIVE FISHES IN THE SIMILKAMEEN RIVER BASED ON SNORKEL SURVEYS

(Source: Okanogan PUD, 2008a)

Common name	IEC beak (1984)	Okanogan PUD (1991)	ENTRIX (2006)	ENTRIX (2007) (upstream only)
Chinook salmon			D	
UCR Steelhead/rainbow trout	D & U in Canada	D	D	
Sockeye salmon/kokanee	U kokanee			
Bridgelip sucker	D	U	U	U (unidentified species)
Largescale sucker		D & U	D & U	U (unidentified species)
Sculpin spp.	D	D & U	D & U	U

[20] Also known as Coyote Falls.

TABLE 9—NATIVE AND NON-NATIVE FISHES IN THE SIMILKAMEEN RIVER BASED ON SNORKEL SURVEYS—Continued

(Source: Okanogan PUD, 2008a)

Common name	IEC beak (1984)	Okanogan PUD (1991)	ENTRIX (2006)	ENTRIX (2007) (upstream only)
Northern pikeminnow	D	U	D	U
Longnose dace	D & U			U
Redside shiner		U	D & U	U
Burbot		U		
Mountain whitefish	D	D & U	D	U
Chiselmouth				U
Peamouth				U
Smallmouth bass			U	
Largemouth bass		D & U	D & U	U
Black crappie	D	D		
Common carp				U
Yellow perch				U

Note: D = downstream of Enloe dam; U = upstream of Enloe dam.

TABLE 10—NUMBERS AND PERCENT COMPOSITION OF NATIVE AND NON-NATIVE FISHES IN THE RIVER DOWNSTREAM OF ENLOE DAM BASED ON SNORKEL SURVEYS

(Source: Okanogan PUD, 2008a)

Common name	Reach 1 RM 0–4.7		Reach 2 RM 4.7–7.1		Reach 3 RM 7.1–8.8		% of Total catch
	Aug	Sep	Aug	Sep	Aug	Sep	
Sucker spp.	29	314	53	176	0	1	22.0
Largemouth bass	42	25	12	7	0	0	3.3
Smallmouth bass	101	92	32	8	13	20	10.2
Sculpin spp.	3	6	1	3	0	0	0.5
Common carp	0	13	0	0	0	0	0.5
Minnow spp.	472	737	5	0	0	0	46.6
Northern pikeminnow	15	0	21	21	0	1	2.2
Juvenile UCR steelhead/rainbow trout	115	77	16	8	3	1	8.4
Adult UCR steelhead/rainbow trout [a]	0	3	0	0	0	0	0.1
Sockeye salmon	0	13	2	0	0	0	0.6
Chinook salmon	0	33	0	0	0	0	1.3
Mountain whitefish	41	47	1	24	0	0	4.3
Totals	818	1,360	143	247	16	23	100

[a] The numbers of adult anadromous fish observed during the 2006 snorkel surveys were not considered representative of population strength because adult anadromous fish are most abundant in the river during their respective spawning migrations, and the survey occurred outside of the spawning migration period.

The summer-run Chinook salmon in the Similkameen River enter the river from July through late September. In its February 26, 2010 letter, NMFS stated that adults are known to hold in the plunge pool below the falls until spawning takes place in October through early November, peaking in mid-October from RM 0 to RM 8.8. There are no known spawning areas within the project area. Most of the Chinook salmon spawning occurs in the lower 5 miles of the river. Washington DFW counted 1,660 Chinook salmon redds in 2004 and 1,423 in 2005 in the lower Similkameen River. Based on these redd counts, Washington DFW estimated Chinook spawning escapement [21] to be approximately 4,169 fish in 2004 and 3,770 in 2005. Chinook fry emergence occurs in January through April; juveniles emigrate to the ocean within 1–4 months after emergence, when water temperatures begin to increase.

Washington DFW operates a Chinook salmon rearing and acclimation facility called Similkameen Pond at RM 3. Juveniles are released from the pond in mid-April to mid-May.

Sockeye salmon enter the Columbia River from late May to mid-June, and migrate into the Okanogan River. Sockeye salmon spawn primarily in the main stem of the Okanogan River upstream of Lake Osoyoos in Canada, typically in October. Fry emerge in March through May and move downstream to Lake Osoyoos. The juveniles rear in the lake for 1–2 years before emigrating to the ocean, usually in May. Although some sockeye have been reported in the lower Similkameen River, there is no sockeye spawning habitat in the river.

Chinook salmon and sockeye salmon pre-spawn mortalities in the Similkameen and Okanogan Rivers have been associated with high water temperatures. Dead female Chinook salmon were examined to estimate pre-spawn mortality in the Similkameen River from 2004–2006. Examinations in 2004 and 2005 indicated approximately 1 percent of females died prior to spawning. This percentage could vary

[21] Anadromous adults returning to spawn.

depending on the annual flow and temperature conditions.

High water temperatures can also delay upstream migration of the anadromous salmonids into the Okanogan River and can lead to the pre-spawn mortality noted above, or affect the timing of spawning. UCR steelhead, Chinook salmon, and sockeye salmon enter the cooler Similkameen River and migrate as far upstream as the falls during the summer months. The larger, deeper pools (e.g., the plunge pool below the falls) and areas with overhead structure (e.g., large woody debris, bridges) are the preferred holding habitat until temperatures in the Okanogan River decrease and these species can commence their spawning activities. These spawning delays can adversely affect reproductive success by extending incubation and fry emergence into time periods with less suitable conditions for survival, or by shortening the rearing period for juvenile fish prior to their emigration to the ocean.

During snorkel surveys, Okanogan PUD observed juvenile steelhead/rainbow trout in the side channels of reach 1 and 2, where water temperatures were several degrees cooler than the surrounding water. In dry years, flow in the side channels is intermittent, resulting in dewatered segments. Small amounts of large woody debris also occur in these reaches, and sections of the river have been channelized and diked, particularly near Oroville.

In its February 26, 2010, letter, Interior stated that historically significant runs of anadromous Pacific lamprey may have occurred in the project area, and the lamprey has had economic and cultural significance to local Native American tribes. Lamprey larvae are filter feeders that burrow into fine silty substrate in the lower velocity areas of streams (Wydoski and Whitney, 1979). Pacific lamprey remain in the larval stage for 5 to 6 years before they metamorphose and migrate to the ocean as predatory adults. The adult stage is generally short (less than 1 to 2 years) (Moyle, 2002).

Probable suitable Pacific lamprey spawning and rearing habitats are present in the Similkameen River below the dam; however, recent attempts to document adult lamprey have been unsuccessful. Washington DFW has documented unidentified larval lamprey in the hatchery ponds on reach 1, close to the confluence with the Okanogan River. In 2006, the Colville collected adult and juvenile lamprey from screw traps in the Okanogan River, downstream of Salmon Creek. Unconfirmed lamprey redds were observed in the middle reach of the Okanogan River in 2008.

Proposed Bypassed Reach

The 33-foot-long, 20-foot-high Similkameen Falls below Enloe dam is a natural barrier to upstream salmonid fish passage. The falls presents less of an impediment to Pacific lamprey since they use their oral disks to attach to surfaces allowing them to withstand higher current velocities. Fish habitat in the 370-foot-long, bedrock-boulder dominated bypassed reach between the dam and the falls is limited and it was believed that there are few, if any fish in this reach. A snorkel survey of the bypassed reach between Enloe dam and the head of Similkameen Falls was conducted in August 2006. No fish were observed. The dominant substrate is bedrock strewn with large boulders; smaller substrate occurred in sparse patches. There is no overhanging vegetation or large woody debris.

On September 15, 2010, another snorkel survey and hook and line sampling was conducted by Washington DOE and DFW biologists in the plunge pool downstream of Enloe dam, with participation by Okanogan PUD representatives and a biologist from the Colville (report included in filing from Donald H. Clarke, Counsel to Public Utility District No. 1 of Okanogan County, to Kimberly Bose, Secretary, FERC, November 10, 2010). Flow conditions did not allow a complete survey of the plunge pool, and only the east side of the pool was safely accessible to swimmers. Biologists observed small numbers of juvenile suckers, smallmouth bass, rainbow trout, and one sculpin, and two rainbow trout and a northern pikeminnow were captured by hook and line. No anadromous species were observed. Fish were observed actively feeding, indicating that the plunge pool is used as feeding habitat by resident fish species when flow conditions allow. Fish observed in the pool likely gained access to the pool by dropping downstream from upstream of Enloe dam.

Flow in the bypassed reach becomes extremely turbulent during high water. Fish in the bypassed reach and plunge pool would encounter extreme flow conditions during high flow, and may be flushed downstream of the falls unless they can access flow refugia within the plunge pool or elsewhere in the bypassed reach. Aquatic benthic macroinvertebrates would also be subject to high shear stress and scour during high flows.

Upstream of the Dam

Habitat in Enloe reservoir consists mostly of sand and silt substrate with some gravel. Cobble occurs at a few sites near the upstream end. From the middle of the reservoir to the upstream end the banks are also relatively steep. There is more shallow water habitat in this section of the reservoir, although the majority of habitat is still deep and open water. Overhanging vegetation that provides shade and cover is limited along the reservoir, and includes a few large willows. Small amounts of aquatic vegetation and a few patches of submerged grasses occur in the reservoir. Large woody debris is scarce; the most common habitat structure and cover were steep rock walls, submerged boulders, and partially submerged boulders along the shoreline.

There are fewer fish species in Enloe reservoir than in the river below the dam (tables 9 and 11). Native resident fishes in the reservoir include chiselmouth, peamouth, bridgelip sucker, largescale sucker, mountain whitefish, longnose dace, burbot, northern pikeminnow, redside shiner, and unidentified sculpin species. Non-native species include largemouth bass, smallmouth bass, yellow perch, and common carp. Native rainbow trout are found upstream of the project boundary in Canada but were not found in the project reservoir but were found in the bypassed reach.

Most of the species in Enloe reservoir are introduced, non-native fish that are better adapted to warmer, slower velocity habitat (table 11). Most fish captured in the reservoir were small and were found in shallow areas associated with the limited presence of cover (mostly vegetation). The larger fish, mostly northern pikeminnow, chiselmouth, and unidentified suckers, use open water areas of the reservoir. No rainbow trout and very few mountain whitefish were found in the reservoir, likely due to a combination of northern pikeminnow predation, warm water temperatures, and lack of cover. Introduced warmwater species, such as largemouth bass, yellow perch, and common carp, may be spawning in the reservoir littoral zones, but more likely are transported to the reservoir from upstream sources such as Palmer Lake.

TABLE 11—NUMBERS AND PERCENT COMPOSITION OF NATIVE AND NON-NATIVE FISHES IN THE RESERVOIR UPSTREAM OF ENLOE DAM

[Source: Okanogan PUD, 2008a]

Common name	2006							2007						
	Beach seine			Minnow trap			% of total catch	Beach seine		Minnow trap		Gill net		% of total catch
	July 7	Aug. 11	Sept. 14	July 7	Aug. 11	Sept. 14		March 22	July 24	March 22	July 24	March 22	July 24	
Suckers spp	22	1	0	0	1	0	10.2	0	2	1	0	0	2	6.7
Sculpin spp	2	0	0	0	0	1	1.3	0	0	1	0	0	0	1.3
Largemouth bass	53	16	0	0	0	0	29.4	0	16	0	0	0	0	21.3
Chiselmouth	0	0	0	0	0	0	0	0	0	0	0	0	8	10.7
Common carp	14	0	0	0	0	0	6.0	0	0	0	0	0	0	0
Minnow spp	68	28	1	4	4	3	46.0	0	1	0	1	0	0	2.7
Peamouth	0	0	0	0	0	0	0	0	0	0	0	0	2	2.7
Northern pikeminnow	0	0	0	0	0	0	0	0	0	0	3	0	16	25.3
Redside shiner	2	0	0	1	0	0	1.3	1	0	11	1	0	0	17.3
Longnose dace	0	0	0	0	0	0	0	3	3	0	0	0	0	8.0
Yellow perch	13	1	0	0	0	0	6.0	0	1	0	0	0	0	1.3
Mountain whitefish	0	0	0	0	0	0	0	0	2	0	0	0	0	2.7
Totals	174	46	1	5	5	4	100	4	25	13	5	0	28	100

Similkameen River aquatic benthic macroinvertebrate data were collected by Vinson (1994) from three riverine sites between the Canadian border and the project area at RMs 12, 16, and 17. Eighty-five taxa were collected; 10 taxa made up 80 percent of the total sample (table 12). The majority of macroinvertebrates collected were chironomid larvae (50.3 percent relative abundance). Ephemeroptera from the family Ephemerellidae accounted for 19 percent of the relative abundance; Trichopterans represented 9 percent.

TABLE 12—AQUATIC BENTHIC MACROINVERTEBRATE TAXA FOUND IN THE SIMILKAMEEN RIVER ABOVE ENLOE RESERVOIR

[Source: Okanogan PUD, 2008a]

Order	Family	Sub-Family	Genus	Portion of sample (%)	Cumulative %
Diptera	Chironomidae	Orthocladiinae		21.0	21.0
Diptera	Chironomidae	Chironominae		19.2	40.2
Ephemeroptera	Ephemerellidae		Ephemerella	11.0	51.2
Diptera	Chironomidae	Tanypodinae		8.0	59.2
Trichoptera	Hydropsychidae		Hydropsyche	7.1	66.3
Ephemeroptera	Baetidae		Baetis	5.4	71.7
Ephemeroptera	Ephemerellidae			2.6	74.3
Diptera	Chironomidae			2.1	76.4
Trichoptera	Brachycentridae		Brachycentrus	1.9	78.3
Oligochaeta	Tubificidae	Naidinae		1.8	80.1

There are no benthic macroinvertebrate data for Enloe reservoir or the river below Enloe dam. It is likely that the reservoir benthic macroinvertebrate community is less diverse than the riverine community. A significant increase in non-insect taxa that are tolerant of silt conditions, such as oligochaete worms and isopods, would be expected in the reservoir. The macroinvertebrate communities in reaches 2 and 3 below Enloe dam are likely similar to communities found in the upper Similkameen River. Reach 1 is a lower velocity, braided channel with more fine sediment deposition; as such, it is likely to have a higher percentage of taxa that burrow, swim, or sprawl, with a corresponding reduction in the percentage of macroinvertebrates that cling and/or crawl.

3.3.3.2 Environmental Effects

Effects of Project Construction (WQ–05 Through WQ–08, FISH–01, BOTA–03 and BOTA–04, BOTA–07 Through BOTA–13)

As proposed by Okanogan PUD, construction of the project access road, intake channel, penstock, and powerhouse would require excavation and placement of spoil using heavy equipment, blasting, and would be supported by staging and laydown areas and fuel and lubricant storage facilities.

Okanogan PUD proposes a Blasting Plan that includes environmental measures to minimize potential negative effects on anadromous and resident fish that are in the large pool at the base of the falls. The Blasting Plan incorporates the following mitigation measures to avoid adverse effects on anadromous and resident fish:

- Small charges would be set off with time delays to minimize peak vibration and avoid creating excessive pressure waves and noise. Threshold criteria for pressure waves and noise have been adopted in the Blasting Plan to avoid potentially harmful levels of pressure and noise.
- Impacts would be minimized by timing near- and in-water blasting to coincide with the lowest water levels (low flows) combined with lowest potential for fish occupation in the area.
- Blast scheduling would avoid periods when federally listed or sensitive fish species are present.
- Blasting adjacent to the river would take place prior to spring high flow or during fall low flow.

• The amount of time that near- or in-water construction and blasting occurs would be minimized when the downstream end of the tailrace channel is excavated. During this period, construction activities would be expedited to reduce the amount of time fish may be exposed to the effects of blasting activities.

• Impacts would be minimized or avoided by removing as many fish as practical from the area adjacent to the proposed blasting and installing an exclusion barrier downstream of the potentially affected area to prevent entry of additional fish into the affected area.

• Mechanical excavators with hydraulic rock hammer attachments would be used in lieu of blasting to trim the excavation, excavate rock in areas unsuitable for blasting, and to excavate loose rock. Okanogan PUD would remove residues from the blasting operation to the extent practical.

• Hydrophones would be used to monitor pressure waves from blasting that could affect fish.

• Creation of hydrostatic pressure waves greater than 100 kilopascals (or about 14.5 pounds per square inch), or noise levels exceeding 190 decibels (dB) would be avoided, as practical.

In response to a comment by Washington DFW, Okanogan proposes to station biological monitors in the field during blasting to observe mortalities or changes in fish behavior that might make them more susceptible to predation.

Our Analysis

Blasting

The large, deep plunge pool downstream of the falls is an important habitat feature for anadromous and resident fishes that is not found elsewhere in the Similkameen River. Blasting would expose fish in the plunge pool to short-term physiological stress, sublethal injuries, mortality, or predation. Okanogan PUD's proposed Blasting Plan, as described above, however, would minimize these impacts and be protective of the fishery.

Additionally, Okanogan PUD proposes to capture anadromous and resident fish in the pool and relocate them prior to blasting activities. This measure would physically remove fish from areas where they could experience negative impacts due to blasting and would be protective of these fishes. This measure could result in some negative effects to captured fish including net abrasion, short-term physiological stress, sublethal injuries, mortality, and increased predation during transport or as a result of relocation to less optimal habitat. Capture of all individuals in the plunge pool prior to blasting would be difficult given the size of the pool (400 feet long by 80 to 100 feet wide by ≥ 20 to 30 feet deep) and the turbulence created by the falls. Accordingly, some fish, particularly smaller fish such as juvenile UCR steelhead, would remain in the deep pool below the falls after removal efforts. After fish are removed from the plunge pool, Okanogan PUD proposes to use netting across the Similkameen River which would exclude fish from re-entering the blast zone.

Okanogan PUD proposes visual biological monitoring during construction of project facilities to observe mortalities or changes in fish behavior that might make them more susceptible to predation. As noted by Okanogan PUD, however, the physical characteristics of the plunge pool would make it difficult to effectively monitor the area of impact effectively. If biological monitors were to observe mortalities or changes in fish behavior, Okanogan PUD also does not specify what kind of mitigative or protective actions may be taken.

Direct or indirect effects of the blasting activities may cause mortality or injury to ESA listed UCR steelhead. Additional discussion of effects on the listed steelhead is included in section 3.3.5, *Threatened and Endangered Species.*

Because there is the potential for adverse effects on a listed species (UCR steelhead) and other high-value species (Chinook salmon), and that the PUD's proposed Blasting Plan does not resolve all issues related to blasting, it would be appropriate for Okanogan PUD to consult with the TRG in preparing a final Blasting Plan. Involving the agencies that comprise the TRG in the development of this plan would ensure that all appropriate protection measures are considered and included in the plan.

Sediment

In its comments in response to the REA notice, NMFS recommends that Okanogan PUD prepare and implement a Soil Erosion Control Plan to guide project construction, as well as operation and maintenance of the project. Interior recommends that Okanogan PUD develop and implement an Erosion and Sedimentation Management Plan.

In response to the agency comments and recommendations, Okanogan PUD developed a Spill Response Plan, and a Storm Water Pollution Prevention Plan. The Spill Response Plan would be implemented at project initiation. Construction plans would be developed prior to construction, and BMPs would be implemented during all construction activities.

To characterize the hydraulic transport of sediment through the project, Okanogan PUD performed a modeling effort using the River 2D model. Results of the modeling show that sediment in the Enloe reservoir undergoes an annual deposition and erosion cycle.[22] Currently, Enloe dam acts as a sediment trap during low flow portions of the year (May through December). Low flow periods correspond with low water velocities from which suspended sediments settle creating a mound of sediment in the project reservoir near the dam. This mound of sediment is washed downstream annually during high flow periods (January through April) when flows increase by a factor of 20 or more. This sediment is washed over the dam and is transported downstream.

Under Okanogan PUD's proposed project operations, sediment transport in the Similkameen River in the project vicinity would change slightly. Okanogan PUD would divert up to 1,600 cfs through the turbines during all months of the year. Sediment carried in this water would still be transported downstream of the dam, but would do so by traveling through the powerhouse as opposed to spilling over the dam. Flows during the high flow portion of the year (January through April), which range on average from 1,800 to 7,600 cfs, would exceed the hydraulic capacity of the project and would spill over the dam as now occurs, transporting sediment out of the project reservoir and into the river downstream of the powerhouse. Overall, proposed project operations would have a negligible effect on the current cycle of sediment transport in the Similkameen River.

Sediment deposited in the reservoir may be transported downstream during project construction and operation. This could result in both adverse and beneficial impacts to aquatic resources. Adverse impacts would include short-term turbidity plumes and sedimentation from construction activities, which could cause mortality of eggs, fry, and juvenile fish due to smothering or abrasion. Re-suspension of contaminated sediments containing elevated levels of copper or arsenic could also occur and lead to bioaccumulation of those contaminants in fish eggs or fry, and to acute levels in predatory fish and insectivores such as salmonids and bass. Additional sedimentation, however, could provide

[22] Results of the River 2D modeling are found in Appendix E.2.3 to the license application.

benefits to species that utilize sediment as their preferred habitat. Species potentially benefiting from any deposition of finer sediments would include the Pacific lamprey (which spends most of its life in freshwater submerged in fine sediment), western ridged mussel, western pearlshell mussel, western floater mussel, and the California floater.

Okanogan PUD proposes to develop and implement two measures to mitigate for possible sediment inputs into the Similkameen River due to project construction and operation: an ESCP and a CSMP. These measures are discussed in more detail in section 3.3.1.2.

As noted above, Okanogan PUD proposes a Spill Response Plan and a Storm Water Pollution Prevention Plan. The Spill Response Plan includes practices to minimize the chances or severity of spills of hazardous materials into or near the river. These practices include: Ensuring all hazardous materials are safely sealed; immediate cleaning-up of all spills according to manufacturer's recommended methods; properly disposing of waste generated during spill clean-up; and notifying state and local government agencies in the case of spills. The Storm Water Pollution Prevention Plan includes BMPs to prevent erosion in project areas and to protect water quality. The BMPs include: visibly marking land-clearing limits; controlling river flow rates; installing sediment controls such as straw bales, silt fences, and sandbags; stabilizing all disturbed soils; protecting slopes in the project area; stabilizing all channels and outlets; and controlling pollutants. The implementation of these plans would be protective of aquatic resources in the project area.

Okanogan PUD's proposals for an ESCP, a CSMP, a Spill Response Plan, and a Storm Water Pollution Prevention Plan would minimize short-term degradation of aquatic habitat during construction, including critical habitat for UCR steelhead and EFH for Chinook salmon.

Enhancement Measures for Resident Fish (FISH–02)

Okanogan PUD proposes to construct light-colored boulder clusters to improve mountain whitefish habitat and recreational fisheries in the river upstream of the reservoir.

Washington DFW and Interior do not recommend the proposed boulder clusters because they say that the mountain whitefish fishery above the dam is limited and restricted to the winter months. Interior also suggests that the boulder placement may create a further heat sink and increase water temperatures. Instead, these agencies as a part of the Fisheries Enhancement Plant and Resident Fish Habitat Management Plan, respectively, recommend annual stocking of catchable-size sterile, triploid rainbow trout to provide a greater recreational fishery opportunity. Okanogan PUD states that it would consider contributing up to $60,000 (the cost of the boulder clusters) towards a trout stocking program for the term of the license, if the other state and federal agencies, tribes, and other stakeholders agree.

The Colville, the Ministry of Environment, and the Canadian Parks and Wilderness Society have expressed concerns throughout the licensing process that Washington DFW and Interior's recommendation for introduced fish stocks of triploid rainbow trout would pose an unacceptable risk to resident fishes due to potential disease transfer and competition for food and space, while providing a limited contribution to the recreational fishery.

Our Analysis

Most of the fish in the reservoir are non-native species that are better adapted to warmer, slower velocity habitat than native coldwater salmonids. The project would raise the elevation of the reservoir by 4 feet, and therefore, would result in more lake habitat and less riverine habitat for coldwater resident fishes. Okanogan PUD's proposal to add boulder clusters upstream of the reservoir to provide habitat for resident fish would create a small amount of pool habitat behind the clusters that could be utilized by native mountain whitefish. However, very few whitefish (0 in 2006; 2 in 2007) have been found in the reservoir during recent surveys, likely due to a combination of northern pikeminnow predation, warm water temperatures, lack of cover, and the sand-silt substrate. Therefore, it is unlikely that the proposed boulder clusters would provide much of any benefit to the very limited mountain whitefish fishery in this section of the river.

The introduction of hatchery fish stocks would provide a limited and short-term contribution to the recreational fishery, because water quality and high water temperatures in the Similkameen River would only allow a fishery during the cooler months of the year. The stocked rainbow trout may not survive in the river during the warmer summer months. Stocked rainbow trout would also pose a threat to native fish stocks in the United States and Canada due to potential for disease transfer and competition for food and habitat. In addition, although fish occurring in the river upstream of the project may utilize the project reservoir at times, the proposed run-of-river operation of the reservoir would likely have no effect on these species and would not affect the riverine habitat upstream of the reservoir.

Large Woody Debris Transport (FISH–03)

Large woody debris is an important component of a healthy stream ecosystem. Large trees that fall into streams perform an important role in forming pools, regulating storage and routing of sediment, and trapping spawning gravel. Large woody debris also provides complex fish habitat that increases carrying capacity, high flow refugia for fish, and substrate for macroinvertebrates. Enloe dam prevents the supply and transport of all large woody debris from the upper Similkameen River Basin to the lower river, except during high flows. The lower river has low levels of large woody debris, and currently all wood that enters the reservoir from the upper basin is either passed over the dam during flood stage or removed from the reservoir and not returned to the river below the dam. Lack of large woody debris from the upper basin may contribute to a reduction in structural habitat complexity for fish and macroinvertebrates downstream of the dam.

Okanogan PUD proposes to allow large woody debris to pass over the spillway during the annual flood flows; allow natural downstream transport of the woody debris; and would transport some large woody debris around the dam and place it in the river downstream of the dam, if needed. Transport of large woody debris would occur once annually during the recession of the annual high flow.

Interior recommends a plan [23] for the collection and relocation (downstream transport) of large woody debris to be completed at least 1 year before the start of any land-disturbing or land-clearing activities.

Our Analysis

Okanogan PUD's proposal to allow natural wood passage over the dam during large flood events when the crest gates on the spillway would be fully open, and to supplement that supply of woody debris by transporting large wood impounded by the dam to the

[23] As a part of their recommended Fisheries Enhancement Plan.

river below the dam, would provide additional anadromous and resident fish and macroinvertebrate habitat and would increase productivity downstream of the dam. Development of a large woody debris transport plan after consultation with FWS, NMFS, Interior, Washington DFW, and the Colville would help to guide implementation of the measures, including providing direction on determining when such transport would be required, the methods to be used for collection and transport of the wood, and the best locations for release of the woody debris downstream of the dam.

Intake Trashrack, Entrainment Studies, and Fish Monitoring (FISH–04 and FISH–05)

Entrainment into the intakes and passage through the turbines could result in injury or mortality to resident reservoir fish that are attempting to move downstream. Additionally, larger fish could become impinged on the trashrack causing possible injury or mortality. Okanogan PUD proposes to install a modified intake trashrack adjacent to the existing dam overflow spillway with provisions for a low velocity approach channel, and a trashrack at the intake with narrow (1-inch) bar spacing to prevent entrainment of large fish. Okanogan PUD also proposes to generate with Kaplan turbines, which generally cause low mortality for any small fish entrained into the power flow. Okanogan PUD proposes to file detailed design drawings of the modified trashrack intake and the trashrack cleaning system no later than 180 days prior to start of construction. Okanogan PUD also proposes to monitor adult and juvenile impingement and entrainment effects and to conduct quarterly fish sampling over a 1-year period.

Interior and Washington DFW recommend filing detailed design drawings of an intake fish screen and a schedule to build the screen before the start of any land-disturbing or land-clearing activities, as well as a monitoring plan and corrective actions to minimize fish impingement and entrainment.

Our Analysis

Impingement

The proposed spillway would provide a 276-foot-long exit from the reservoir for any downstream moving fish. During high-flow periods, this route would have high approach velocities. By comparison, the proposed power intake is a much smaller outlet with a lower approach velocity. Diverting water from the spillway to the power intake would likely draw some fish toward the intake and away from passage over the spillway, potentially exposing these fish to impingement on the trashracks or entrainment through the turbines. However, the modified trashrack with 1-inch bar spacing proposed by Okanogan PUD would be designed so that smaller fish can pass safely through the racks without becoming impinged, and larger fish (greater than 6 inches in length) would be discouraged or prevented from passing through the racks and in turn the turbines.

Okanogan PUD calculated the average monthly water velocities [24] at the trashrack to examine impingement risk for larger fish. Estimated monthly average velocities at the trashrack ranged from 1.06 feet per second (fps) to 2.91 fps, depending on the intake flow and associated river flow and reservoir elevation. Swimming speeds of fish known to reside in the project reservoir were collected for comparison to water velocities at the trashrack, to examine if resident fish would be able to swim away from the trashrack, thus avoiding impingement. Nine of the fish species known to reside in the reservoir [25] are able to reach burst speeds [26] of between 4.6 and 10 fps (for adult life stages).[27] These species would be able to swim away from the trashracks in all months of the year, avoiding impingement. From April to July, predicted velocities at the trashrack would average 2.65 fps, which could result in impingement for two species known to reside in the reservoir. Northern pikeminnow and chiselmouth have burst swimming speeds of 2.5 fps, and thus would be susceptible to impingement if unable to avoid the intake flow. Fishes impinged would be subject to injury and mortality, which would be most likely to occur from April to July.

Entrainment

Reservoir sampling showed that most of the small, resident fish in the reservoir are found in shallow water areas with cover. Accordingly, very few small fish are expected to be in the area of the intake because of unsuitable habitat (deep open-water habitat with steep, almost vertical walls). Two native species—chiselmouth and northern pikeminnow—would have the greatest potential of occurring near the intake. Native suckers, mountain whitefish, and introduced species, such as largemouth bass, carp, and yellow perch, may also be present near the intake. Resident rainbow trout were not found between the U.S./Canadian border and Enloe dam during recent studies, and probably would not occur near the intake. Because the population density of fish in the reservoir is low, and the project would have narrow-spaced trashracks, the rate of entrainment at the project would likely be low resulting in undetectable effects of the population levels of resident fishes in the reservoir. Additionally, the survival rates of fish that would be susceptible to entrainment (those less than 6 inches in length) after passing through the turbines have been estimated to be 84% to 95%.[28]

Okanogan PUD proposes to monitor seasonal variation in entrainment susceptibility, entrainment mortality, and fish populations in the reservoir after project construction. Both entrainment levels and mortality of entrained fish are expected to be very low. Additionally, effects of project entrainment on reservoir populations are expected to be minor. Therefore, these data collection efforts likely would not produce useful data. Additionally, Okanogan PUD did not specify if these monitoring efforts would lead to adaptive management, if needed, to adjust the proposed measures to reduce any adverse effects associated with operation of the intake.

The agencies recommendation for a fish screen did not include any design details, so we are unable to determine how the performance of the proposed narrow-spaced trashrack would compare to a fish screen. However, Okanogan PUD's proposed trashrack would achieve the same goal of physically excluding the majority of fish approaching the intake. Fish screens cost much more than trashracks to build, install, and maintain. The proposed trashrack would achieve similar results at a much lesser cost than a fish screen. To ensure that the applicant's proposed narrow-spaced trashrack achieves similar exclusionary goals of a fish screen, it would be beneficial for Okanogan PUD to consult

[24] See Okanogan PUD AIR response filed on July 21, 2009. In this AIR response, Okanogan incorrectly stated that burst speed for largemouth bass is 2.1 fps. Appalachian Power Company (2009) collected critical swimming speeds for largemouth bass from 10 studies identified in the literature and were able to estimate that the burst speed of juvenile largemouth bass is between 3.2 to 4.3 fps, while adults would be capable of faster speeds.

[25] These species are bridgelip sucker, largescale sucker, unidentified sunfish species (genus Lepomis), common carp, yellow perch, rainbow trout, Kokanee salmon, and mountain whitefish.

[26] A speed that can be maintained for a short period of time, typically seconds.

[27] See Okanogan PUD AIR response filed on July 21, 2009.

[28] Survival rates were calculated by Okanogan PUD using the U.S. Department of Energy's Advanced Hydro Turbine System Program.

with the fisheries agencies during the final design of the intake structure and trashracks. By including some or most of the design features of a fish screen into the design of the narrow-spaced trashrack, fish protection would be provided concurrently with protection of the generating equipment from the influx of trash.

Tailrace Net Barrier and Tailrace Video Monitoring (FISH–06 and –07)

Operation of the project may attract upstream migrating fish into the turbine discharge flow. It is expected that this behavior could result in UCR steelhead or anadromous salmonids attempting to enter the draft tubes and swim through the draft tubes to an area near the turbine runner blades. Fish may be injured or killed by impact with the spinning runner blades during partial load operation when velocities downstream of the turbine may be low enough for the fish to reach the turbine runner. Okanogan PUD proposes to design (after consultation with NMFS), install, and operate a net barrier at the outlet of each draft tube. Okanogan PUD proposes to maintain the nets and to develop a written operation plan in consultation with NMFS. Okanogan PUD also proposes to monitor the effectiveness of the tailrace barrier nets through the use of underwater videography. Okanogan PUD would submit draft and subsequent design plans to NMFS; obtain NMFS' approval of design specifications for the tailrace barrier; and file a detailed design of the barrier nets with the Commission at least 180 days before the start of any land-disturbing or land-clearing activities. Okanogan PUD also proposes to develop and implement a postconstruction evaluation and monitoring plan and an inspection and maintenance plan.

NMFS recommends that when downstream oriented velocities in the draft tube are less than or equal to 27 feet per second (the highest burst swimming speed attainable by UCR steelhead) the tailrace barrier should be in place and operated as designed. NMFS states that development of the final detailed barrier designs (in consultation with NMFS), including expected approach velocities, be completed 180 days prior to the start of any land-disturbing activities. NMFS further recommends that these final designs include a hydraulic evaluation of the facilities; a written operation plan; a postconstruction evaluation and monitoring plan; a contingency plan in the event the proposed tailrace net barriers do not perform according to criteria; and an inspection and maintenance plan.

Washington DFW and Interior make similar recommendations regarding the need for the tailrace barriers and consultation; however, these agencies recommend the filing of detailed design drawings with the Commission at least 1 year before the start of any land-disturbing or land-clearing activities.

Our Analysis

Of the fishes that are found in the area where the tailrace would be located, UCR steelhead are the strongest swimmers, and therefore would be most likely to be able to access the draft tubes while the project is operating. Adult UCR steelhead are strong swimmers and are reported to have a burst speed of 27 feet per second (Bell, 1986). During full load operation, the water velocity immediately downstream of the turbine runner blades would exceed this burst speed, creating a velocity barrier that would prevent fish from reaching the area where injury or mortality could occur. Installation of a net barrier at the outlet of each draft tube, however, would provide a physical barrier to prevent injury to fish during periods of reduced generation, when water velocities would be lower than steelhead burst speed and too low to maintain the velocity barrier.

Okanogan PUD would use underwater video cameras during the peak presence of UCR steelhead, Chinook, and sockeye salmon during the first two years of operation, to monitor the openings of the net barriers. The video would be reviewed to document if adult salmonids are able to enter the area where barrier nets are deployed, and if so, if the nets effectively prevent fish from moving further upstream into the draft tubes, and if fish are able to safely exit the barrier net locations. This measure would allow Okanogan PUD to monitor the effectiveness of the tailrace barriers nets. It would also allow for adaptive management, so that the tailrace barriers nets location or design could be adjusted or operated in a more efficient or effective manner, if possible. The use of underwater videography would ensure that anadromous salmonids and resident fishes are protected from entering the draft tubes where mortality or injury could result.

It is expected that the final barrier design, the operation plan, postconstruction evaluation and monitoring plan, and the inspection and maintenance plan, to be developed after consultation with NMFS, and filed with the Commission for approval, would provide sufficient assurance that the proposed barrier net designs would provide adequate protection to fish downstream of the proposed powerhouse.

Run-of-River Operations (FISH–08)

Okanogan PUD proposes to operate the Enloe project in a run-of-river mode. The 370-foot-long bypassed reach would receive a minimum flow of 10 or 30 cfs (see below) during the lower flow months when river flow is equal to or less than the hydraulic capacity of the powerhouse. Powerhouse discharges would be returned to the river below the falls.

Our Analysis

The proposed run-of river operations would have no effect on water quantity above the dam or downstream of the project powerhouse at the base of the falls. This would be protective of the current fisheries habitat in the lower Similkameen River downstream of the falls, as river flows would be unchanged from current conditions.

Ramping Rates

Okanogan PUD proposes to implement interim ramping rates based on Washington State guidelines (Hunter, 1992) to protect aquatic resources downstream of the tailrace (table 13). The ramping rates would apply to changes in hourly water elevations associated with project operation during normal powerhouse start-up and shut-down. Temporary modifications to ramping rates may be needed to address operating emergencies or planned outage.

TABLE 13—PROPOSED RAMPING RATES

[Source: Hunter, 1992]

Season	Daylight [a]	Night [b]
February 16 to June 15	No ramping	2 inches per hour.
June 16 to October 31	2 inches per hour	1 inch per hour.

TABLE 13—PROPOSED RAMPING RATES—Continued

[Source: Hunter, 1992]

Season	Daylight [a]	Night [b]
November 1 to February 15	2 inches per hour	2 inches per hour.

Notes:
[a] Daylight is defined as the period from 1 hour before sunrise to 1 hour after sunset.
[b] Night is defined as the period from 1 hour after sunset to 1 hour before sunrise.

Interior, Washington DFW, NMFS, and American Rivers *et al.* recommend implementation of the ramping rates shown in table 13 for the protection of aquatic resources. These agencies recommend that temporary modifications of the ramping rates that may be needed due to operating emergencies or planned outages should be developed by mutual agreement among Okanogan PUD and the interested agencies and tribes. To expedite these discussions, Okanogan PUD requests that these agencies be required to appoint a single local representative who has the authority to address such operational issues. If the interim ramping rates are so modified, Okanogan PUD would notify the Commission, as soon as possible, but no later than 10 days after each such incident. A second issue regarding ramping rates was described in the applicant's recent filings, related to ramping rates immediately downstream of Enloe dam when spillage flows are reduced as the project powerhouse is brought on line. The September 2010 snorkeling survey conducted by Washington DFW and Washington DOE identified bedrock benches along the shoreline of the plunge pool that could strand fish if spillage over the dam was to be reduced at a rate where fish could not vacate that habitat before it is dewatered. As a result, Okanogan PUD now proposes to determine the critical flow thresholds related to dewatering of these bedrock benches, based on field observations, so that appropriate downramping of spillage flows can be made between those flow thresholds (letter from Donald H. Clarke, Counsel to Public Utility District No. 1 of Okanogan County, to Kimberly Bose, Secretary, FERC, October 28, 2010).

Our Analysis

Okanogan PUD proposes the interim ramping rates recommended by Interior, Washington DFW, NMFS, and American Rivers *et al.,* for the protection, mitigation of damages to, and enhancement of aquatic resources downstream of the powerhouse. Rapid flow reductions in a stream channel, especially in low gradient stream areas, have the potential to strand fish in dewatered areas including pools and side channels. Fry and juvenile fish less than 2-inches-long are most vulnerable to potential stranding due to weak swimming ability; preference for shallow, low velocity habitat such as edgewater and side channels; and a tendency to burrow into the substrate to hide. The magnitude of change can also affect habitat use and the production of macroinvertebrates that are vulnerable to drift or stranding. Side channels are particularly susceptible to dewatering and disconnection from the main channel as flows recede. As a result, young-of-the-year salmonids that prefer to rear in side channels (e.g., UCR steelhead) may be stranded.

Based on Hunter (1992), we expect that the interim downramping rates described in table 13 should protect Chinook salmon and UCR steelhead redds and fry, and juvenile Chinook salmon, UCR steelhead, sockeye salmon, and aquatic macroinvertebrates from stranding and mortalities associated with flow fluctuations downstream of the powerhouse. In addition, because the project would operate in a run-of-river mode, any reductions in powerhouse flow would result in an immediate increase in spillway flows, which would also enter the pool at the base of the falls at about the same time that powerhouse flows are reduced. Thus, the pool at the base of the falls and the Similkameen River downstream of this pool would not experience wide water level fluctuations under normal operations. This proposed operation and the proposed ramping rates would also protect UCR steelhead designated critical habitat and Chinook salmon EFH downstream of Similkameen Falls.

Recently proposed measures to limit downramping of spillage flows immediately downstream of Enloe dam would protect any resident species from potential stranding on bedrock benches along the shoreline of the plunge pool. Identifying the critical flow thresholds and associated water elevations in relation to the bedrock benches would allow development of actual ramping rates between those flow thresholds. Okanogan PUD proposes that these flow thresholds be determined by field observations and monitoring prior to initiation of project operations, but does not specify what the ramping rates would be once the flow thresholds are determined. It would be appropriate to determine the flow thresholds by field observations, because there have been no detailed surveys of the river bathymetry or instream flow modeling in the bypassed reach. Future ramping rates would still need to be determined, as appropriate rates in the bypassed reach may not necessarily be the same as those outlined in Hunter (1992). Therefore, a study plan would be required that would describe how the flow thresholds would be determined by field observation, and how future downramping rates for the bypassed reach would be developed. This study would need to be prepared in consultation with Washington DFW, Washington DOE, FWS, and the Colville, and filed with the Commission for approval.

Ramping Rate Compliance Monitoring

Okanogan PUD proposes to use the existing Washington DOE gage in the lower Similkameen River to monitor ramping rate compliance downstream of the powerhouse. Interior, Washington DFW, NMFS, and American Rivers *et al.* recommend that the location to measure compliance should be determined by Okanogan PUD in consultation with Interior, NMFS, Washington DOE, Confederated Tribes and Bands of the Yakama Indian Nation (Yakama Nation),[29] and the Colville, before project operation begins.

Our Analysis

The Washington DOE gage that Okanogan PUD proposes to use to monitor ramping rate compliance on the lower river is located in Oroville at river mile 5, nearly 4 miles downstream of the project site. Sites for monitoring compliance with ramping rates should be located in relatively close proximity to project discharges, so that gage heights recorded reflect the water surface elevations immediately downstream of the powerhouse. It is

[29] NMFS and Interior's 10(j) recommendation for compliance of the ramping rates included consultation with the Yakama Nation.

unlikely that the existing DOE gage in Oroville would meet these criteria, because any small fluctuations in discharge from this proposed run-of-river project would likely be attenuated in the 4 miles of river between the tailrace and the gage.

Interior, Washington DFW, NMFS, and American Rivers et al.'s recommendation that a monitoring site would need to be established as a result of consultation between those parties and Okanogan PUD would ensure that the location for monitoring ramping rate compliance would be near the project and would adequately measure the ramping rates. The result of this selection process could require the installation of a new monitoring gage on the Similkameen River near the project's tailrace. A plan detailing how Okanogan PUD would monitor compliance with their proposed ramping rates, including the location selected for doing so would be beneficial and would need to be filed with the Commission for approval.

Flow Continuation

Interior recommends development of a plan that would provide up to 48 hours of flow continuation in the event of emergency project shutdown at the unmanned, remotely operated powerhouse. Interior also recommends that the crest gates or flow continuation valves for each penstock be designed to open automatically to provide outflow into the lower river from a combination of the tailrace and spillway flows, so that river flow never drops below the level of inflow to the reservoir. Interior further recommends that the plan include detailed drawings and flow capacities for the proposed crest gates or flow continuation valves.

Our Analysis

In the case of an unplanned outage, the power plant control system would open the crest gates automatically to maintain tailwater elevation at the powerhouse to within the proposed ramping rate described above (table 13). This would ensure an uninterrupted flow of water downstream of the project tailrace. A small, short-term fluctuation in downstream flows could occur as flow through the powerhouse is reduced and flow over the spillway crest gates increases. The estimated travel time from the spillway to the pool below the falls depends on flow, but is estimated to be about 1 minute. Thus, any fluctuation in river flow downstream of the project would be of short duration and would be attenuated by water storage in the large pool below the falls and in the river channel further downstream. Therefore, the proposed crest gate operations, as described, would protect and maintain aquatic habitat downstream of the project, and there would be no need for a specific flow continuation plan as recommended by Interior. Flow continuation would occur as part of normal project operations, so downstream aquatic habitat, including UCR steelhead designated critical habitat and Chinook salmon EFH below Similkameen Falls, would be protected in the event of operating emergencies or planned outages.

Anadromous Fish Passage at Enloe Dam

Under the current proposed action, fish passage would not be provided at the dam, and the 370-foot long bypassed channel would be reduced to a minimum flow of 10 or 30 cfs during the low flow months when most of the river flow would be diverted through the powerhouse and returned to the river below the falls.

American Rivers *et al.,* BIA, and CRITFC commented that the issue of fish passage was not resolved in a previous license proceeding for this site; there is suitable anadromous habitat above the dam; and this issue needs to be resolved prior to issuance of a new license. CRITFC recommends that the applicant work with CRITFC's member tribes, the BIA and other parties to resolve the issue of historical anadromy by employing the best available scientific methods including paleolimnological, genetic and archeological studies. CRITFC and BIA also requested production potential estimates for salmon and UCR steelhead be included as part of a fish passage alternative in the current licensing proceeding. The BIA commented that cost estimates for designing, constructing, operating, and maintaining upstream and downstream fish passage facilities for the term of the license need to be developed in case such an action is required in the future.

The Colville, Okanogan Nation Fisheries Commission, Canadian Parks and Wildlife Society British Columbia Chapter, and the Ministry of Environment oppose introduction of anadromous fish passage above the falls based on the belief that historical anadromy never occurred above the falls, and introduction of anadromy would have negative impacts on resident fishes and other aquatic life due to disease transfer and competition for food and habitat; would provide a limited contribution to a recreational fishery in the upper river; and would violate traditional laws, the Coyote mythology that prohibits fish passage at the falls, and sacred principles of the Tribes (Vedan, 2002).

FWS has determined that it does not have sufficient information to support filing a Section 18 prescription for fishways for the Enloe Project at this time, because of the uncertainty of historical anadromy above the falls. Both FWS and NMFS recommend that upstream anadromous fish passage facilities not be required now, and have reserved their authority to require fish passage under Section 18 in the future.

Our Analysis

There are no documented accounts of Chinook salmon, sockeye salmon, UCR steelhead, or Pacific lamprey anadromy above Similkameen Falls. Aboriginal traditional beliefs suggest that Similkameen Falls historically blocked anadromy (Vedan, 2002). In an Annual Report of the Department of Indian Affairs for the Year Ended December 31st, 1890, the Indian agent reported that "at the mouth of the Similkameen River, in the United States Territory, are falls which prevent the ascent of salmon up the Similkameen...I have several times urged Indians to construct a fish ladder and thus provide themselves with a supply of salmon..." (Department of Indian Affairs, 1890, in Vedan, 2002).

More recently, conservation planners with knowledge of the affected area and fish populations have weighed in on the issue. The Okanogan Sub-basin Plan, which was prepared for the Northwest Power and Conservation Council, concluded that Similkameen Falls was an impassable historic barrier to upstream salmon migration (KWA Sciences *et al.,* 2004). The Similkameen watershed above Enloe dam was not included in their sub-basin salmon ecosystem analysis for this reason.

In 2007, the Upper Columbia Salmon Recovery Board issued the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan. The Upper Columbia Salmon Recovery Board is composed of representatives from Chelan, Douglas, and Okanogan counties, the Colville, and the Yakama Nation. Their recovery plan does not identify upstream and downstream passage of fish at Enloe dam as being a short-term or long-term action that would contribute to the restoration of these fish stocks, based on the uncertainty of fish being able to ascend Similkameen Falls before the construction of Enloe dam (Chapman *et al.,* 1994).

Several entities including, Washington DFW, American Rivers *et al.,* and CRITFC believe that steelhead, Chinook salmon, sockeye salmon, and Pacific lamprey may be able to ascend

the falls and access the bypassed reach above Similkameen Falls under some flow conditions. No data, provided in this proceeding, however, have shown this to occur, or to be a likely possibility. Washington DFW has stated that it has anecdotal information that places anadromous fish above the falls, that UCR steelhead penetrated farther upstream of the falls before construction of Enloe dam, and that rainbow trout above the dam probably retain genetic similarity to UCR steelhead; however, Washington DFW did not provide such information confirming these assertions.

In an effort to understand the historical range of anadromous fishes in the Similkameen River, CRITFC commissioned Ford (2010a) to analyze sediment core samples collected in Palmer and Blue lakes upstream of Enloe dam. Sediment core samples were collected and analyzed for isotopic content. The core samples appear to contain isotopic signatures characteristic of marine-derived nitrogen, possibly indicating anadromy; however, the preliminary analyses were inconclusive and additional analysis is under way (Ford, 2010a, b; Myers, 2010). CRITFC recommends that additional studies similar to Ford (2010a) be required to attempt to resolve the issue of whether anadromy occurred upstream of the falls. While such studies may provide some indication of the former presence of anadromous fish upstream of the falls, Ford (2010b) states that such results by themselves would not provide "compelling evidence" that anadromous species once occurred above the falls.

CRITFC and BIA requested that production potential estimates for salmon and UCR steelhead be included as part of a fish passage alternative in the current licensing proceeding. The CRITFC letter included estimates that the habitat upstream of Enloe dam could support approximately 55,000 Chinook salmon and 98,000 steelhead spawners. Although undoubtedly there may be some suitable habitat for salmon and steelhead upstream of Enloe dam, based on available information in the literature, it appears that anadromous fish likely did not pass the Similkameen Falls in substantial numbers prior to the construction of Enloe dam. An occasional account of a sighting of an anadromous fish above the falls does not outweigh the lack of historic record describing a salmon and UCR steelhead fishery or population above the falls. Native American and First Nation belief that salmon were blocked from the upper reaches of the Similkameen River above the falls is additional support that salmon and UCR steelhead did not ascend the falls and enter the upper reaches of the river to spawn prior to the construction of Enloe dam.

Regardless of whether anadromous fish historically migrated to areas upstream of Similkameen Falls, if Okanogan PUD were to provide for fish passage at the project, anadromous fishes that have been known to occupy the plunge pool would be able to access habitat in the Similkameen River upstream of Enloe dam for spawning and rearing. Benefits to anadromous species could include an increase in the populations of these fish stocks, as they gain additional spawning and nursery habitat in the upper Columbia River basin. Other benefits to upstream aquatic habitat would be the influx of marine nutrients through the decay of salmon carcasses, which would benefit primary production and the entire food chain, potentially enhancing resident fish populations. Passing adult anadromous species upstream would also have the potential to enhance the sport fishery in the river, depending on regulations that would likely be put in place to protect stocks introduced to the upper Similkameen River.

The extent that these potential benefits might occur is not known, and the introduction of anadromy to the upper Similkameen River could also have negative impacts on both the anadromous and resident fishes in the river. Anadromous fishes reaching the upper river may or may not access suitable spawning and nursery habitat, as the reach immediately upstream of Enloe dam (the reservoir) is not high-quality salmonid habitat. While there may be suitable habitat upstream of the reservoir, juveniles of anadromous species that are successfully spawned and rear upstream of Enloe dam would also face an additional impediment to downstream migration, the Enloe Project, which fish in the lower Similkameen River would not face. Although the project may be required to provide downstream fish passage facilities if anadromous species are introduced upstream, such facilities are seldom 100 percent effective, so fish from the upper river would be exposed to potential delay, injury, and mortality. Resident species could be adversely affected by the introduction of anadromous species by the potential for disease transfer and competition for food and habitat between resident and anadromous species.

Location of the Tailrace (FISH–09)

UCR steelhead, Chinook salmon, and sockeye salmon enter the cooler Similkameen River and migrate as far upstream as Similkameen Falls during the summer months. The large, deep plunge pool below Similkameen Falls is used as holding habitat until temperatures in the Similkameen and Okanogan rivers decrease and these species can begin their spawning activities (figure 4). Chinook salmon arrive in the plunge pool in July and August, and hold prior to spawning in the lower river. Sockeye salmon use the pool in August and September while also holding prior to spawning in the fall. Sockeye and Chinook salmon generally leave the pool by the end of September. Juvenile sockeye and Chinook salmon are not known to utilize the pool area. Adult UCR steelhead occur in the plunge pool below Similkameen Falls from September through March. Juvenile UCR steelhead can be found in the pool year-round.

Currently all flow provided to the plunge pool flows over the falls and provides well oxygenated habitat for fish species. Bypassing flow around the falls could result in reduced DO concentrations in the plunge pool. To remedy this, Okanogan PUD proposes to locate the tailrace so that it discharges into the plunge pool in a manner that allows the flow to circulate to maintain water quality (TDG and DO) for fish holding in the pool. Okanogan PUD also proposes to install turbine venting to enhance DO levels in project discharges.

Our Analysis

When the tailrace is operational under Okanogan PUD's proposal, flow would enter the pool approximately 90 feet downstream from the falls at an angle and create clockwise circulation in the pool upstream of the tailrace exit. Orienting the tailrace to discharge flow into the plunge pool in this manner would provide circulation within the pool to prevent stagnation and water quality degradation. The potential TDG and DO effects of the tailrace discharge are addressed in section 3.3.2.2, *Water Quantity and Quality, Environmental Effects.*

Water circulation in the plunge pool, along with turbine venting, would benefit all anadromous and resident fishes found in the pool by ensuring adequate DO levels, while reducing TDG levels. These water quality measures that reduce TDG, while maintaining adequate DO (see section 3.3.2.2), would have the greatest potential to benefit juvenile UCR steelhead, as they are known to occupy the plunge pool year-round. The proposed tailrace location would maintain the UCR steelhead designated critical habitat and Chinook salmon EFH below Similkameen Falls.

Side Channel Enhancement (FISH–10)

Low velocity, high complexity side channels provide important habitat for juvenile fishes. Elevated summer stream temperature and limited rearing habitat are the most significant limiting factors for salmonids in the lower Similkameen and Okanogan Rivers.[30] The purpose of the side channel enhancement measure is to create cooler water, side channel habitat in the lower river to benefit anadromous fish, and mitigate any impacts such as entrainment mortality and any decreased production in the Similkameen River.

Okanogan PUD proposes the side-channel enhancement project in reach 1 (RM 0–4.7). The project would include the enhancement of one to three side channel areas in the Similkameen River located downstream of Enloe dam. The candidate side channel would be approximately 800 feet in length with an average gradient of 0.15 percent. The channel(s) would be entrenched in the floodplain; the cross section would be approximately trapezoidal with some undulation and woody debris in the channel bottom. Riparian vegetation would provide cover and shade over the majority of the open channel(s). The side-channel enhancement proposal would provide cool water in these candidate side channels that would enhance habitat for juvenile fishes.

Cool water would be provided by a well to sustain flow in the side channel. The well is expected to be about 12 inches in diameter with a minimum depth of 40 feet. Total depth would depend upon site specific sub-surface conditions. It is anticipated that a 25 to 30-horsepower pump would be adequate to provide the desired flow rate of 2 cfs. Based on water samples from adjacent wells, the temperature of water from the well is expected to be near 14 °C. Constructed riffles would contain buried manifold systems capable of delivering 2-cfs low pressure flow from the well.

The cool water pumped from the well to the side channel(s) would discharge water into a lateral channel of the mainstem Similkameen River that is disconnected from the main flow during the summer low flow period. The cool water discharged into the lateral channel would extend downstream for at least 200 to 300 feet. The water in this side channel would be backwatered by the mainstem flow, thus providing additional ponding of cool water, and the discharge into the channel would be approximately 4 acre-feet per day (2 cfs).

Most of the construction activity would occur in a dry channel. Sediment, erosion control, and water quality protection would be implemented using procedures outlined in Washington DOE's Stormwater Management Manual for Eastern Washington, as needed. BMPs would be used to protect water quality and prevent streambank erosion. Postconstruction monitoring would be conducted annually for the first 3 years after side channel construction, then every 5 years thereafter. Monitoring would likely be accomplished through a snorkel survey and the use of other fish observation techniques for shallow water, given that UCR steelhead are listed as threatened and there is risk of mortality or stress associated with electrofishing or seining. Sampling would occur in the low flow August to mid-September time frame.

The river stage at which flow would begin to naturally enter the upper end of the side channel and the relationship between river flow and side channel flow above this threshold value has not been determined. This information would be collected during a second planning and evaluation phase and would determine the timing of start-up and duration of well operation. It would also provide insight regarding the need to protect the side channel from flood flow; because the river gradient is flat, flood stage may backwater the downstream end of the side channel preventing higher water velocity from developing. If a downstream backwater is present, large floods would maintain natural processes within the side channel without destroying the investment in rearing habitat.

Washington DFW, Interior,[31] and NMFS recommend the proposed side-channel enhancement project. NMFS also recommends development of a fish habitat enhancement plan in consultation with NMFS, FWS, Washington DFW, the Colville, and the Yakama Nation. This recommended plan would consist of provisions for side channel enhancement, as well as Okanogan's proposed gravel supplementation plan (FISH–11) which is discussed below. NMFS recommends the final plan be filed with NMFS at least 180 days prior to the start of any land-clearing activities and include a schedule for completion in 3 years, performance criteria, monitoring provisions, contingency plans, and provisions for periodic review of the plans.

Our Analysis

The effect of the side channel improvements is not expected to have a significant effect on water temperatures in the Similkameen River. The side channel improvement would include the development of a small area (~1,000 square feet) of cool water at the confluence of the side channel and the mainstem river. It is expected that the outflow of 2 cfs (4 acre feet/day) of cool water from the side channel would maintain cool water habitat in the lateral channel. Lower temperatures would also be expected in the mainstem Similkameen River where the lateral channel connects to the river; however the downstream extent of the cool water influence is unknown at this time, but expected to be 200 to 500 feet.

The purpose of the proposed side channel enhancement is to provide coolwater rearing habitat for juvenile salmonids during the summer to decrease mortality, improve fish condition, and mitigate the loss of fisheries resources that could occur as a result of the construction and operation of the project. The proposed side channel and lateral channel enhancements would benefit juvenile UCR steelhead/rainbow trout, Chinook salmon, and sockeye salmon in the lower river during the low flow summer months by providing thermal refugia. Cutthroat trout and brook trout are also present in very low densities and could benefit. The proposed side channel habitat would be best suited to age 0+ steelhead/rainbow trout, and to a lesser degree age 1+ steelhead/rainbow trout. The relatively shallow water depths in the side channel would likely preclude significant occupancy by older age cohorts of trout and salmon. Monitoring the side channel via snorkel surveys after construction would determine if the newly created habitat was being utilized by the target species.

Installation of the structures, channel excavation, and other instream work related to the proposed side-channel enhancement project could cause short-term turbidity plumes and sedimentation when water is turned back into the dry channel following construction. In-water construction to connect the side channel with the river may cause mortality of eggs, fry, and juvenile fish due to crushing or abrasion during construction. It would be beneficial for Okanogan PUD to consult with NMFS, FWS, Washington DFW, the Colville, and the Yakama Nation, and file the side-channel enhancement plan with the Commission, as well as providing copies to the agencies, at least

[30] See license application.

[31] As part of Washington DFW and Interior's recommended Fisheries Enhancement Plan.

180 days prior to implementation, as recommended by NMFS.

Spawning Gravel Enhancement (FISH–11)

The Similkameen River is a gravel-poor system and Enloe dam prevents the transport of gravel from the upper watershed, which results in limited spawning habitat for Chinook salmon, sockeye salmon, and UCR steelhead in the lower 5 miles of the Similkameen River. Spawning salmonids use gravel deposits near and downstream of RM 4, and limited spawning occurs along the left riverbank (looking upstream) near RM 5.2. Okanogan PUD proposes a gravel supplementation program in reach 1 (RM 0–4.7). Okanogan PUD would supplement up to a maximum of 15,000 cubic yards of 1- to 3-inch diameter gravel on a schedule of 3,000 cubic yards 5 times at 5-year intervals. Each 3,000-cubic yards of gravel deposited would have the potential of providing approximately 2 acres of additional spawning area.

The preferred site for introduction of the gravel at RM 5.8 is near an abandoned orchard that would not require any site grading to create a pad for the conveyor belt and truck turn-around, and has a low river bank (12 feet high), which would allow a shorter conveyance system to reach the active channel of the river. The ground cover in this location is predominately riprap with a small number of willow shrubs and small cottonwoods growing in the riprap. Approximately eight willow shrubs on the riverbank would be cut back and allowed to resprout following the first supplementation.

The gravel would be placed adjacent to or in the wetted channel where it could be naturally redistributed at high flows. To reduce disturbance of the riverbanks and associated riparian habitat, a rock conveyor would be used to transport the gravel from an upland staging area to the river channel. The in-channel gravel pile is anticipated to be about 30 feet tall, 40 to 50 feet wide, and 150 feet long, and would extend 35 to 40 feet into the wetted channel.

Gravel supplementation is recommended by Interior, NMFS, and Washington DFW.[32] The Colville comments that the proposed gravel supplementation program would reinitiate gravel recruitment processes that have been disrupted by the presence of Enloe dam; would greatly increase the quality and quantity of spawning habitat in the lower Similkameen River, and would have minimal impacts on existing habitat. The Colville also comments that the benefits of the proposed activities would vastly outweigh any incidental impacts.

Our Analysis

Enloe reservoir would continue to interrupt gravel transport from upstream sources after the proposed project is constructed. The proposed gravel supplementation program would provide long-term benefits for spawning Chinook salmon and UCR steelhead/rainbow trout in the lower river as the gravel is redistributed. The proposed 3,000 cubic yards of gravel, however, may need to be distributed over more than one river location to allow efficient distribution under normal flow conditions and prevent unwanted channel alteration.

Deposition of the gravel into the wetted channel would likely cause short-term turbidity plumes, sedimentation, and mortality of juvenile fish due to crushing or abrasion. It would be beneficial for Okanogan PUD to consult with NMFS, FWS, Washington DFW, the Colville, and the Yakama Nation to develop and file a gravel enhancement plan with the Commission, as well as providing copies to the agencies, at least 180 days prior to implementation, as recommended by NMFS.

Biological Review and Fisheries Monitoring Database (FISH–12 and FISH–13)

Okanogan PUD proposes a TRG to monitor the success of proposed mitigation and enhancement measures. The TRG would: (1) Consult in the design of management and monitoring plans; (2) review and evaluate data; and (3) develop resource management proposals or other recommendations to further improve the measures, if appropriate. The group's meetings would be open to the public, and Okanogan PUD would maintain records of the meetings and any recommendations made. Data and information from the monitoring programs would be used to examine long-term trends and make decisions regarding adapting measures to further protect aquatic resources. As part of the biological review process, Okanogan PUD would develop a central database for organization and storage of the monitoring data related to aquatic resources. Database format and development would be consistent with other aquatic data gathered in the Okanogan River Basin. The monitoring programs that would be included in the biological review process are:

- An entrainment study, including reservoir sampling;
- Tailrace barrier monitoring;
- Monitoring the use of boulder clusters upstream of the reservoir; and
- A side-channel habitat monitoring program.

Washington DFW recommends that Okanogan PUD develop an adaptive management plan within 1 year of license issuance that includes goals, monitoring protocols, decision criteria, and actions to be completed in response to monitoring results.

Interior recommends development of a Resident Fish Habitat Management Plan within 1 year of license issuance that includes a comprehensive study of resident fish species, populations, numbers, and habitat conditions in the river from Nighthawk down to the reservoir to complement the studies already completed in the reservoir and downstream of the dam, and development of a fish habitat monitoring plan for the river upstream of the reservoir. The plan also includes provisions for temperature monitoring, riparian plantings in the reservoir, the stocking of triploid rainbow trout in the reservoir, and a fish habitat monitoring plan.

Our Analysis

Development and implementation of the fish monitoring database and study plans; interpretation of monitoring results; and development of adaptive management strategies based on monitoring results would best be accomplished through consultation among the proposed TRG and Okanogan PUD to ensure integration between license measures and other resource management plans, such as regional salmon recovery efforts. Creation of a TRG and a database with the results of the proposed monitoring programs would allow Okanogan PUD to manage project related mitigation and enhancement measures, to determine the success of these measures, and to modify these measures, if appropriate, to improve their effectiveness. This TRG and its functions would satisfy the Washington DFW recommendation for an adaptive management program.

Interior's recommendation for a Resident Fish Habitat Management Plan upstream of the project contains recommendations that are not directly related to project operations or effects, and thus do not have a direct nexus to the project. These recommendations include a comprehensive study of resident fish species, populations, numbers, and habitat conditions in the river from Nighthawk down to the reservoir; and development of a fish

[32] As part of Interior's Resident Fish Habitat Management Plan.

habitat monitoring plan for the river upstream of the reservoir The proposed run-of-river operation of the reservoir would likely have no effect on reservoir species, and would have little effect on the riverine habitat upstream of the reservoir. Some of the recommended provisions including temperature monitoring and riparian monitoring are duplicative of Okanogan PUD proposals discussed elsewhere in the document. The recommendation for stocking triploid rainbow trout has also been recommended by other agencies and is discussed in detail previously in this section.

Minimum Flow Proposal

As we've said, Okanogan PUD proposes continuous minimum flows for the 370-foot-long bypassed reach. Proposed minimum flows would be 30 cfs from mid-July to mid-September, and 10 cfs the rest of the year.

Okanogan PUD also proposes to evaluate critical flow thresholds for bypassed reach downramping requirements that may be implemented during emergency situations after observation of *in situ* conditions during provision of minimum flows.

American Rivers *et al.* recommend a minimum flow release to the bypassed reach equal to the requirements of Washington state law, to prevent degradation of existing instream water uses (WAC 173–201A–310). These releases would vary from 400 cfs to 3,400 cfs depending on the month. CRITFC recommends maintenance of minimum flows in the bypassed reach to provide biotic production and protect designated critical habitat in the reach. Washington DFW also recommends establishment of instream flows in consultation with Okanogan PUD as a condition for licensing and operation of the project, to protect fish in the bypassed reach and in the plunge pool below the falls. Neither CRITFC nor Washington DFW recommendations contained specific volumes for their recommended flow releases. In their preliminary recommendations, Washington DFW notes that new information is likely to be developed during the Washington DOE WQC process, and because fish and wildlife resources are greatly affected by water quantity and quality, Washington DFW will not be able to finalize its recommendations until the certification process is completed.

Our Analysis

Proposed flow diversions for project operations would cause flow in the 370-foot-long bypassed reach to be reduced by up to 1,600 cfs when the powerhouse is in operation. When river flow is greater than 1,600 cfs, the amount of water provided to the bypassed reach would be any flow in excess of 1,600 cfs. When river flow is less than 1,600 cfs and both generating units are operational, the only flow provided into the bypassed reach would be either 10 or 30 cfs depending on the time of year.

Table 14 shows mean flows in the bypassed reach under current conditions and under Okanogan PUD's minimum flow proposal. As shown in Table 14, under Okanogan PUD's proposal, flows in the bypassed reach would be greatly reduced for much of the year. The large majority of the wetted area in the 370-foot reach would be dewatered and the majority of aquatic habitat in this reach would be lost. While this reduction of flow in the bypassed reach may seem extreme, the aquatic habitat in this reach is not heavily utilized and is not accessible to most fish in the project area.

Similkameen Falls at the downstream end of the bypassed reach is a natural barrier to upstream fish passage; therefore, the only fish that could occupy the bypassed reach are individuals from resident populations above Enloe dam that pass over the spillway. Washington DFW states that rainbow trout could be washed over the dam into the bypassed reach and could contribute to the rainbow trout/UCR steelhead population in the river below the dam if sufficient flow and depth is maintained to avoid injury. Rainbow trout have not been found in the reservoir above the dam in previous sampling (Table 9), but in recent (September 2010) snorkeling and hook and line surveys in the plunge pool and bypassed reach immediately downstream of Enloe dam, rainbow trout were observed. Smallmouth bass, northern pikeminnow, sculpin, and unidentified suckers were also observed or collected.[33] Flow conditions did not allow a complete survey of the plunge pool, so additional fish may have been observed if a complete survey had been conducted.

Based on the recent survey, several species of fish are able to utilize the habitat in the plunge pool at least during lower-flow periods (river flow during the survey was about 600 cfs). Under Okanogan PUD's proposed minimum flows, most of the habitat in the plunge pool would disappear except during the summer months when natural flows are higher than 1,600 cfs. This would be the same timeframe when we would expect that fish would be washed over Enloe dam due to high flows. Therefore, the plunge pool habitat would be available during high flow months when resident fish may need it to survive when they are washed over Enloe dam. The plunge pool habitat would then largely disappear from August to March annually, as it would only contain minimum flows of 10 or 30 cfs. This would probably be of little consequence to resident fish populations, as no fish would be washed over Enloe dam during this timeframe. The survival chances of fish who would be occupying the plunge pool when it was dewatered annually are not known; however, recent surveys have shown that their numbers are quite small. Regardless of the numbers of fish in the plunge pool after high flow events, those fish would benefit from the minimum flows proposed by Okanogan PUD.

TABLE 14—COMPARISON OF AVERAGE MONTHLY FLOWS IN BYPASSED REACH WITH OKANOGAN PUD'S PROPOSED MINIMUM FLOW REGIME

[Source: Staff]

Month	Mean flows in bypassed reach under current conditions (cfs) [1]	Mean flows in bypassed reach under minimum flow proposal (cfs)
January	659	10
February	682	10

[33] Data were included in Okanogan PUD's November 10, 2010 filing.

TABLE 14—COMPARISON OF AVERAGE MONTHLY FLOWS IN BYPASSED REACH WITH OKANOGAN PUD'S PROPOSED MINIMUM FLOW REGIME—Continued

[Source: Staff]

Month	Mean flows in bypassed reach under current conditions (cfs) [1]	Mean flows in bypassed reach under minimum flow proposal (cfs)
March	746	10
April	2,086	486
May	2,086	486
June	8,597	6,997
July	2,965	1,365
August	916	30
September	596	30
October	697	10
November	938	10
December	798	10

[1] Data from USGS Nighthawk gage no. 12442500 (1929–2005).

Any fishes that would be occupying the plunge pool could be negatively affected by the reduction in minimum flow provision in the case of emergency operations, such as project shutdown. Okanogan PUD's proposal to determine appropriate downramping rates through monitoring and field observation would allow them to decide upon an appropriate downramping rate that would be utilized during these situations. This would be protective of any fishes utilizing the plunge pool.

The minimum flow now proposed by Okanogan PUD and agreed to by Washington DOE and Washington DFW would be only a small fraction of the flow recommended by American Rivers *et al.* (400 to 3,400 cfs). Although American Rivers *et al.* states that their recommended flow is based on Washington regulations to ensure that state water quality standards are met, neither of the Washington agencies has recommended this flow, nor has American Rivers *et al.* provided a technical justification, based on site specific data, for the higher flows that it recommends. American Rivers *et al.* only states that its recommended flow would provide adequate depth, substrate, cover and velocity, and does not provide any analysis of alternative flows.

Another issue associated with minimum flows in the bypassed reach is the design of the minimum flow release structure, which we previously discussed in section 3.2.2.2. We concluded that a flow release structure consisting of a gate and pipe using one of the former penstock intakes would be the best option, because it would minimize any potential water temperature increases, would allow placement of the flow discharge at a point below the dam that would provide the greatest environmental benefit, and would provide the best control of the flows to be released. For the flow discharge point, a point closest to the center of the dam would likely be best, to ensure good flow circulation to most of the pool area. We also concluded that the final design of this structure should be developed in consultation with the resource agencies (Washington DOE, Washington DFW, FWS, NMFS, BLM, and the Colville), prior to filing the design with the Commission for approval.

3.3.3.3 Cumulative Effects

We consider the geographic scope of cumulative effects on aquatic resources to be the Similkameen River basin. Non-power development and other activities contributing to cumulative effects on water quality include historic and present land use as described in section 3.3.2.3. Hydropower development at the Similkameen Falls began in the early 1900s with Enloe Dam being constructed in 1920. The powerhouse operated until 1958, when it was decommissioned and the flashboards removed from the dam. The proposed Enloe Project would replace the flashboards with crest gates, increasing the normal operating level of the reservoir by 4 feet, equal to its original operating level.

Cumulative effects on aquatic resources would occur on both resident and anadromous species in the Similkameen and Okanogan rivers, with potential effects on anadromous species extending to the Columbia River. For resident species, primary effects would be associated with construction-related effects downstream of Similkameen Falls (increased sedimentation and turbidity), and downstream passage through the turbines. The Similkameen River already experiences degraded water quality conditions associated with past mining activities, and high water temperatures during the summer months. Construction-related effects could add additional stress to both resident and anadromous species downstream of the falls, although Okanogan PUD has proposed measures to reduce construction-related effects, as described above. These effects would also be of relatively short duration, would subside after completion of construction, and overall would not contribute significantly to cumulative effects on the fishery resources of the basin.

Fish entrainment through the turbines would result in the mortality of some resident species that attempt to move downstream past Enloe dam, and could have some effect on resident populations in the lower Similkameen River, if those populations rely on recruitment from upstream river reaches to maintain their populations. Okanogan PUD's proposed intake design would include narrow-spaced trashracks that would act to exclude larger fishes from passing through the turbines, but would allow smaller individuals to pass. These smaller individuals, however, would have higher survival rates than larger fish, and any mortality may not significantly affect the downstream population. Smaller/younger cohorts of fish populations typically have higher natural mortality than older cohorts, so any turbine-related mortality may not be detectable in the downstream population. Okanogan PUD is also proposing to monitor fish entrainment at the project, to determine the effectiveness of the proposed intake

design, so overall, any turbine-related mortality would not contribute significantly to cumulative effects on the resident fishery resources of the basin.

Anadromous species occurring in the Similkameen River immediately downstream of the project include the UCR steelhead (listed species), Chinook salmon, and sockeye salmon. These species enter the Columbia River from the Pacific Ocean and migrate over nine downstream hydropower dams on the Columbia River, before reaching the Okanogan River and tributary Similkameen River. These species use the plunge pool at the base of Similkameen Falls as summer holding habitat prior to spawning, but the falls blocks any further upstream migration. Spawning for these species occurs in the lower Similkameen River or in the Okanogan River. The proposed tailrace would discharge into the plunge pool, but should have no negative effect on the holding habitat in the pool, and would result in water quality improvements associated with the reduction in TDG, and the maintenance of adequate DO levels as a result of air injection in the turbine draft tubes. The turbine draft tubes would also be equipped with barrier nets to prevent adult steelhead from swimming into the draft tubes and contacting the turbine blades. The project would operate in a run-of-river mode and would implement specific ramping rates when operations are changed, so proposed project operations would not result in excessive water level fluctuation in the lower Similkameen River. Other enhancements proposed by Okanogan PUD include construction of enhanced side channel habitat for juvenile salmonids, and spawning gravel supplementation in the lower river. In all, proposed project operations and enhancement measures would result in a positive cumulative effect on the anadromous salmonids occurring in the Similkameen River. Any beneficial effects on Similkameen River salmonids resulting in increased production could also be observed in the Okanogan and Columbia Rivers, as any increased production could result in increased adult returns to those rivers.

3.3.4 Terrestrial Resources

3.3.4.1 Affected Environment

Vegetation

The Enloe Project area is located in the Similkameen River Valley, within the Okanogan Highlands Province (Franklin and Dyrness, 1973). This valley is a transitional zone between the Cascade Mountains to the west and the Okanogan Highlands to the east. Columbia Basin steppe vegetation reaches its northernmost extension in this valley. Vegetation is a complex mosaic of three steppe vegetation units, including the big sagebrush/bluebunch wheatgrass association, the bitterbrush/Idaho fescue community, and the threetip sagebrush/Idaho fescue community. Soil, slope, aspect, topography, and grazing practices influence the distribution of these communities within the valley.

Previous botanical studies conducted in the vicinity of the project include a vegetation mapping study conducted along the Similkameen River in 1984 by FWS for the Corps and vegetation studies conducted for the 1991 license application by the Okanogan PUD. Additional vegetation and habitat mapping and riparian vegetation studies were conducted by Okanogan PUD in 2006. The 2006 studies were completed in consultation with state and federal agencies responsible for the management of terrestrial biological resources of the Similkameen River.

Five major vegetation communities were identified within the project area: Shrub-steppe; upland meadow; riparian forest; riparian shrub; and herbaceous wetland. Other minor communities included areas of rock, unconsolidated shore, developed land and open water.

The shrub-steppe community primarily occurs throughout the project area on hillsides above the dam along the eastern side of the reservoir. Smaller communities are located immediately downstream of the dam along both sides of the Similkameen River. It is the most extensive community, covering approximately 27 acres. Native shrub-steppe communities have been diminished in both extent and condition as a result of overgrazing by livestock, invasion of non-native plants, agricultural conversion, and wildfire suppression. Most extant shrub-steppe may appear to be in a natural condition, but it is actually a considerably altered ecosystem, compositionally and functionally different than pre-European settlement conditions (Altman and Holmes, 2000).

Dominant species in this community include big sagebrush, threetip sagebrush, bitterbrush, grey rabbitbrush, bluebunch wheatgrass, and Idaho fescue. Other common grass and forb species include Sandberg's bluegrass, cheatgrass, arrowleaf balsamroot, and prickly pear. Within the shrub-steppe community, the bitterbrush/Idaho fescue community is found on steeper slopes with coarse soils, while the big sagebrush/bluebunch wheatgrass is found on gentler slopes. Invasive exotic species, including knapweeds, thistles, and tumble mustard, are also common, particularly in disturbed sites.

A deciduous component of the shrub-steppe community occurs in draws and the steepest slopes of the hillsides on both sides of the river. Common shrub species in these areas are smooth sumac, serviceberry, and Wood's rose. Rocky Mountain maple occurs in some stands of this community. Scattered ponderosa pine trees occur within the shrub-steppe community, particularly with the deciduous component.

The upland meadow community occurs where shrub-steppe vegetation has been cleared and replaced by grasses and forbs. Cheatgrass usually dominates in these areas. Common grass and forb species include Idaho fescue, knapweeds, and tumble mustard. This community occupies approximately 4.3 acres of the project area and occurs primarily at two locations. Both of these locations are old homestead sites, with the larger situated near Enloe dam on the east bank of the river. These areas are also used for grazing livestock.

Riparian forest in the project area consists of stands of woody vegetation from 12 to 80 feet tall. This community occupies approximately 2.9 acres in the project area and is found primarily along the reservoir. The largest stand is on the east bank of the river at Enloe dam. The dominant tree in this community is black cottonwood, but quaking aspen and water birch contribute to overstory canopy in some areas. Common understory trees and shrubs include willow, red-osier dogwood, chokecherry, black hawthorn, Rocky Mountain maple, and mountain alder. Common herbaceous species include clematis, rushes, sedges, and horsetail. Introduced species such as maple, juniper, yucca, and lilac are found at the former homestead site near Enloe dam.

Stands of riparian forest on the east side of the river burned in 1991. Many of the larger black cottonwoods are at least partly dead, although resprouting is occurring. These stands are important as they provide crucial habitat, especially to species that are not well adapted to living in the arid grasslands and forests that dominate this part of the region. Cottonwoods grow quickly and die relatively young. They often provide cavities and snags, which are important to a variety of wildlife species. These snags may eventually fall into the stream, where they help create cover and pool habitat for fish and other aquatic creatures. In this capacity, fallen or dead trees help to stabilize stream banks and prevent erosion and siltation of streambeds.

The riparian shrub community consists of woody vegetation that is less than 12 feet tall. This community occupies approximately 7.4 acres in the project area and is found primarily along the east bank of the reservoir where the slope is gentle. It also occurs as a narrow fringe elsewhere along the reservoir and the Similkameen River, including the proposed side-channel enhancement site about 5 miles downstream from Enloe dam. Willow stands, varying in size from bands of seedlings or small shrubs to large dense thickets, provide over 75 percent of the total shrub canopy cover. The dominant willow species are Bebb willow and yellow willow. Other species in this community include red-osier dogwood, chokecherry, clematis, smooth sumac, and young black cottonwoods.

The herbaceous wetland community is found on wet or seasonally flooded areas. This community occupies approximately 3.5 acres in the project area and occurs in scattered patches on low-elevation terraces immediately adjacent to the reservoir. Dominant species are perennial grasses, including reed canary grass and bluegrass. Other species include cattail, horsetail, milkweed, and knapweed. Woody species found in these areas include Wood's rose, red-osier dogwood, black hawthorn, and willow, but they provide less than 5 percent of the cover in this community.

Several types of unvegetated areas are found in small portions of the project area. These areas include rock outcrops along the hillside slopes, bare soil, and sand and gravel bars (unconsolidated shore) along the reservoir shoreline. Unconsolidated shore areas were mapped as 5.0 acres in the project area. An unconsolidated sand and gravel bar area exists at the outfall of the proposed side-channel enhancement location where it connects to the mainstem Similkameen River. Some sandbars support a sparse herbaceous cover and overlap with the herbaceous meadow community. The open water of the reservoir and the Similkameen River downstream of Enloe dam occupy much of the project area (76.8 acres and 4.2 acres, respectively).

Developed areas exist within the project area. These areas include the dam itself, the old powerhouse, and various roads. These areas are also unvegetated and represent 0.5 acre in the project area.

Noxious Weeds

Noxious weeds and other exotic and invasive plant species are defined as those plants listed by the Washington State Noxious Weed Control Board under Washington Administrative Code 16–750 and adopted by local county boards. They are classified as A-, B-, or C-rated plants according to their current distribution and degree of threat, with A-rated being of highest concern.

Weed species have already infested the Enloe dam area and are currently targeted for eradication/reduction. These include three Class B weeds (houndstongue, diffuse knapweed, and sulfur cinquefoil), as well as one Class C weed (babysbreath).

Other weeds, such as thistles and tumble mustard, are common in the shrub-steppe and upland meadow communities, particularly along roadsides and disturbed sites. Invasive and noxious plants do not appear to be spreading into forested lands or other less-disturbed habitats.

Sensitive Species

In July 2006, Okanogan PUD conducted floristic surveys for sensitive species on all undeveloped land comprising the Enloe dam project area. The entire project area from the upstream end above Shanker's Bend to the downstream end below the existing powerhouse was surveyed. In most areas, the project boundary does not extend much above the ordinary high water line. Okanogan PUD conducted additional vegetation surveys along the proposed new access road in 2007 and the proposed side channel enhancement site in 2009.

Habitat for two sensitive plant species, Ute ladies'-tresses, which is state-listed as endangered and federally listed as threatened (see section 3.3.5, *Threatened and Endangered Species*), and Snake River cryptantha, which is state-listed as sensitive, occurs in the project area. No sensitive plants were observed.

Wildlife

The Okanogan Basin and Similkameen Subbasin are important ecological corridors for migratory megafauna. Species such as mule deer use the north-south corridor that connects the dry landscapes of Canada's interior with the grasslands to the south. In addition to megafauna, this corridor is a crucial part of the flight path for many species of birds during annual migrations in the Pacific Flyway between summer and winter ranges.

The Enloe Project vicinity supports a variety of waterfowl, aquatic furbearers, and amphibians. Prominent among the waterfowl are mallards, common mergansers, and greater and lesser scaup. Canada geese are resident in the project vicinity and small numbers may nest along the water in the project area.

Beaver is the most prevalent aquatic furbearer, feeding primarily on willow found in the riparian shrub and tree habitats bordering the reservoir. Amphibian observations are infrequent in the project area due to limited habitat suitability. Amphibian species that may be present in the project vicinity include Pacific tree frog, Columbia spotted frog, western toad, long-toed salamander, tiger salamander, and spadefoot toad. No amphibians were observed during reconnaissance surveys carried out in August 2006.

Riparian habitat, generally recognized as having a high diversity of wildlife species, supports a number of song birds best represented by the western flycatcher, eastern king bird, American robin, Bullock's oriole, cedar waxwing, and various species of warblers, sparrows, and woodpeckers. The upland area contains habitats dominated by sagebrush, bitterbrush, serviceberry, and rock outcrops, which support mule deer, yellow-bellied marmot, black-billed magpie, and ground-nesting species such as the introduced chukar partridge and the native California quail. Reptiles are also common in these habitats including western rattlesnakes, racers, and gopher snakes.

Wildlife species that use a wider variety of habitat types in the project area include swallows, vultures, raptors, and coyotes. Common swallow species in the project vicinity are barn swallows, bank swallows, and violet-green swallows. Vultures and raptors are primarily represented by turkey vultures. American kestrels, red-tailed hawks, sharp-shinned hawks, golden eagles, and bald eagles are also present but in smaller numbers. Except for swallows, these species may occur in the project year-round. Swallows only occur in the summer months.

Project area use by most of these species, as well as other less common species, is greatest in the spring and summer and lowest in the winter, when many species migrate, move upslope away from the river, or hibernate. Prominent exceptions are mule deer and bald eagles, which winter in the project area and remain active in this season.

Sensitive Species

Townsend's big-eared bat, which is a federal species of concern and a candidate for the State of Washington's threatened and endangered species list, uses irrigation tunnels adjacent to the proposed access roads immediately adjacent to or inside the proposed project boundary as night roosts. During BLM surveys conducted in 2000 in the Enloe dam area, one male Townsend's bat was observed. Washington DFW

states that the abandoned powerhouse and penstocks on the west side of the river (figure 1) may provide suitable habitat for this species.

State-listed wildlife species that may occur within the project area include the state threatened bald eagle, state endangered sage grouse, and state endangered Northern leopard frog. The bald eagle was removed from the federal threatened and endangered species list, effective August 8, 2007 (72 FR 37,346 [July 9, 2007]); thus, it is not subject to ESA protection. The Bald and Golden Eagle Protection Act is now the primary federal law protecting the species. This eagle is still state-listed as threatened in Washington, although it has been recommended for down listing to sensitive by Washington DFW.

Bald eagles occur along the Similkameen River during most of the year, but they are most abundant from approximately October to April. Very small numbers may occur during summer, but no nests have been located along the river, below Palmer Lake, since 1989. It appears that most bald eagles observed in the Enloe Project area are recorded as they cross the area and fly up- or downriver. When present, eagles range widely within the area depending on water conditions, prey availability, perch site locations, and human disturbance. Consequently, although bald eagles may be observed in the Enloe Project area throughout much of the year, they neither nest nor appear to have communal roosts there.

The project area is within the historical range of the state-listed sage grouse, but the nearest existing population of this species is more than 60 miles to the south.

Potential habitat may be present within the project vicinity for the state-listed Northern leopard frog. The species typically occupies waterbodies situated in grassland, scrubland, or forests. Although most historical occurrences of this species were in the shrub-steppe community, the project area is well outside the current range of the species. Additionally, Washington DFW states that the Northern leopard frog has not been found in Okanogan County for many years and may be extirpated (ENTRIX, 2009).

3.3.4.2 Environmental Effects

Activities that would be authorized under a license that could affect terrestrial species and habitats include: effects of proposed project actions on wetlands, riparian and littoral habitats; disturbance of vegetation, wildlife, and their respective habitats resulting from construction, road grading, and grounds maintenance; effects of water elevation changes on riparian and wetland vegetation; grazing access; introduction and spread of noxious weeds; and effects of proposed project actions on wildlife species. As discussed below, Okanogan PUD proposes measures to reduce adverse effects on terrestrial resources.

Effects of Construction, Operation, and Maintenance of Project Facilities on Wetlands, Riparian and Littoral Habitats (BOTA–01 Through BOTA–09)

Okanogan PUD proposes to mitigate the modification of existing riparian and wetland vegetation by facilitating the rapid development of riparian vegetation to replace any losses when the low-flow elevation for the reservoir is increased by 4 feet. This would be accomplished through the implementation of its Vegetation Plan, included in the additional information filed on March 2, 2009.

The overall objectives of the Vegetation Plan are to ensure that Okanogan PUD's proposed measures and agency recommendations are successfully planned and executed. The Vegetation Plan would establish the following measures:

- Planting riparian vegetation at previously identified sites along the west and east banks of the reservoir to mitigate for the temporary loss of habitat while fringe riparian vegetation establishes along the new low water line;
- Abandoning and restoring the existing unimproved shoreline road along Enloe reservoir to mitigate the effects of project construction noise and habitat fragmentation;
- Planting riparian vegetation along the corridor to mitigate the effects of the abandoned shoreline road;
- Planting riparian species on east and west banks downstream from Shanker's Bend;
- Installing grazing control measures, including fencing, to protect riparian plantings and other sensitive areas from cattle grazing;
- Monitoring restored areas and replanting if necessary in accordance with the performance criteria in the Vegetation Plan; and
- Employing BMPs to protect riparian and wetland vegetation to reduce or avoid effects associated with construction activities.

Okanogan PUD's Vegetation Plan would provide for appropriate protective measures, if monitoring results show project-related effects, and also would include employee training and monitoring to determine whether the measures are effective. The Vegetation Plan would provide for adaptive management, based on monitoring results and would outline consultation with the agencies and provision of annual reports on plan activities, with the opportunity to update the plan, as needed. Okanogan PUD's proposed BMPs for resource protection, cutting and planting methods for riparian trees and grasses, grazing controls, noxious weed maintenance, vegetation monitoring, and training would be included as part of the plan to ensure that riparian areas are developed and become more valuable areas for wildlife.

Okanogan PUD prepared the Vegetation Plan after consultation with FWS, BLM, and Washington DFW to address the measures that would be taken to facilitate the development and protection of riparian vegetation that is otherwise expected to occur naturally. As such, Okanogan PUD's Vegetation Plan would incorporate all the measures that BLM and Washington DFW recommend, except a BLM recommendation for additional sensitive plant species surveying above and below the dam.

FWS, BLM, and Washington DFW recommend that Okanogan PUD prepare a vegetation resources management plan that would include the measures contained in the Vegetation Plan, but would also include measures specifically addressing the restoration of riparian habitat lost, degraded, or disturbed by project construction, operation, and maintenance using a 3:1 ratio. Okanogan PUD replied that its Vegetation Plan would provide the appropriate replacement ratio with a net increase in riparian habitat over what currently exists.

BLM, FWS, and Washington DFW further recommend that Okanogan PUD monitor restored areas (upland sites, riparian and wetland sites) every year for 5 years and continue monitoring every 5 years thereafter and replant sites as necessary. Okanogan PUD's Vegetation Plan includes provisions for monitoring of restored areas of sites that may convert from upland meadow to herbaceous wetland.

Our Analysis

Development and implementation of Okanogan PUD's environmental measures contained in its Vegetation Plan for shoreline vegetation would mitigate or reduce the effects of project construction, operation, and maintenance on associated wetlands and riparian habitats and would provide a benefit to wildlife species that use the riparian habitats within the project area.

Overall, implementation of Okanogan PUD's Vegetation Plan would represent

a reasonable level of effort to mitigate the effects of increasing reservoir surface water elevation that would inundate 0.4 mile of riverine and wetlands habitat at Shanker's Bend. Okanogan PUD's Vegetation Plan includes provisions for monitoring of restored areas of sites that may convert from upland meadow to herbaceous wetland. Restoration of these habitats under this plan would provide a net increase in riparian habitat over what currently exists. Monitoring restored areas every year for 5 years after license issuance for success, with replanting if necessary, would be an appropriate measure to ensure effectiveness of habitat restoration.

Disturbance of Vegetation and Wildlife Resulting From Construction, Road Grading, and Grounds Maintenance (BOTA–03, BOTA–04, BOTA–08 Through BOTA–10, and WILD–02)

Okanogan PUD proposes to abandon and restore a 2,000-foot-long segment of the existing unimproved shoreline road traversing riparian habitat along the east bank of Enloe reservoir. This area would be restored to natural condition through the implementation of Okanogan PUD's proposed Vegetation Plan. Abandoning and restoring this segment of the road is intended to help mitigate the effects of project construction by eliminating the current disturbance of wildlife by vehicular traffic and associated noise and removing the current interruption between upland and riparian habitat posed by the road. Aquatic/riparian species, such as beaver, waterfowl, and other riparian birds, and upland species, such as coyotes, deer, snakes, and birds that forage in both upland and riparian areas, would be expected to benefit.

Okanogan PUD proposes in its Vegetation Plan to plant woody riparian vegetation along the abandoned shoreline road. BMPs to protect riparian and wetland vegetation would also be employed. Measures such as flagging and temporarily fencing any wetland and riparian vegetation in the vicinity of the project would reduce or avoid accidental impacts. Okanogan PUD proposes to provide a biological monitor to check construction sites on a weekly schedule to ensure that protected areas are not disturbed and that fencing is intact. It further proposes to limit construction and maintenance-related disturbance of sensitive habitats by concentrating construction activities with the loudest noise to occur in summer and early fall. This measure would minimize potential effects on noise-sensitive species, such as over wintering birds and bald eagles as much as possible.

BLM recommends, in addition to the measures contained in the Vegetation Plan, that Okanogan PUD develop a wildlife management plan that would include a measure to plant fast-growing native shade producing trees along the reservoir, such as native willows, alders, and/or cottonwoods. While a formal wildlife management plan was not developed, Okanogan PUD addresses facilitating the rapid development of riparian vegetation in its Vegetation Plan. Several other related recommendations made pertaining to wildlife were adopted (see table 23).

Our Analysis

Construction effects on vegetation would be limited to vegetation removal and possible noxious weed encroachment near the powerhouse and access road and recreational access areas. Project operation would not be expected to result in significant effects on the upland vegetation communities near the powerhouse.

Relocating the existing unimproved access road bordering the east side of the reservoir approximately 200 feet to the east (up slope) would not significantly affect wildlife; it would allow riparian habitat along low-lying sections of the current road corridor to naturally reestablish, resulting in a net benefit for wildlife and their habitat. The proposed route would follow an abandoned irrigation ditch through highly disturbed terrain largely consisting of low quality rocky habitat and debris.

Effects on wildlife would be minor, consisting primarily of temporary disturbance or displacement of wildlife during construction. Most wildlife may temporarily occupy other, nearby similar habitats during construction. Once the project is complete, the minor and constant noise associated with the project that could affect wildlife would be masked by the sound of water flow. Minor impacts would be associated with installation of crest gates, connection to Okanogan PUD's nearby power distribution line, and relocation of a portion of the unimproved access road along the reservoir.

Effects of Water Elevation Changes on Riparian and Wetland Vegetation (BOTA–01 Through BOTA–05 and BOTA–07)

Okanogan PUD proposes to install crest gates at the dam, increasing reservoir water level elevations by 4 feet, which would result in the inundation of approximately 0.4 mile of riverine and wetlands habitat at Shanker's Bend. BLM comments that the larger reservoir would reduce vegetation and wetlands along the shore of the current impoundment. Okanogan PUD maintains that increasing the minimum pool elevation would shift mesic conditions upslope, but would not necessarily result in a reduction in suitable habitat.

In response to BLM, FWS, and Washington DFW's recommendations for a vegetation resources management plan, Okanogan PUD proposes to plant riparian vegetation at previously identified sites along the west and east banks of the reservoir to mitigate for the temporary loss of habitat while fringe riparian vegetation establishes along the new low water line. It also proposes to plant riparian vegetation on east and west banks downstream from Shanker's Bend and along the corridor to enhance the effects of abandoning the shoreline road. Okanogan PUD would monitor restored areas and replant if necessary in accordance with the performance criteria in its Vegetation Plan.

Our Analysis

Habitat lost, degraded, or disturbed by project construction, operations, and maintenance would be restored or replaced along the Similkameen River. Habitat that is expected to be affected includes the 0.4 acre of riparian and wetland habitat that would be inundated by the rise in water level elevation. Currently, the herbaceous wetland community occupies approximately 3.5 acres in the project area and occurs in scattered patches on low-elevation terraces immediately adjacent to the reservoir. Although long-term inundation would affect approximately 12 acres of habitat along the shore of the reservoir, Okanogan PUD maintains that this does not suggest that all 12 acres of habitat would be lost. The total acres of vegetated habitat in that zone, including sparsely vegetated to barren rocky cliff habitat, is 7 acres. The remaining 5 acres of unconsolidated shore and water would remain. It is anticipated that while some of the habitat may become unvegetated; some habitat may merely undergo conversion to another wetland cover type, resulting in a minor long-term impact.

The restoration and subsequent operation of crest gates would increase the minimum pool elevation and inundate narrow strips of riparian and wetland habitat along the reservoir for longer periods than now occurs. Some habitat loss would be short-term and naturally mitigated as the inundated area would be replaced by the establishment of new riparian habitat upslope within a few years. Fringe riparian strips would eventually

reestablish along the new water line, in response to the higher water levels. Permanent alteration of about 5.1 acres of wetlands and riparian vegetation currently occupying seasonally exposed flats or benches along the reservoir would likely occur.

Under a run-of-river mode of operation, all project outflows would approximate all project inflows at any point in time. In this operation mode, a stable water level of the reservoir and stable flow in the downstream tailrace would be maintained. As such, effects of modified flows on vegetation and wildlife downstream of the dam would be negligible.

Implementation of Okanogan PUD's proposed riparian restoration as a component of its Vegetation Plan would provide a reasonable level of effort to restore and maintain these affected areas under altered conditions. The measures proposed to protect, mitigate, and enhance the affected riparian, wetland, and low-elevation upland habitats would benefit wildlife in the project vicinity by helping to preserve and enhance habitats surrounding the sub-basin that are important to maintaining wildlife populations, including small game species, migratory birds, and other wildlife.

Effects of Construction, Operation, and Maintenance of Project Facilities on Grazing Access (BOTA–06)

The lands within and adjacent to the proposed project boundary are currently not fenced. Cattle have free access to the river wherever the topography allows. Livestock grazing practices have led to trampled streambanks, increased bank erosion and sedimentation, and changes in vegetation, including loss of native grasses, effects on woody vegetation, and establishment of noxious weeds (PNRBC, 1977). Currently, grazing pressures occur mostly along the eastern side of the project area.

To protect riparian/wetland mitigation sites for the project from grazing and trampling damage while mitigation plantings are establishing, Okanogan PUD proposes livestock fencing for most of the eastern side of the project area along the Similkameen River between Enloe dam and Shanker's Bend. An additional security/safety fence section is proposed for the landward side of the new powerhouse, its intake at the dam, and the area between the intake and the powerhouse. Protective enclosures for individual plants would be used to protect young plantings from consumption by cattle and wildlife, such as beaver or deer.

FWS and Washington DFW recommend that Okanogan PUD install grazing control measures, including fencing, to protect sensitive riparian areas and restored sites. Okanogan PUD's Vegetation Plan includes a provision for installing a stock watering tank approximately 300 feet upslope from the river, just inside the project boundary and north of the proposed recreation site, as an alternative source of drinking water for grazing cattle (Okanogan PUD, 2009b). BLM recommends that any new livestock water development associated with the project include a wildlife escape ramp.

Our Analysis

Okanogan PUD's proposal to install fencing would protect riparian/wetland areas while accommodating livestock grazing. Okanogan PUD would need to consult with BLM, however, regarding finalizing its proposal to address grazing permittees' access to and use of water, including the provision of a wildlife escape ramp as part of its Fence Plan consultation (see section 3.3.6, *Recreation and Land Use*).

Effects of Construction, Operation, and Maintenance of Project Facilities on the Introduction and Spread of Noxious Weeds Within the Project Boundary (BOTA–11 Through BOTA–13)

Noxious weeds and other invasive plant species can negatively affect native plant communities and wildlife, as well as recreation, aesthetics, cultural values, and economic resources. Several federal, state, and county policies and regulations have been developed to address concerns about the spread of weeds, and to guide management of weeds on private and public lands. Landowners in the state of Washington are required by state law and various county ordinances to take steps to control the spread of certain specified noxious weeds on their property.

Okanogan PUD proposes to include a noxious weed control program as a component of its Vegetation Plan. This program would include noxious weed control measures for the proposed construction and management activities. Monitoring provisions in the vegetation resources management plan would include monitoring of sites that may convert from upland meadow to herbaceous wetland.

Okanogan PUD also proposes to include soil disposal and revegetation measures BOTA–12 and 13, as a component of the Vegetation Plan to further limit introduction and potential spread of noxious weeds within the project area. Prior to excavation and placement of spoil, existing vegetation in construction areas would be cleared and grubbed and buried in spoil disposal areas.

The spoil disposal areas would be surveyed for the noxious weeds addressed in the Vegetation Plan and control measures would be implemented to control any infestations of those species prior to spoil disposal. Following completion of spoil disposal, the spoil disposal areas would be hydroseeded with appropriate seed mixes to encourage revegetation with native upland species and reduce the potential for noxious weed introduction. These areas would be included in subsequent weed survey and treatment efforts.

FWS and Washington DFW recommend that Okanogan PUD implement a noxious weed control program to increase wildlife forage. BLM recommends the measures proposed in Okanogan PUD's proposed noxious weed control program be incorporated as a component of its recommended vegetation resources management plan. This plan would allow inclusion of additional provisions that, at a minimum, would identify and limit introduction and potential spread of noxious weeds. Specifically, BLM further recommends expanding Okanogan PUD's proposed Vegetation Plan to include surveying; documentation of species occurrences; treatment method and type of application; post treatment and site rehabilitation; and long-term prevention and control of noxious and invasive weeds; and mapping and digital database development.

BLM, FWS, and Washington DFW further recommend Okanogan PUD monitor restored areas (upland sites, riparian and wetland sites) every year for 5 years and continue monitoring every 5 years thereafter and replant sites as necessary. Okanogan PUD's Vegetation Plan includes provisions for monitoring of restored areas of sites that may convert from upland meadow to herbaceous wetland and maintains monitoring should be discontinued once success criteria have been met.

Our Analysis

Noxious weeds and invasive non-native plants are a growing threat throughout the west. Diffuse knapweed, in particular, is an invader species and a serious water quality threat in the Similkameen watershed. The introduced species crowd out the native vegetation and create instability along the riverbanks. There are multiple small areas of noxious weed infestations within the project boundary that would be controlled, reduced, or eradicated

through the implementation of a noxious weed management program.

While concentrated along access roads and disturbed areas, weeds and invasive species are widespread throughout the project area. Prevention of introduction and spread of weeds relies on early detection, effective treatment, on-going education of land managers and the public about weed issues, and proper planning and management of ground disturbing activities. Monitoring existing weed populations and patrols to identify new infestations are essential to evaluate the success of the steps being taken to control and prevent the spread of weeds.

Without management, weeds would likely continue to spread because of their tolerance for a variety of soil and moisture conditions, and their ability to out-compete native plants. Project construction and maintenance activities and increased human activity, in addition to wind, water, and animal transport, would continue to serve as vectors for weed dispersal.

Implementation of Okanogan PUD's noxious weed control program as a component of its Vegetation Plan would represent a reasonable level of effort to control existing weed populations and prevent the introduction and further spread of weeds in the project area. Implementation of the program would also encourage the growth of native plant species by preventing encroachment of non-native weeds on existing plant populations. The adaptive nature of the program would enable the plan to be responsive to changing conditions such as changes in weed status, occurrence, or distribution.

Effects of Construction, Operation, and Maintenance of Project Facilities on Wildlife Species (WILD–01 and WILD–02)

Okanogan PUD proposes several measures to protect and reduce effects on wildlife at the project. Construction activity (WILD–02) would be timed to minimize effects on over-nesting and over-wintering birds and bald eagles, as much as possible. Okanogan PUD also proposes a new 13.2-kV, approximately 100-foot-long primary transmission line (WILD–01). It would be constructed and connected to the Okanogan PUD's existing distribution system at an existing pole immediately to the east of the proposed project location. The existing pole would be relocated or modified to prevent raptor electrocutions.

FWS, BLM, and Washington DFW recommends that, in addition to the measures contained in the Vegetation Plan, Okanogan PUD develop a wildlife management plan that would include a measure to plant fast-growing native shade producing trees along the reservoir, such as native willows, alders, and/or cottonwoods. The agencies also recommend that all dead trees along the reservoir be retained as perch trees until the planted trees are large enough for raptor use and that the project transmission line crossing the Similkameen River be visually marked to prevent avian collision. They further recommend the installation of 10 artificial perch poles along the reservoir shoreline and in places where perch trees are sparse or lacking, and an unspecified number of nest boxes for small birds in areas that lack snags or natural tree cavities. They also recommend that to avoid disturbance of Townsend's big-eared bats using project lands, Okanogan PUD install barriers on irrigation canal tunnels to prevent human entry while allowing use by bats, and exclude project activities during the winter bat hibernation period. BLM recommends that Okanogan PUD institute seasonal restrictions on human activity near active nest sites of bald eagles, golden eagles, ospreys, peregrine falcons, and other raptors on BLM-administered lands within the project boundary. Washington DFW recommends that the wildlife management plan also provide a 200-foot-wide buffer around wetlands/riparian habitat.

While a formal wildlife management plan was not developed, several of the agency recommendations made pertaining to wildlife were adopted (see table 23). As a component of its Vegetation Plan, Okanogan PUD would employ BMPs to limit vegetation maintenance in sensitive habitats to the extent possible. This would include the retention of snags and dead trees, with the exception of trees that pose a hazard to human and facility safety. Okanogan PUD states that a previous fire resulted in the loss of large shoreline cottonwoods and other trees that could provide perching or cavity-nesting habitat. Okanogan PUD maintains that the project would not affect perching or cavity-nesting habitat in areas that lack such habitat and that perch poles and nest box installation should not be required.

Our Analysis

The construction, operation, and maintenance of the proposed project is expected to have minimal effects on wildlife because the footprint for the hydroelectric facility would be small and effects on flows would be minimal. Primary effects would be associated with human activity and noise associated with project construction and restoration.

Implementation of Okanogan PUD's WILD–01 and WILD–02 measures would reduce the effects of project construction and operation on bald eagles and other wildlife that use the project area. Bald eagle use of the area is incidental and transient and is not expected to be affected by the project. Modification to the transmission line pole would protect wildlife that use the eastern side of the reservoir and reduce the adverse effects of the power line on raptors and other birds. The transmission line would not cross the Similkameen River, further reducing the potential for avian contact (see figure 1).

Okanogan PUD does not propose to remove any non-hazard trees along the reservoir, including potential perching trees, therefore, no effects to existing perching habitat are anticipated. Likewise, any reduction in potential nesting habitat for cavity nesters would be slight and temporary, as shifts in riparian habitat occur in response to the new minimum pool elevation and new riparian vegetation establishes. This would not be a substantial adverse effect and does not require mitigation. Effects on bald eagles and other sensitive species would be limited and would be mitigated by measures addressing shoreline vegetation management, construction timing, and transmission pole modification. The proposed project would not affect these habitats. The Vegetation Plan, which includes the abandonment and natural restoration of the 2,000-foot-long segment of the existing unimproved shoreline road, would provide the same protection for riparian and wetland habitats as the 200-foot-wide buffer.

Construction, demolition, and blasting may disturb wildlife in the immediate vicinity of these activities. Okanogan PUD proposes to time construction activity to minimize effects on wildlife including nesting and over-wintering birds and bald eagles, as much as possible. Bald eagles and other wildlife may be temporarily displaced from the immediate project area and may avoid perching or feeding near the project. Because most perch trees are located considerably upriver from the dam, the disturbance effect should be minimal.

Most habitats in the project area are already affected by some level of human disturbance, due to existing informal recreational access. Development of a proposed public access site near the dam would not substantially increase the level of human disturbance on water-dependent wildlife within the

project area. It is likely that some vegetation would be removed or disturbed for site access and improvement. Much of this disturbance would occur in previously altered areas or in areas adjacent to existing facilities. As a result of this disturbance, some wildlife species that use riparian areas could be temporarily displaced. Okanogan PUD proposes to provide a biological monitor during construction to further assist with resource protection.

Once the project is complete, minor noise would be associated with the operation and maintenance of the hydroelectric facility, but generally would be masked by the sound of water flowing over the dam or the falls, or through the tailrace immediately below the dam (water would not flow over the dam or falls for 10 months of the year, thus it would not mask noise from operations). Noise levels at the facility would be fairly constant at all times. Wildlife commonly habituate to constant noise and human disturbance levels, provided they are not harassed by people working at the facility. Most wildlife would be expected to return once construction activities diminish and work is completed.

Activities related to the construction, maintenance, and increased recreational use associated with the project may disturb Townsend's bats, which are highly sensitive to human disturbance. Although not proposed by Okanogan PUD, Washington DFW recommends installation of barriers on the project's defunct irrigation tunnels. A recent inspection in March 2010 noted that the tunnel entrance nearest to Enloe dam had been blocked by a landslide, and, therefore, would not be suitable habitat for bats. Tunnel sites near Shanker's Bend and further upstream probably have more potential for good bat habitat than the tunnels closer to Enloe dam. These sites are far enough from the project site that recreational or construction noise would be unlikely to affect bats.

Under measure WILD–02, Okanogan PUD's proposes to concentrate construction activities with the loudest noise to occur in summer and early fall to minimize effects to over wintering birds and bald eagles as much as possible. This mitigation measure would also serve to reduce noise impacts to any bats potentially using the area close to the site of construction.

3.3.5 Threatened and Endangered Species

3.3.5.1 Affected Environment

Aquatic Species

Bull trout (*Salvelinus confluentus*) are listed as threatened by the FWS and have been reported to occur in the Okanogan River, but are not found in the Similkameen River. We conclude that bull trout are not present in the area that is subject to project effects. Therefore, the proposed Enloe Project would have no effect on the federally listed Columbia River bull trout.

UCR steelhead (*Oncorhynchus mykiss*) is listed as threatened and the Similkameen River from its confluence with the Okanogan River to the Similkameen Falls is designated as critical habitat. UCR steelhead spawn in the Similkameen River downstream from the falls. In its February 26, 2010, letter, NMFS stated that UCR steelhead enter the river from mid-September through April; spawning usually occurs in March through July. Adults hold in the river from the mouth to the plunge pool below the falls until spawning takes place. Most of the UCR steelhead redds are found below Oroville Bridge at RM 5, and above the cross channel with the Okanogan River. There are no known UCR steelhead spawning areas within the project boundary. During Okanogan Basin Monitoring and Evaluation Project surveys of the lower section of the Similkameen in 2005, 106 UCR steelhead redds were counted; their density was 18.8 redds per square mile. In 2006, 98 redds were counted, and their density was 17.4 redds per square mile. Fry emerge from the gravel between July and September, and move downstream in search of overwintering habitat in the fall. Juveniles generally rear in freshwater for 2–3 years before migrating to the ocean.

Terrestrial Species

Vegetation

As previously mentioned, the Ute ladies'-tresses (*Spiranthes diluvialis*) could occur within the project area. FWS lists Ute ladies'-tresses as federally threatened and therefore protected under the ESA (FWS, 2010). FWS initiated a status review in 2004 for this species, but no determination has been issued to date regarding a change in status. No other federally-listed plant species have been found within the project boundaries. Ute ladies'-tresses is a perennial terrestrial orchid that flowers from mid-July through August in Washington. It is found in early to mid-seral vegetation in wet meadows, stream or river banks, irrigated hay meadows, and wetlands associated with wet meadows, springs, streams, lakes, irrigation ditches, and reclaimed gravel and peat mines.

Although this orchid was reported as historically found in riparian areas in Colorado, Utah, and Nevada when it was listed, existing populations were known only in Colorado and Utah at that time. Since 1992, populations have been found in Montana, Wyoming, Idaho, Nebraska, and at four locations in Washington. One Washington location is in a periodically flooded alkaline flat. The other three are on stabilized gravel bars along the Columbia River. Washington populations are at elevations ranging from 720 to 1,500 feet. No critical habitat has been designated for this species.

The nearest known population to the Enloe Project is at Wannacut Lake, approximately 5 air-miles to the southwest. Wannacut Lake is in the Whitestone Creek watershed, and the Whitestone Creek confluence with the Okanogan River is approximately 9.8 miles downstream of the Similkameen River confluence with the Okanogan River. No individuals of Ute ladies'-tresses or any other species of Spiranthes were observed during Okanogan PUD's botanical surveys of the project area in 2006, 2007, or 2009. However, the surveys identified two areas of suitable habitat. An approximately 9-square-foot area at the edge of the reservoir (Okanogan PUD, 2009d) and a sparsely vegetated area at the downstream end of the proposed side channel enhancement location, immediately adjacent to the active Similkameen River channel approximately 5 miles downstream from Enloe dam, could provide potential habitat for these species, although Ute ladies'-tresses were not observed during an October 2009 survey.

Wildlife

FWS lists three wildlife species potentially occurring in Okanogan County that are federally designated as threatened and therefore protected under the ESA (FWS, 2010). These species are the Canada lynx (*Lynx canadensis*), grizzly bear (Ursus arctos), and northern spotted owl (*Strix occidentalis caurina*). Designated critical habitat for two of these species—Canada lynx and northern spotted owl—is also present in Okanogan County. Based on literature review and agency consultations, these species are not likely to occur within the project area due to the lack of suitable habitat. Effects on these species are not likely to occur due to their absence within the project area.

Canada Lynx—The Canada lynx is a medium-sized cat that is highly mobile and has a large home range. Its population and distribution is closely tied to its main prey, the snowshoe hare. Populations in northern boreal regions fluctuate in response to snowshoe hare population level cycles; however, this cycling has not been found to occur in Washington (Stinson, 2001).

Canada lynx inhabit moist coniferous forests with cold, snowy winters. In Washington, the majority of lynx records and evidence of reproduction are from older lodgepole, subalpine fir, and spruce forests at elevations higher than 4,000 feet (Stinson, 2001). Based on Washington surveys, the nearest designated critical habitat for the Canada lynx is located in existing Lynx Management Zones of the Okanogan National Forest. The Okanogan Lynx Management Zone contains extensive stands of lodgepole pine and supports one of the largest lynx subpopulation in Washington. The project area, however, is not located within this designated critical habitat.

Furthermore, forests around the project area include shrub-steppe and riparian species that are located well below elevations typically occupied by Canada lynx, and are not characterized as forest habitat that would be considered suitable for this species. Prey opportunities are also not available at or near roadways, proposed facilities, and other project features close to the Similkameen River.

For these reasons, the Canada lynx is unlikely to occur in the project area. No studies were requested or performed by Okanogan PUD to investigate the presence or status of the Canada lynx in the project area. We conclude the Canada lynx is not likely to occur in the project area. The project would have no effect on the Canada lynx, and for this reason, we do not discuss this species further in this EA.

Grizzly Bear—Preferred habitats of grizzly bears include sub-alpine meadows and open or semi-open forests, but individuals are very wide-ranging and can be found in diverse habitats. Dens are typically located far away from human activity on steep slopes where snow accumulation is deep and persistent. Seasonal movements often occur associated with patterns of newly sprouted vegetation, ripening berries, spawning salmon runs, and the availability of other prey, such as marmots.

FWS established several recovery zones throughout the western United States in 1993; the North Cascades Ecosystem Recovery Zone is the only zone in north central Washington. Current population levels in this zone are unknown, but are believed to be very low, possibly fewer than 20 animals (FWS, 2004). Without augmentation, FWS concludes there is a low likelihood of recovery in the north Cascades (FWS, 2004).

Grizzly bears are unlikely to occur in the project vicinity other than as a rare transient. Okanogan PUD did not perform and the agencies did not request any studies to investigate the presence or status of the grizzly bear in the project area. The grizzly bear is unlikely to occur in the project area. The project would have no effect on the grizzly bear, and we do not discuss this species further in this EA.

Northern Spotted Owl—Northern spotted owls inhabit temperate forests of the Pacific Coast region from southwestern British Columbia, through the Olympic and Cascade ranges in Washington and Oregon to north central California. The northern spotted owl is commonly associated with old-growth or mature conifer forest stands, especially during nesting, although younger stands that have late-successional stand remnant structures are also sometimes used, especially during times of dispersal (Thomas *et al.,* 1990).

Nest sites are generally located in previously excavated cavities or on platforms in large trees, and northern spotted owls may use nests built by other species (FWS, 2008). Established pairs normally remain in the same territories from year to year and foraging areas may reach nearly 2,500 acres (FWS, 2008). Breeding behavior is generally initiated in March and continues into June, depending on elevation. Parental care continues into September and sometimes October, as fledglings learn to fly and hunt on their own. FWS considers the period between March 1 and July 15 to be the early breeding season, when birds are most vulnerable to disturbance. Birds may be less sensitive during the late breeding season (July 16 and September 30).

The northern spotted owl was listed as federally threatened on June 26, 1990. FWS issued a final recovery plan in May 2008 (FWS, 2008). Based on Recovery Action 4 of the plan, FWS revised the designation of critical habitat to provide for a network of managed owl conservation areas that are of sufficient size and spacing to achieve long-term recovery of spotted owls. The designation includes only federal lands. FWS designated managed owl conservation areas in north central Washington, which includes Critical Habitat Unit 3. It consists of approximately 115,600 acres in Whatcom, Okanogan, and Chelan counties and is composed of lands managed by the Okanogan and Wenatchee National Forests.

The project area is not located within Unit 3; the project area does not meet the size requirement of small habitat blocks and is not within the Okanogan National Forest. The forested areas around Enloe dam and along the access roads and project facilities do not provide suitable habitat for nesting, roosting, and foraging. No studies were requested by FWS or other agencies participating in the licensing, and none were performed by Okanogan PUD to investigate the presence or status of northern spotted owls in the project area. The northern spotted owl is unlikely to occur in the Project area. The project would have no effect on the northern spotted owl, and we do not discuss this species further in this EA.

3.3.5.2 Environmental Effects

Aquatic Species

UCR Steelhead

We evaluated the effects of Okanogan PUD's proposed measures on aquatic resources, including UCR steelhead, the only listed fish species known to occur in project affected waters, in section 3.3.3.2, *Aquatic Resources.* As we previously noted, the Similkameen River below Similkameen Falls is designated critical habitat for the threatened UCR steelhead, and UCR steelhead use the Similkameen River for spawning, rearing, and thermal refugia.

Our Analysis

Under the proposed action, fish passage would not be provided at the dam, and the 370-foot long bypassed reach would only receive a minimum flow of 10 to 30 cfs during the low flow months,[34] when most of the river flow would be diverted through the powerhouse and returned to the river below the falls. As discussed in section 3.3.3.2, we have concluded that the Similkameen Falls is a natural barrier to fish passage preventing fish migration further upstream, so the project would have no effect on the upstream migration of the UCR steelhead. Similarly, because steelhead are unable to use the bypassed reach as habitat, and the reach is not considered critical habitat, there would be no effect on UCR steelhead by only providing a relatively low minimum flow in the reach.

Other recent Okanogan PUD proposals related to the WQC

[34] This is Okanogan PUD's alternative minimum flow proposal based on agreements reached in WQC negotiations with Washington DOE and Washington DFW, as reported in its filing of October 28, 2010.

negotiations would also have no effect on the UCR steelhead, or would act to enhance habitat quality for this species. The proposed temperature and DO monitoring and associated adaptive management program would ensure that water quality downstream of the project continues to meet state standards, and adequate quality for the UCR steelhead. Other measures related to developing appropriate ramping rates for spillage flow over Enloe dam, and determining a point of release for the minimum flow from Enloe dam, would have no effect on UCR steelhead because this species does not occur upstream of Similkameen Falls.

Overall, Okanogan PUD's proposed environmental measures would be consistent with the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan developed by the Upper Columbia Salmon Recovery Board to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region. This plan is an outgrowth and culmination of several conservation efforts in the Upper Columbia River Basin, including current efforts related to the ESA, state and tribal-sponsored recovery efforts, subbasin planning, and watershed planning. In regard to Enloe dam, the plan does not identify upstream and downstream passage of fish as being a short-term or long-term action that would contribute to the restoration of these fish stocks. This conclusion was based on the uncertainty of fish being able to ascend the falls before the construction of Enloe dam at that site.

Although Okanogan PUD's overall plans for development of the Enloe Project would generally enhance aquatic habitat in the Similkameen River, construction of the project would have the potential to adversely affect UCR steelhead and UCR steelhead designated critical habitat. These effects would be associated with: (1) The direct or indirect effects of blasting activities that may cause mortality or injury to steelhead adults and juveniles in the plunge pool immediately below Similkameen Falls; and (2) turbidity plumes and sedimentation, including potential contaminated sediment, within steelhead habitat, which could cause injury or mortality of eggs, fry, and juvenile fish due to smothering or abrasion. Okanogan PUD has proposed several measures to minimize the effects of construction on downstream aquatic habitat (the fish salvage plan for blasting, the Spill Response Plan, the CSMP, the ESCP, employing BMPs, and the Storm Water Pollution Prevention Plan). The proposed measures would minimize potential take of UCR steelhead during blasting activities; however, some take due to physiological stress, injury, predation, or mortality could still occur. Development of a fish salvage plan that includes seasonal work windows, in consultation with NMFS, FWS, and Washington DFW, would reduce the potential for injury or mortality of steelhead during capture and relocation activities. Measures to control erosion and sedimentation would also reduce the potential for effects on steelhead, but some physiological stress could still occur during unanticipated releases of turbidity or sedimentation.

Project operations could affect the UCR steelhead, as a result of some flow fluctuations downstream of the project, and the potential for adult steelhead to swim into the project draft tubes and impact the runner blades. The project would be operated run-of-river so that outflow equals inflow to the reservoir, but there could be some fluctuations in flow releases as unit operations change or as spill gates are opened or closed, possibly resulting in the stranding of redds, fry, and juveniles. Okanogan PUD, however, is proposing a ramping rate below the project ranging from 1 to 2 inches per hour depending on the season and time of day. These proposed rates would minimize any effects related to stranding of UCR steelhead downstream of the project. Okanogan PUD is also proposing to install draft tube net barriers to prevent adult steelhead from entering the draft tubes during operational periods when lower outlet velocities may prevail. Successful deployment of these barriers would prevent steelhead from entering the draft tubes and experiencing injury or death by contacting the runner blades.

Okanogan PUD also proposes habitat enhancement measures in the Similkameen River downstream of the project, including supplementing spawning gravel, transporting large woody debris to enhance habitat diversity, and providing side channel enhancements that would provide coldwater side channel habitat for steelhead juveniles. Although the measures would likely enhance aquatic habitat for listed UCR steelhead downstream of the falls, the risk of incidental adverse effects on individual fish cannot be entirely eliminated. Some short-term habitat degradation would occur during construction and implementation of the gravel supplementation program and side-channel enhancement projects. All of these proposed measures would entail instream work, which has the potential to result in injury or mortality of eggs, fry, or juvenile trout that may be in the direct path of instream equipment, or during placement of structures and/or gravel in the stream channel, or create turbidity and sedimentation. In the long term, these measures would provide benefits to steelhead, such as improved spawning and rearing habitat in the river downstream of the dam and increased productivity. Okanogan PUD's proposed biological review process, fisheries monitoring, and adaptive management program would also provide long-term benefits for UCR steelhead and UCR steelhead designated critical habitat, because those programs would ensure that the proposed mitigation and enhancement measures are being successfully implemented.

Although long-term benefits would occur as a result of measures proposed by Okanogan PUD, we conclude that licensing the project would adversely affect the federally listed UCR steelhead because proposed project construction and habitat enhancement projects could result in short-term increases in turbidity and sedimentation and the risk of injury or mortality to eggs, fry, juveniles, or adults as a result of runoff from construction and instream use of equipment. Construction of the tailrace could result in injury or mortality to eggs, fry, juveniles, or adults caused by capture and transport, relocation, and blasting. We conclude that the proposed project would not appreciably diminish the value of designated UCR steelhead critical habitat for both survival and recovery of this species, but because of potential impacts on steelhead during the construction period, we will request formal consultation with NMFS pursuant to section 7 of the ESA.

Terrestrial Species

The following sections summarize our analyses for Ute ladies'-tresses, which may be affected by project operation or project-related activities.

Effects of Construction, Operation, and Maintenance of Project Facilities on Federally Listed Species and Their Habitats (BOTA–14 and WILD–03)

Habitat for the threatened Ute ladies'-tresses has been identified within the project area. Okanogan PUD did not observe this species in surveys of the project area it conducted in 2006, 2007, and 2009. The survey of the proposed side-channel enhancement site was conducted in October 2009, outside the typical mid-July through August flowering period when Ute ladies'-tresses can be distinguished from other

plants; Okanogan PUD states, however, that the species may still be flowering or fruiting as late as October.[35] BLM states that Okanogan PUD's plant surveys were not adequate to determine the presence or absence of Ute ladies'-tresses. In response to agency concerns about its plant surveys, Okanogan PUD proposes to conduct an additional 3 years of surveys for Ute ladies'-tresses prior to construction (BOTA–14). Surveys for this species would be conducted in the summer/fall and would be timed to correlate with the flowering period for the Ute ladies'-tresses. Okanogan PUD would also take the following measures that would protect the Ute ladies'-tresses: employ BMPs to limit vegetation disturbance in sensitive riparian and wetland habitats to the extent possible, control noxious weeds, conduct an environmental training program for its employees, and provide a biological monitor during construction.

FWS, Washington DFW, and BLM recommend additional surveys, using FWS and BLM's protocols, for Ute ladies'-tresses and other threatened and endangered plant species as a component of their recommended vegetation resources management plan. BLM further recommends that the section of the vegetation resources management plan, which expands on Okanogan PUD's proposed Vegetation Plan include surveying, documentation of species occurrences, evaluation of impacts, and mapping and digital database development.

FWS and Washington DFW recommend that Okanogan PUD survey and document threatened and endangered plants within 1 year of any license issuance and every 5 years thereafter for the duration of the license term. The agencies further recommend that Okanogan PUD monitor known threatened and endangered plant habitat at 5-year intervals and evaluating the effects of any new ground-disturbing activities or substantive changes in project operation on listed plants and their habitats prior to implementation of the activities or changes in operation. Okanogan PUD would be required to evaluate the adequacy of the vegetation resources management plan and update the plan as needed.

Our Analysis

Habitat for Ute ladies'-tresses has been identified within the project area along the reservoir and near the proposed side-channel enhancement area. According to Fertig *et al.* (2005), perennial stream and riverine habitats occupied by this species typically have short vegetative cover maintained by grazing, periodic flooding, or mowing. In the absence of disturbance or as sites become drier, streamside wet meadow habitats may become encroached by riparian shrub or woodland vegetation. Ute ladies'-tresses populations may persist for a short time in the grassy understory of woody riparian shrublands, but do not appear to thrive under these conditions.

An approximately 9-square-foot area at the edge of the reservoir could support Ute ladies'-tresses, although no plants were found in Okanogan PUD's 2006 and 2007 surveys. Okanogan PUD states that any Ute ladies'-tresses present along the reservoir would be adversely affected if they occur in the area that would be permanently inundated by the proposed crest gate operation and if they are unable to establish at the new water line (Okanogan PUD, 2009d).

Suitable Ute ladies'-tresses habitat has also been identified at the proposed side-channel enhancement site. Okanogan PUD's October 2009 survey of the site did not identify this species. Okanogan PUD anticipates temporary disturbance of vegetation at the side-channel enhancement site to install the well pad, buried pipeline, and one power pole for a distribution line to the well, and proposes to minimize disturbance to the extent practicable. The disturbed area would not exceed 40 feet in width within the lower 400 feet of the channel. Along the pipeline route, the disturbance area is assumed to be a 10-foot-wide by 300-foot-long corridor. Operation and maintenance activities at the side-channel enhancement site would likely be limited to activities at the well. The footprint of the proposed construction and subsequent operation and maintenance activities could be adjusted, if necessary, to avoid adversely affecting any Ute ladies'-tresses identified in additional surveys.

Okanogan PUD's 2006 and 2007 surveys of the Enloe dam and reservoir area were adequate to identify suitable Ute ladies'-tresses habitat and were likely adequate to determine the presence of the species, although it is unclear whether Okanogan PUD's were conducted using protocols acceptable to FWS and BLM. Therefore, there would likely be no adverse effects on Ute ladies'-tresses as a result of inundation of the 9-square-foot-area of suitable habitat at the edge of the reservoir. However, Okanogan PUD's surveys of the suitable habitat at the proposed side-channel enhancement site were not conducted at the optimum time to identify the species.

In order to ensure the protection of threatened and endangered plant species, we agree with Okanogan PUD, FWS, and BLM that additional surveys should be conducted before land-clearing or land-disturbing activities, both in the Enloe dam and reservoir area and the side-channel enhancement site.

Monitoring of known threatened and endangered plant habitat and evaluating the effects of any new ground-disturbing activities or substantive changes in project operation would reduce any potential effects on threatened and endangered species such as the Ute ladies'-tresses and their habitat. Preparing and implementing a monitoring plan after consultation with FWS, BLM, and Washington DFW would ensure that the 3 years of additional surveys are adequate to determine the presence or absence of Ute ladies'-tresses and other listed species. If the surveys identify a listed species in areas that would be affected by the proposed project, developing a plan, after consultation with the agencies, to avoid or minimize adverse impacts would be appropriate. We conclude that licensing the project, with staff's recommended measures, would be not likely to adversely affect the Ute ladies'-tresses.

3.3.6 Recreation and Land Use

3.3.6.1 Affected Environment

The proposed project boundary includes about 2.75 miles of the Similkameen River. The proposed upstream project boundary extends upstream from the dam (RM 8.80) approximately 2.50 miles (RM 11.30); the downstream extends 0.25 mile to encompass a short reach of the tailwater (RM 8.55).

Recreation

Regional Recreation Opportunities

As we've said, the Enloe Project is located in north-central Washington about 2 miles south of the Canadian border and 3.5 miles northwest of the city of Oroville on the Similkameen River in Okanogan County (figure 5). BLM manages the recreation resources that provide recreational opportunities within the Enloe Project area. The BLM's Spokane District, Wenatchee Field Office, manages the informal Miner's Flat area located about 3 miles upstream of Enloe dam and 0.25 mile upstream of the project boundary. Dispersed camping occurs on the Flat, which includes several informal fire rings created by recreational users, and there are several trails and a rough road

[35] The 2006 survey was conducted in July and the 2007 survey was conducted in July-August.

that provides access to the river. Similkameen Camp, another primitive campground maintained by the BLM, is located approximately 2.25 miles upstream from the project boundary.

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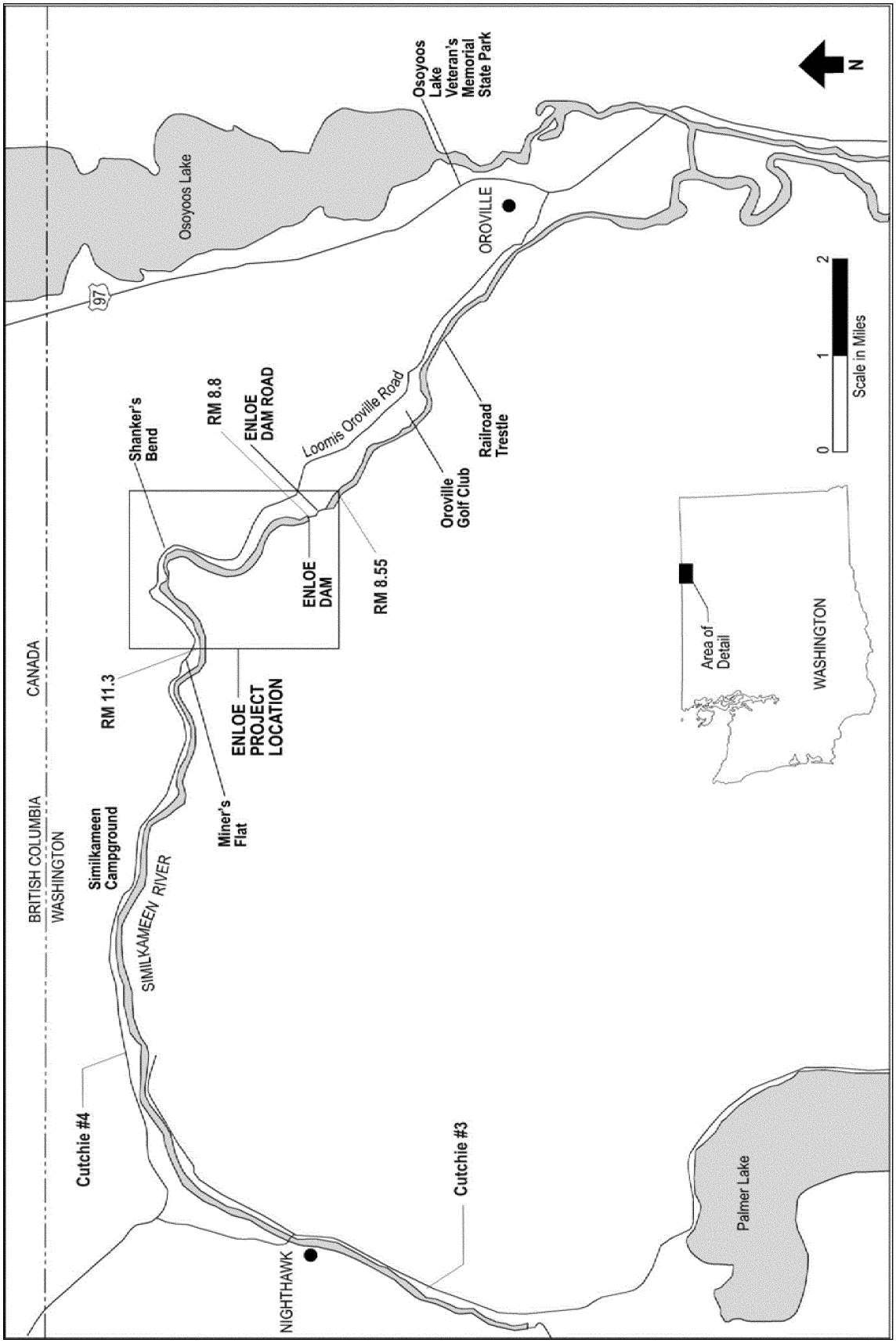

Figure 5. Recreation facilities in the Enloe Project area (Source: Okanogan PUD, 2008a, as modified by staff).

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No formal or developed recreation facilities are located within the Enloe Project area. The nearest developed campground is about 4 miles east of Enloe dam, in Osoyoos Lake State Veteran's Memorial Park. Osoyoos Lake State Veteran's Memorial Park is a 47-acre camping park on a 14-mile-long lake that stretches several miles north into British Columbia.

The park has 86 standard camping sites, one dump station, two restrooms (one accessible) and two showers, a park office, small store and entrance kiosk. Recreational activities include camping, picnicking, boating, swimming, fishing, wildlife viewing, bird watching, and horseshoe pits. Winter activities in the park include ice skating, snow playing, and ice fishing.

Washington DFW owns two river access sites on the Similkameen River upstream of the Enloe Project area. The site known as Cutchie #4 is located about 7 miles west of Oroville on the Loomis-Oroville Road. The site is surrounded by private land and is accessible only from the river; it has no developed facilities. Another site known as Cutchie #3 is located about 1.5 miles south of Nighthawk on the Loomis-Oroville Road.

The Loomis-Oroville Road in the vicinity of the Enloe Project area is designated as a segment of the Pacific Northwest National Scenic Trail (Scenic Trail). The Scenic Trail is a 1,200-mile-long multi-use recreation trail that runs from the Continental Divide in the Rocky Mountains to the Pacific Ocean. The Pacific Northwest Trail Association constructed and maintains the Scenic Trail. A new Okanogan County Nighthawk Scenic Trail (non-motorized trail) is currently under construction and follows the abandoned railroad bed and Similkameen River between Oroville and Nighthawk for a total of 12.5 miles. The portion of the trail that has been completed can be accessed from the City of Oroville and travels 3.5 miles to a scenic view of Similkameen Falls at about RM 8.5 and just outside of the lower end of the proposed project boundary (Okanogan County, 2010). The corridor of the old railroad bed for the Great Northern Railroad runs through the Similkameen River Valley, roughly following the west bank of the Similkameen River from the railroad trestle bridge located about 2 miles below Enloe dam. The old railroad bed passes through the proposed project boundary and goes through a tunnel near the upstream end of the Enloe Project area. BLM owns and manages most of the Great Northern Railroad corridor within the proposed project boundary.

The Water Trail Committee is developing a work plan for a water trail catering to canoes and kayaks in the Columbia River Basin. The route of the proposed trail would include the Similkameen River from the Canadian border to the confluence with the Okanogan River at Oroville. The Water Trail Committee, working with federal, State, and local partners, proposes to develop infrastructure, including launch sites, directional signs, educational signs, sanitary sites, and campsites.

Extreme Adventures and Alpine Fishing Guides, a commercial outfitter, provides raft floating and fishing trips on the Similkameen River. This outfitter provides three experiences, including: (1) A scenic flat water float that starts at the Canadian border and ends near Nighthawk or at Washington DFW's Cutchie #3 site (mentioned above); (2) an introduction to whitewater experience that starts at Miner's Flat and ends at Shanker's Bend; and (3) a trip that runs through Enloe Dam Canyon, which starts below Enloe dam and the falls and provides some whitewater experiences depending on the season.

Regional Comprehensive Plans

In terms of regional recreational management goals, Washington State Recreation and Conservation Office (2008) identified the following policy statements in its *Defining and Measuring Success: The Role of State Government in Outdoor Recreation, A State Comprehensive Outdoor Recreation Planning Document:*

- Recognize outdoor recreation sites and facilities as vital elements of the public infrastructure, essential to the health and well-being of Washington citizens, and important to visitors;
- Assist local and state agencies in providing recreation sites and facilities that benefit our citizens' health and well-being;
- Provide adequate and continuing funding for operation and maintenance needs of state-owned fish and wildlife habitat, natural areas, parks, and other recreation lands to protect the state's investment in such lands;
- Work in partnership with federal agencies to ensure the availability of a variety of opportunities and settings for outdoor recreation;
- Encourage the private sector to contribute needed public recreation opportunities; and
- Encourage all agencies to establish a variety of financial resources that can be used to significantly reduce the backlog of needed outdoor recreation, habitat, and open space projects.

Recreation Opportunities Within the Enloe Project Area

There are no formal, developed recreation sites within the project boundary. Public use of undeveloped dispersed recreation sites consists primarily of individuals who access the shoreline for fishing, hunting, swimming, paddle sports (i.e., canoeing, kayaking, and river rafting), picnicking, camping, hiking, biking (road touring and mountain biking), ATV riding, horseback riding, gold prospecting, bird and wildlife watching, photography, and scenic driving. Winter activities include fishing, snowshoeing, snowmobiling, and cross-country skiing when weather allows.

On the east side of the river, two access roads to project lands spur off of Loomis-Oroville Road. These access roads are not maintained for passenger vehicles. The Enloe Dam Road or downstream access road is a steep, one-lane road that contains exposed embankments, heavy ruts, and active erosion areas. This county road is unsafe for passenger vehicles and lies partially within the Enloe Project boundary. The upstream access road or OTID Road provides informal access to the river corridor and the reservoir shore for public use . Heavy brush impedes clearance, and the road is heavily rutted and steep in places. The upstream access road is impassable during the spring and early summer due to the spring runoff and remains muddy for some time after the peak flow period.

Informal/unimproved reservoir access ramps are located just upstream from the safety barrier. The old powerhouse eastbank access road now provides pedestrian access only to the shoreline area below the dam for boaters, miners, anglers, and hikers. An informal/unimproved parking area is located near the top of the dam from which emerge informal user-created trails providing access to the reservoir above the dam and some dispersed camping areas on the east bank of the reservoir.

The steep terrain limits access to the shoreline on the west bank of the Enloe reservoir and downstream of the dam. Below the dam and the falls, the Similkameen River is confined between nearly sheer rock walls until the canyon opens just below the railroad trestle about 2 miles downstream from Enloe dam. This downstream canyon area is accessible only on foot from the east bank, via informal user trails. Access to the west bank is limited because the old rail bed crosses private land and is gated. From the west bank, access crosses private land and occurs via game trails and existing hiking trails

leading to the river from the rail grade, which sits nearly 100 feet in places, above the river. The only other means of access is by boat.

Recreation Use Within the Enloe Project Area

Shore fishing and boating are the most popular activities inside of the Enloe Project area. In the past, fishing for steelhead and Chinook salmon has been popular downstream of the falls, and some trout and bass fishing has also taken place there.

During high water periods, the river attracts a limited number of whitewater enthusiasts who run the river above Shanker's Bend and below the dam. As water levels drop and the temperatures warm, the river sees more relaxed water-based recreation. Rafting, kayaking, and inner-tubing have been observed both above and below Enloe dam in the Project area. Swimming near Shanker's Bend and floating in the canyon below the dam are popular activities during these periods. Boaters and floaters use a number of informal, user-developed access points in the Project area. Some users walk down the old access road on the east bank of the river to launch rafts, kayaks, and inner tubes just below the waterfall downstream of the dam.

Okanogan PUD conducted one visitor intercept survey between June 1 and October 15, 2006, to coincide with the peak recreational use, particularly to encompass the recreational gold mining season, to gather information to estimate visitor use of the Enloe Project area. Because the survey was conducted during only one recreational use season (2006), Okanogan PUD assumed that 2006 was an "average" recreational use year. Recreational use estimates were based on 59 survey records completed with respondents in the field on 21 days from June 1 through October 15, 2006. Surveys were conducted on weekdays, weekend days, and "peak" days (selected holiday weekends).

Survey results indicate that use of the Enloe Project area is estimated at 1,378 user days during the June 1–October 15 peak recreation season. Table 14 provides Okanogan PUD's estimate of monthly user-days during the June–October recreation season. Use peaks quickly in July and remains at a fairly constant level from August through October. Outside of the Enloe Project area the most popular recreational activity is gold prospecting followed by boating, shore fishing, and sightseeing. Most of the mining and camping activities occur outside of the Enloe Project area.

TABLE 14—ESTIMATE OF USER DAYS BY MONTH FOR THE PROJECT AREA

[Source: Okanogan PUD, 2008a]

Month	Estimate of user days	
	Number	Percent
June	190	13.8
July	346	25.1
August	267	19.4
September	278	20.2
October	297	21.6
Total	1,378	100.0

Table 15 indicates estimated user days by type of day. In this area, weekend and weekday use levels are similar, but peak days show a marked increase in use.

Fishing occurs mainly in the lower reaches of the Similkameen River near Oroville; however, many anglers walk down the old access road on the east bank of the river to fish just below the dam. Okanogan PUD reported that as many as 30 people have been seen at one time fishing below the falls. In response to surveys, visitors expressed the importance of the river corridor below the dam and falls for fishing, gold prospecting, and sightseeing; a desire for safety features or assigned a high priority to the provision of additional facilities; and a need for picnic facilities, vault toilets, garbage collection, and improved river access.

TABLE 15—ESTIMATE OF USER DAYS BY TYPE OF DAY FOR THE PROJECT AREA

[Source: Okanogan PUD, 2008a]

Type of day	Number	Per day
Peak days[a]	540	14
Weekend days	190	6
Weekdays	648	6
Total	1,378	

[a] Days coinciding with holidays or recreational events, including Fourth of July (4 days), Northwest Miner's Rally (3 days), Labor Day/Blues Festival (3 days), and first weekend of deer hunting season (2 days).

Although thirty-three respondents (60 percent) reported staying longer than one day at the project area, only two of the parties surveyed actually camped within the Enloe Project area due to the absence of developed facilities.

Land Use

The proposed Enloe Project boundary is generally defined by the 1,055-foot elevation contour. The boundary extends 0.25 mile downstream from Enloe dam, following the 1,055-foot elevation contour to include the falls and the site of the proposed powerhouse, tailrace, and associated facilities. The Enloe Project boundary deviates from the 1,055-foot elevation contour to accommodate rehabilitation of the OTID Ditch Road. In that area, the Enloe Project boundary has been set 100 feet landward of the OTID Ditch Road's upper leg; it does not maintain a specific elevation.

Agriculture, grazing, and recreation are the primary land uses in the Enloe Project vicinity. A number of orchards, vineyards, and a public golf course are located along the Loomis-Oroville Road. The Enloe Project area is unfenced open range, and the BLM lands in the immediate vicinity of the Enloe Project are generally leased for grazing (figure 6). The bulk of the private land in the Enloe Project area is owned by a livestock company. There are a few residences in the Enloe Project vicinity, mainly along the Loomis-Oroville Road. Most active land uses are some distance from the Enloe Project area, with the nearest located about 1 mile downstream. There are no lands designated as prime or unique farmlands within the FERC boundary.

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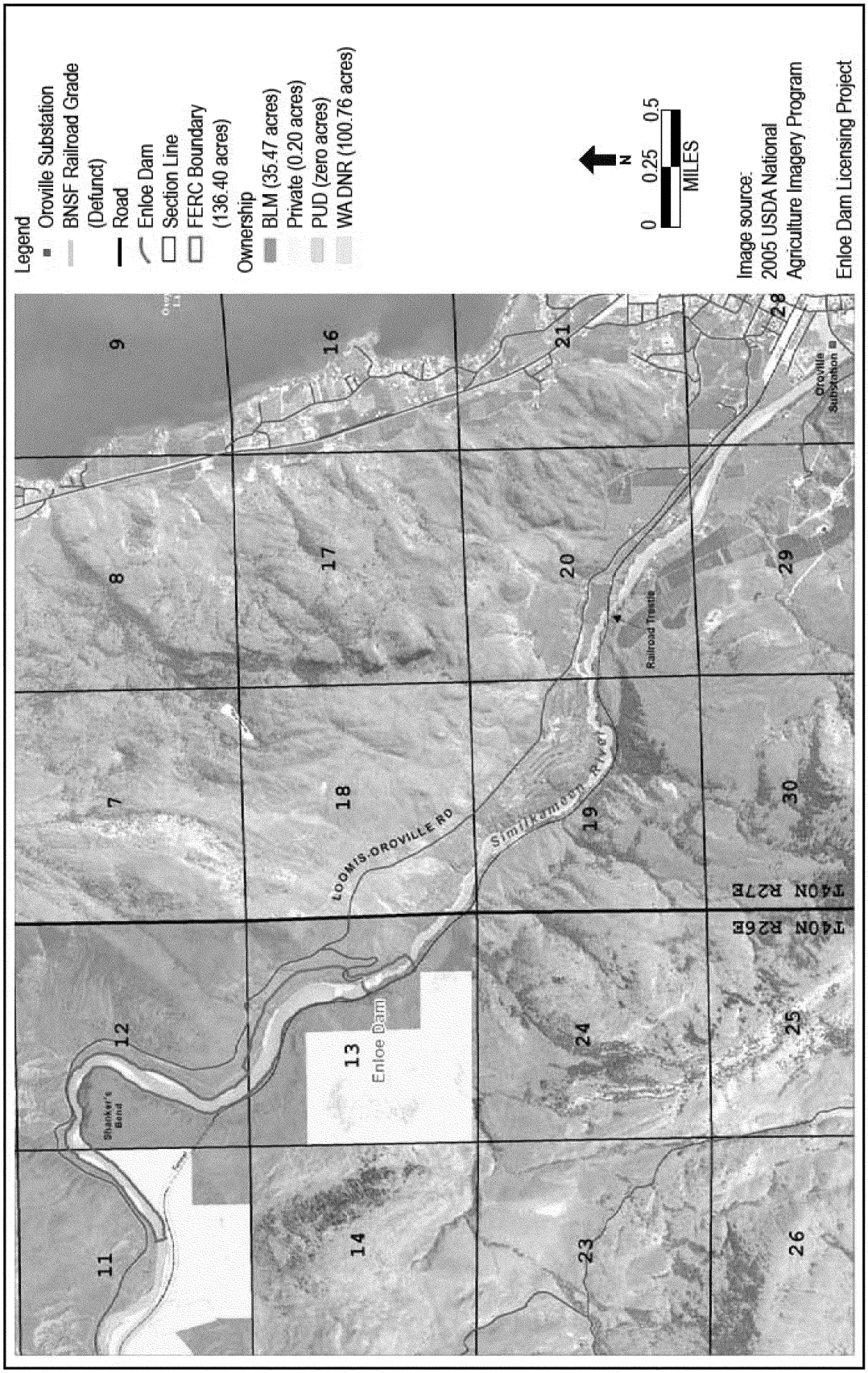

Figure 6. Land ownership in the Enloe Project area (Source: Okanogan PUD, 2008a).

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Mining was once a dominant land use in the region; however, commercial mining activity in the Similkameen Valley in Washington has been very limited during the past 25 to 35 years. Several small individual mining claims exist on BLM lands in vicinity of the Enloe Project. Recreational gold prospecting (small-scale placer mining; conducted primarily with motorized suction dredges) is popular within the river corridor.

One of the largest commercial mines in the area was the Kaaba-Texas Mine, located several miles upstream of the project area, near the community of Nighthawk. The mine operated from the late 1890s until 1951, and discharged tailings directly into the Similkameen River until 1946. In 1999, the EPA removed and disposed of approximately 81,000 cubic yards of contaminated mine tailings from the mine site.

Land Ownership

The Enloe Project boundary encompasses approximately 136.4 acres, including the proposed raised Enloe reservoir, river corridor extending downstream from the dam 0.25 mile, and shoreline generally to the 1,055-foot elevation contour. The project boundary deviates from the 1,055-foot elevation contour to accommodate work that the Okanogan PUD proposes to build a new access road.

Table 17 shows land ownership within the Enloe Project boundary. Public agencies own and manage the majority of the land, with the exception of a portion of a single parcel (comprising about 0.15 percent of the area) held privately.

TABLE 17—LAND OWNERSHIP WITHIN THE PROPOSED ENLOE PROJECT BOUNDARY

[Source: Okanogan PUD, 2008a]

Land owner	Acres	Percent
BLM	35.47	26.00
Washington DNR	100.76	73.85
Private	0.20	0.15
Total	136.43	100.00

Hydropower generation was the primary land use in the Enloe Project area from 1906 until 1958. A hydropower facility was first constructed in 1906 at the falls on the east bank of the Similkameen River, across from the present powerhouse. That facility was replaced by the existing dam and power plant, which began construction in 1916 and was completed in 1923. The facility ceased operations in 1958 for economic reasons. Most of the project structures, including the dam, the powerhouse, one of two penstocks, and the power line, still exist. Portions of the foundation of the original power house are still extant, as well.

At one time, the OTID transported irrigation water through the Enloe Project area via a system of canals and flumes, and some of the structures remain in place. That system has been replaced by a pressurized distribution system, and the point of withdrawal has been transferred from the Similkameen River, 7 river miles upstream of the dam, to Lake Osoyoos, 3.5 miles southeast of the Enloe Project. The Oroville Golf Club maintains a pumping station and pipeline within the project area to provide irrigation water for its course. With the exception of the golf course facilities, no irrigation facilities in the Enloe Project area are currently in use, and there are no other water rights on the Similkameen River.

In accordance with the Washington's Shoreline Management Act of 1971 (WSMA), Washington State has designated the Similkameen River and associated shoreline areas as shorelines of the state, which are subject to the provisions of Okanogan County's Shoreline Master Program (Okanogan Shoreline Program). In Okanogan County, shorelines of the state include water areas and shorelands extending 200 feet landward, on a horizontal plane, from the ordinary high water mark, or the 100-year floodplain, whichever is greater. The WSMA and the Okanogan Shoreline Program provide for protection of shoreline functions and values, including physical and visual access to the shoreline.

The Okanogan Shoreline Program designates all of the shoreline area within the proposed Enloe Project boundary as "Conservancy." According to the Okanogan Shoreline Program, the Conservancy areas contain a resource capable of sustained yield. Forest products, hunting, fishing, agriculture, and many types of recreation are examples of uses compatible with this environment. The intent of this environment is to maintain the existing character of the shoreline.

Access

Highway access to the Enloe dam area is via the Loomis-Oroville Road. Located in a remote rural area, the road carries little traffic. Traffic counts for Loomis-Oroville Road range between 112 and 166 average daily trips according to 2005 traffic counts by Okanogan County.[36] Two access roads (the Enloe Dam Road and the OTID Road), connect the Loomis-Oroville Road to the dam site.

3.3.6.2 Environmental Effects

Recreation

Recreation Management Plan (REC–13)

Okanogan PUD proposes to implement a Recreation Management Plan to address recreational issues associated with the project. The plan includes 12 measures for recreation and three measures for safety and access to the project areas. This Recreation Management Plan was developed in coordination with the BLM, NPS, Washington DNR, the Washington RCO, and tribal agencies that use lands within the project area. Lessees that use project lands for grazing were also invited to participate in the preparation of the RMP. The various measures within the plan are discussed below.

BLM recommends that Okanogan PUD complete a final Enloe Recreation Management Plan after consultation with BLM and the Park Service.

Abandon Portion of Existing Road Along the Shoreline and Restore Existing OTID Road To Provide Access (BOTA–03)

[36] An average daily trip is the average number of vehicles that cross a given surface during a specified 24-hour period.

Okanogan PUD proposes to restore the OTID Road by smoothing out bumps, filling potholes, and adding vehicle turnouts to allow vehicles traveling in opposite directions to safely pass one another. A 2,000-foot-long segment of the existing access road (Shoreline Road) located along the east bank of the impoundment would be abandoned and closed to vehicle traffic (figure 7). The roadway would be relocated approximately 200 feet to the east (up slope) to protect wetlands, reduce effects on cultural resources (for effects of project proposals on cultural resources see section 3.3.8.2, *Cultural Resources, Environmental Effects*), and make the road more accessible during spring, summer and fall months for all users. The new roadway segment would follow the alignment of an old irrigation canal road.

Large rocks would be placed at both ends of the abandoned roadway segment to prevent vehicle access. Pedestrian use of the abandoned road would be discouraged until riparian vegetation planted in that area has become established. Other existing unimproved spur roads in the project area would also be closed to vehicles by blocking entry points with large rocks. All parties have agreed that additional design details on the access road and any proposed crossing structures would require consultation.

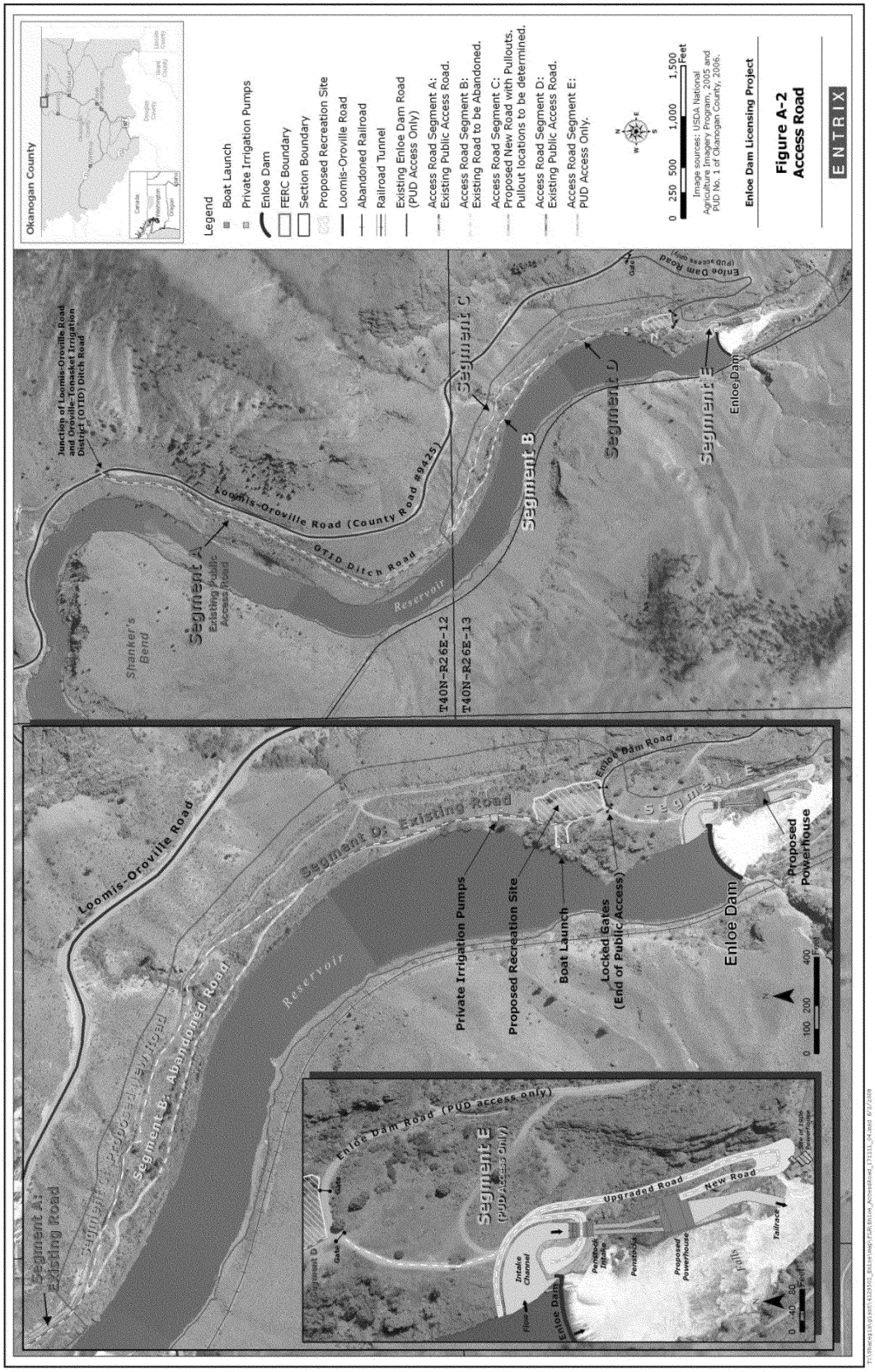

Figure 7. Roads, gates, and spurs in the project area (Source: Okanogan PUD, 2009b).

Although the access road would not be plowed on a regular basis during the winter, Okanogan PUD may clear the road periodically to access project facilities for maintenance and operations purposes.

Consistent with Okanogan PUD's proposal, BLM recommends improving an existing access road for public access into the Enloe dam area and abandoning and relocating a segment of the existing road that would be subjected to seasonal flooding under the proposed project operations. BLM also comments that the Commission should develop and analyze an alternative access road configuration that does not affect the OTID right-of-way.

Our Analysis

The realignment of a 2,000-foot-long segment of the existing access road located along the east bank of the impoundment would improve recreation at the project by providing enhanced access to project lands and waters. However, it is unclear in Okanogan PUD's application whether the entire public access road (OTID Road) between the Loomis-Oroville Road and the proposed project boundary (approximately 4,000 feet) would also be maintained to the same standard. Although, Okanogan PUD proposes to make improvements to the entire access road from the Loomis-Oroville Road to the dam, it does not intend to bring the entire access road into the proposed project boundary. Brining the entire length of the access road from the Loomis-Oroville Road to the dam would ensure that the entire access road is maintained by the licensee for project operation as well as recreational access. Incorporating the 4,000-foot stretch of this road including a 50-foot-wide corridor and turnouts would add approximately 5.0 acres of land to the proposed project boundary.

Okanogan PUD's proposal to construct an access road is in a portion of the OTID right-of-way. Okanogan PUD has consulted with OTID, and OTID has agreed that the proposed access road would not conflict with the OTID's interest or affect any facilities in current use. The two parties have come to an agreement that would allow Okanogan PUD to construct an acceptable access road to the project dam. A final agreement would be negotiated after the licensing decision. Therefore, we do not see a demonstrated need for Commission staff to develop and analyze an alternative access road configuration at this time.

During the winter season, Okanogan PUD would not regularly plow or maintain the access road for visitors but states it may clear the road periodically to access project facilities for maintenance and operations purposes. Access to project waters was evident during the site visit in January 2009, when Commission staff noted that there was a fisherman downstream of the dam. Therefore, there is a need for more periodic maintenance of the roadway in the winter to allow visitors to project lands and water. Development of an established plowing schedule with signs posted at the beginning of the access road would have a direct beneficial effect on winter recreation users by providing enhanced access to project lands and waters.

Fence Plan (REC–01)

Safety/Security Fence—Okanogan PUD proposes to remove the existing chest-high chain-link fence, approximately 100-foot-long, that separates visitors on the east bank of the river from the dam and the lower reaches of the impoundment and install a new fence (at least 6 feet high) along the upland perimeter of the power generating facilities and tailrace (figure 8). The fence would be constructed of small mesh chain-link material finished in traditional galvanized zinc or coated in brown vinyl. A top rail would be installed to keep the fence from sagging. Authorized personnel would have keys to access selected locked gates. Signs warning the public about high voltage and other hazards would be posted on appropriate fence locations.

Cattle Fencing—Okanogan PUD proposes to install an 8,000-foot-long cattle fence along the eastern boundary of the project boundary from Shanker's Bend to Enloe dam. At its northern end, the cattle fence would tie in to a rock outcrop just south of the apex of Shanker's Bend and an access point through the fence would be provided for pedestrians. Cattle would have access to the river just upstream from the rock outcrop. At its southern end, the fence would tie in to another rock outcrop just east of the proposed powerhouse. The configuration of the cattle fence would be consistent with BLM guidelines for livestock fencing installed in areas inhabited by common ungulate species. The fence would consist of no more than four, well-stretched horizontal wires with the top wire no more than 42 inches above the ground. The other wires would be spaced evenly no less than 8-, 16-, and 24-inches below the top wire.

The grazing lessee has an existing water right to withdraw water from the river for stock watering purposes. Okanogan PUD proposes to install a stock watering tank approximately 300 upslope from the river, just inside the project boundary and north of the proposed recreation site, as an alternative source of drinking water for all grazing cattle with rights to this area. The tank would be supplied with water from an existing pump and waterline located on the east bank of the river. The pump and waterline are owned by one of the grazing lessee Okanogan PUD would monitor the need to install a security fence around the pump and electrical power system to discourage vandalism and theft if they become problems.

A cattle guard would also be installed where the cattle fence crosses the main access road to the dam. The cattle guard grid would be designed to bear the maximum expected vehicle load (which may include construction equipment). A gate (accessible only by authorized personnel) would be installed where the cattle fence crosses Enloe Dam Road.

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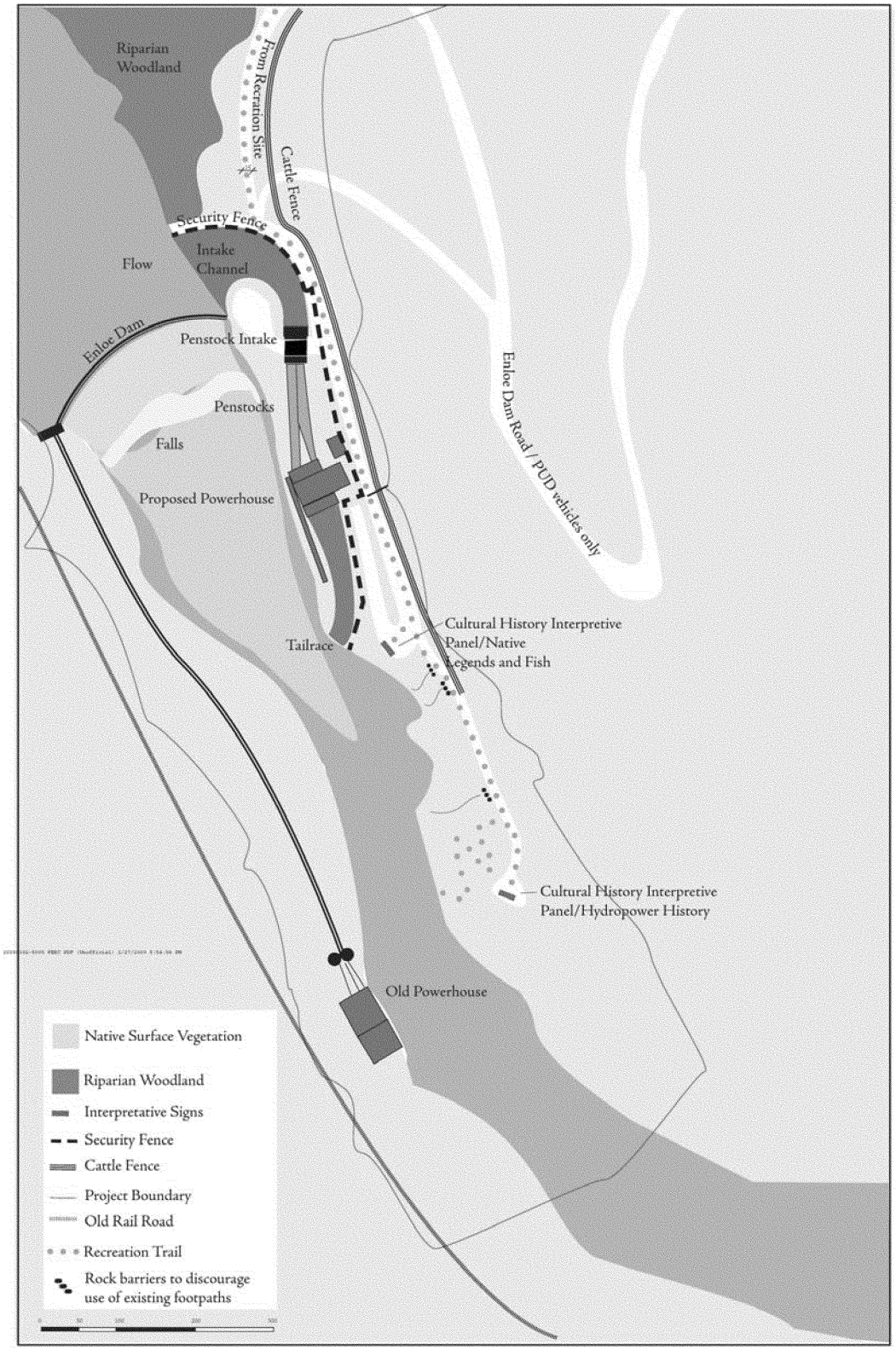

Figure 8. Location of proposed fencing downstream of Enloe dam (Source: Okanogan PUD, 2009b).

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BLM recommends non-barbed wire be used near the recreation area or the addition of crossings as needed for safe access to project lands and waters. In addition, BLM recommends prior to building the proposed Enloe Project fence, Okanogan PUD develop and implement a plan to provide water outside the fenced area for the use of livestock that are authorized to graze on BLM-administered public lands within and adjacent to the Enloe Project.

Our Analysis

Three ranchers have rights to graze cattle on BLM land within the proposed project boundary. Because there are no fences to limit or control livestock access, cattle freely roam the entire site. The grazing lessee has an existing water right to withdraw water from the river for stock watering purposes. Cattle access the river for drinking water wherever the topography allows. Okanogan PUD's Fence Plan implemented in coordination with its vegetation resources management plan would be consistent with BLM's recommendations. The proposed fence configuration would protect wildlife and vegetation within the project area while still allowing access to recreation users. Injury to fawns and yearling deer who often try to move between lower fence wires would be reduced and adult deer could easily jump a fence with a top wire 42 inches above the ground. However, continued consultation with BLM and lessees who have the water rights would ensure the fence meets BLM standards and cattle are still able to access water within the project area. In addition, Okanogan PUD's proposal to install a stock watering tank north of the proposed recreation area would provide an alternative source of drinking water for all grazing cattle with rights to this area. A written agreement to provide water for all three lessees' cattle at this proposed watering site would also ensure all three ranchers' cattle would have an alternative source of water.

Barriers to Restricted Areas—Okanogan PUD proposes to install locked gates and rock barricades to limit vehicle access by recreational users. The proposed barriers and access restrictions are described below:

- Locked metal gates would be installed at the upper end of Enloe Dam Road to prevent unauthorized vehicles from using the road. The road is very steep and is not maintained for passenger vehicles. Visitor access to the project area would be via OTID Road. Because Enloe Dam Road is a county road, Okanogan PUD would work closely with Okanogan County on plans to close the road to public vehicle access. Pedestrians would be able to walk along the road; however, they would need to use the pedestrian access at the north end of the recreation area to access the new recreation site and areas below the dam.
- Okanogan PUD staff and other authorized personnel would have keys to the locked gates. Okanogan PUD does not propose to install a gate at the entrance to the main access road off Loomis-Oroville Road.
- A locked metal gate would also be installed at the intersection of the one-way loop road within the proposed recreation site and the new access road to the area below the dam. Only Okanogan PUD staff and authorized personnel would have keys to open the gate. Large rocks spaced approximately 3 feet apart would be used to prevent visitors from attempting to drive around the gate. Visitors (including those portaging rafts, canoes, kayaks and mining equipment) would be able to access the area below the dam by using a trail to be located near the west end of the gate.

Consistent with Okanogan PUD's proposal, BLM also recommends installing barricades and fencing to prevent unauthorized access to closed areas.

Our Analysis

Finalizing and implementing the Fence Plan after consultation with BLM and stakeholders as part of the proposed Recreation Management Plan would improve prevent damage to wetlands and proposed riparian/wetland mitigation sites by preventing cattle from entering the proposed recreation site and keeping recreation users out of sensitive vegetative areas. A key schedule developed by Okanogan PUD in consultation with stakeholders would also ensure the appropriate entities had keys to access project facilities.

Recreation Access Below Enloe Dam (REC–02)

The construction of the new power generation facilities would require upgrading or replacing portions of the abandoned road, which currently provides foot access to areas below Enloe dam, including the rocky area above the falls and the lower reaches of the Similkameen River.

The area downstream of the dam contains dispersed trails made by visitors who access different areas below the dam depending on the activity they are taking part in (fishing, hiking, photography, mining, and kayaking/rafting/canoeing). Okanogan PUD proposes to designate and improve a single trail for public recreation access to the river below Enloe dam. Okanogan PUD would allow hikers and visitors portaging watercraft or recreational mining equipment (on foot) to use the improved access road between the recreation site and the powerhouse. Okanogan PUD also proposes to improve approximately 350 feet of the existing trail located between the access road to the powerhouse and the southernmost interpretive display. The trail would be widened to approximately 6 feet, leveled, smoothed, and surfaced with gravel to provide barrier-free access to all users.

In addition, Okanogan PUD proposes to make limited improvements to an existing footpath that extends between the trail described above and the edge of the river. Large obstacles would be moved or avoided, and the path would be widened and smoothed where possible. The path would also be marked to increase its visibility and enhance public safety. Other existing footpaths leading from the upper trail to the river's edge would be closed by placing rocks at the existing entry points to discourage use.

BLM recommends providing recreation access below Enloe dam and rebuilding the footbridge.

Our Analysis

Options for providing access to the river corridor below Enloe dam (including portage options) are limited by site factors (including steep, rocky terrain on both sides of the access corridor and the confined river channel). Generation facility design and security requirements also limit options for improving access to areas below the dam. Okanogan PUD proposes to designate and improve a single trail within the proposed project boundary for public recreation access to the river below Enloe dam. The improved path would provide easier access to those carrying kayaks or prospecting equipment and provide overall enhanced access. Anglers would also be able to access the popular fishing areas below the falls using the improved footpath. The proposed improvements would enhance access to lands and waters downstream of the dam and provide for the effective launching of boats below the falls.

At this time, Okanogan PUD does not propose to provide public access to the west bank of the river as a part of the Recreation Management Plan. Okanogan PUD states it would be receptive to proposals to restore the footbridge across the river if a proponent and source of funding were to come forward. Okanogan PUD would continue to

coordinate with federal and state agencies and local historical societies to explore funding sources for restoring the footbridge (see *Land Use* "Non-motorized Trails and West Side River Access" for a full analysis).

Transfer Ownership of Trestle Bridge (REC–03)

Okanogan PUD proposes to continue collaboration with the County towards development of the County's proposed 12.5-mile non-motorized public access trail on the railroad bed along the west side of the Similkameen River between Oroville and Nighthawk. This trail is currently under construction with the first 3.5 miles having been completed, running from the City of Oroville to a scenic view of Similkameen Falls at around RM 8.5, which lies just outside of the lower end of the proposed project boundary. Okanogan PUD has provided easements through its property to the County with the following conditions: (1) The first phase of the trail would terminate prior to reaching the downstream end of the project boundary—that is, the first phase of the trail would not run adjacent to the project boundary; and (2) Okanogan PUD retains the right to use the bridge and the railroad bed to reach the dam site for project maintenance and operations.

Okanogan PUD also plans to coordinate with the Department of Public Works regarding road approaches and signage.

Our Analysis

Okanogan PUD transferred ownership of the trestle bridge to Okanogan County for the development of a future public, non-motorized, recreational use trail. The rail would provide a beneficial effect to users who would be able access to the west side of the Similkameen River and Enloe Project area for possible informal, dispersed recreational activities.

Improvements to Existing Informal Boat Ramp (REC–04)

Okanogan PUD proposes to install a new formal boat launch in approximately the same location as the primitive put-in/take-out area now used by recreational boaters on the reservoir. The boat launch access road would be accessed from the loop road at the new recreation site. The road to the boat ramp would be approximately 14 feet wide and surfaced with gravel. The road would be accessible to both vehicles with trailers and people carrying watercraft on foot. The boat ramp would be constructed of gravel geoweb materials or concrete planks. Changing water levels would be accounted for in the design of the ramp. If necessary, a trash deflector would be installed to protect the boat ramp from floating debris. A vehicle and trailer parking area would also be located in the new recreation site.

Rock barricades would be installed along both sides of the access road to the boat ramp to prevent vehicles from entering the adjacent woodland area. The rock barricade would consist of three-man rocks [37] placed approximately 3 feet apart.

BLM recommends improving the existing informal boat ramp at Enloe dam, consistent with Okanogan PUD's proposal.

Our Analysis

These improvements would facilitate access for current and future recreation use at the project. By implementing the proposed enhancements in areas where recreational use is most concentrated, within 1.5 miles of the dam, recreation access at the project would be increased and areas for the effective launching and retrieving of boats would be improved.

Clean Up and Restore Wooded Area on East Bank (REC–05) and Remove Existing Trash and Conduct Annual Cleanup (REC–07)

Okanogan PUD proposes to remove existing trash from the following areas: (1) the wooded area on the east bank of the reservoir, just above Enloe dam; (2) the OTID Road access leading from the Loomis-Oroville Road to the dam site; and (3) unimproved beaches within the project area, including Shanker's Bend and area below the dam.

Okanogan PUD proposes to clean up and restore the wooded area on the east bank of the impoundment, just upstream of the dam on BLM land, to enhance visitor experience. Clean up would include removing trash, auto bodies, and other debris from within the wooded area. Restoration would include planting native vegetation appropriate to the site in areas that have been degraded by vehicle use and informal camping.

Okanogan PUD proposes to coordinate with user groups and area civic organizations to arrange an annual clean-up to remove trash and dumped materials that accumulate within the project boundary. Signs stating Okanogan PUD's "Pack it In/Pack it Out" policy would be installed at the entrance to the OTID Road off Loomis-Oroville Road and at a conspicuous location within the new recreation site upstream of the dam.

Okanogan PUD personnel would visit the site several times each month, and if trash or illegal dumping exist, they would be removed as soon as practical.

BLM recommends cleaning up and restoring the wooded area on the east bank as well as removing existing trash and conducting annual cleanup events consistent with Okanogan PUD's proposal.

Our Analysis

The proposed clean-up plan for the wooded area on the east bank of the river and removal of existing trash and an annual clean up plan would address the litter and sanitation concerns expressed by the visitors in response to Okanogan PUD's recreational surveys. The proposed plan would have a direct beneficial effect on the recreational experiences of visitors by providing annual litter pickups, site checks on a regular basis, and signage to encourage users to carry-in/carry-out.

Develop an Interpretive Publication (REC–06)

Okanogan PUD proposes to develop an interpretive publication that would include a map of the project area in consultation with Okanogan County, the Greater Columbia Water Trail Steering Committee, and other interested parties. The interpretive publication would identify the locations of developed recreational facilities and inform visitors of appropriate locations to park, load and unload recreational equipment, portage, and camping areas. The map would include recreation sites and access areas and be suitable for printing as a stand-alone piece that could be posted on an information board.

The design of the publication would follow the style guidelines that would be developed in the Aesthetic Resources Plan (see section 3.3.7 *Aesthetic Resources*) and be consistent with other interpretive signs (REC–11) and information boards (REC–12) at the project.

Okanogan PUD's proposal is consistent with BLM's recommendation to develop an interpretive publication.

Our Analysis

Finalizing and distributing an interpretive publication after consultation with stakeholders as part of the proposed Recreation Management Plan would establish a consistent method to provide visitors with information about the project and recreation sites within the project area. Development of such a publication

[37] A three-man rock is defined as a rock weighing 750–3,500 pounds and measuring approximately 24 to 36 inches on each side.

would increase public safety and awareness at the project.

Develop Parking Area, Including Vault Toilet and Access Road (REC–08), Install Picnic Tables (REC–09), and Develop Primitive Campsites (REC–10)

Okanogan PUD proposes to develop a one-acre recreation site located in a relatively flat area next to the riparian woodland just upstream from the dam. Okanogan PUD chose this site because it is heavily disturbed and would not affect known cultural resources in the area. The design concept for the recreation site is a one-way access road that would circulate traffic in a counter clock-wise direction. The access road would be approximately 14 feet wide and would be surfaced with gravel. A gravel surfaced parking area able to accommodate up to five standard vehicles and two vehicles with trailers would be located on the southern half of the site. Large rocks would be used as needed to direct traffic, protect facilities, and designate the parking areas. Due to space and topographical limitations, vehicles with boat trailers would be required to pull in and back out of the parking area. One vault toilet would be constructed for recreational users at the south end of the parking area.

Okanogan PUD also proposes to install picnic tables in two areas on the east side of the new recreation site near the parking area. The areas would be designated for day-use picnicking, although overnight campers would be able to use the picnic facilities as well.

The first site (Picnic Area I) would be located in the southeast corner of the recreation site outside of the loop road (figure 9). This area is slightly wooded providing natural shade and views toward the dam. Two tables would be spaced approximately 25 to 50 feet from each other to provide privacy. The second picnic area (Picnic Area II) would be located in the northeast corner on the outside of the loop road. This site provides overlooking views of the placid water of the reservoir. Two picnic tables would be clustered together to accommodate larger groups. Parking for both picnic areas would be provided in the parking area located at the south end of the recreation site inside the loop road (Figure 9).

Okanogan PUD would develop four primitive campsites near the parking and picnic areas described above. Each campsite would be approximately 25 feet wide and 50 feet long. The campsites would provide for pull-in parking and include ample space to accommodate a tent site. Rock barriers would be installed to serve as curbstops and define the boundaries of individual campsites. A picnic table and steel fire ring would be provided at each campsite and be surrounded by 3 feet of gravel in all directions to reduce fire danger. Campsites would be available on a first-come, first-served basis and overnight stays would be limited to a maximum number of 14 consecutive stays. Okanogan PUD's overnight stay policy would be clearly posted on an information board at the recreation site and at each campsite. Campsites would be designed to provide barrier free access to all users.

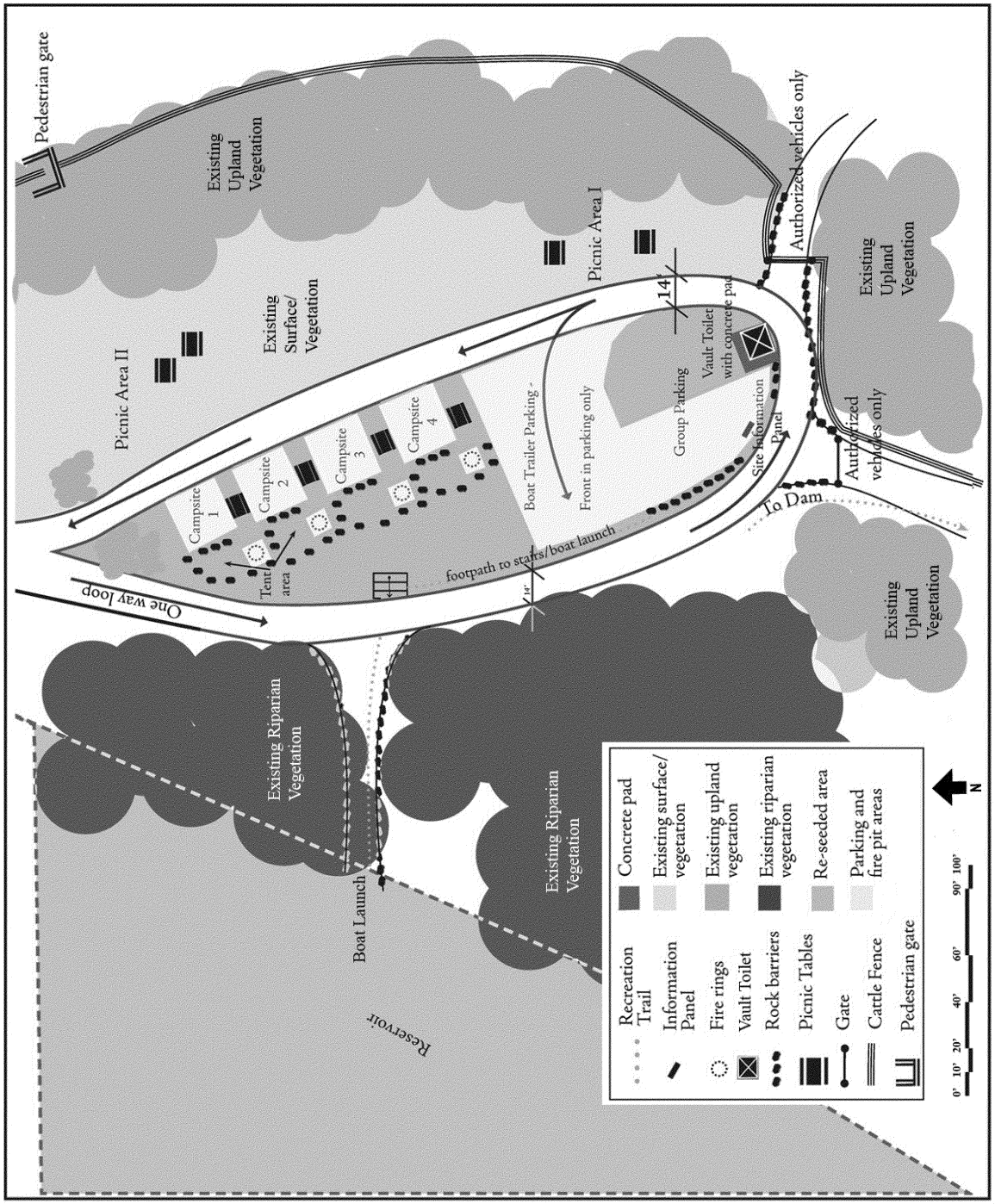

Figure 9. Enloe Project recreation site schematic (Source: Okanogan PUD, 2009b, as modified by Staff).

Okanogan PUD proposes it would, either directly or indirectly through a formal partnership, be responsible for maintaining recreational assets in an acceptable condition through routine maintenance, repair and replacement.

Recreation features would be inspected during normal maintenance visits and any recreation features that are identified as broken or in need of repair would be repaired or replaced. The repair of recreation features, which could include the replacement of certain items, would be conducted on an as-needed basis as soon as practical after being identified through regular facility inspections.

BLM recommends developing a parking area, installing a vault toilet, installing picnic tables, and developing primitive camp sites at the recreation site consistent with Okanogan PUD's proposal. BLM also recommends that Okanogan PUD provide recreation site grounds maintenance and consult with BLM to develop a schedule for site maintenance, facility replacement, modifications, or upgrades to the administered recreation sites at Enloe dam and Miner's Flat. In addition, BLM recommends Okanogan PUD clear and keep clear to an adequate width all lands along roads and trails and dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the Enloe Project that result from maintenance, operations, or alteration of the Enloe Project facilities. Trees that have died or had portions die should be removed or pruned to minimize hazards to the public. Prior to removal, trees would be evaluated for wildlife value and a determination made of the appropriate action. Trees that have been removed should be replaced by planted seedlings of species native to the area.

Our Analysis

The development of this small recreation area is consistent with the low level of current and anticipated use. Survey results indicate that use of the Enloe Project Area is estimated at 1,378 user days during the June 1 to October 15 survey period.

Okanogan PUD developed a Recreation Needs Assessment, dated April 2009. The Recreation Needs Assessment projected the needs and capacity data for the project area through the year 2050 using peak use estimates.

The peak day-use projection for campers visiting the survey area in 2030 under Okanogan PUD's high growth scenario is 15, which would be in balance with the capacity available at the project site once the campsites are developed. The 2050 peak day demand is anticipated to be 38 percent of the total survey area capacity, including the primitive campsites available 3 miles upriver at Miner's Flat. This suggests that peak day demand for camping facilities at the project would be exceeded in 20 to 30 years. Thus, it appears there would be sufficient capacity to accommodate anticipated future demand for camping in the area of the project.

The proposed sites would be appropriate given current recreational use at the project. Recreation access would be improved at the project by providing formal campsites and picnic areas in the areas where recreational use is concentrated. The addition of a vault toilet would ensure that human waste is handled in a manner that would protect environmental and aesthetic resources. The addition of picnic tables and primitive campsites would assist in defining areas for recreational activity and would concentrate recreational use in these intended areas. This would reduce the current adverse effects on surrounding natural and cultural resources from recreational activities that could cause ground compaction, vegetation loss, and erosion. Similarly, the designation of parking spaces for recreational users would reduce impacts on natural and cultural resources. Although grounds maintenance is already included in Okanogan PUD's day-to-day operation and maintenance activities finalizing the Recreation Management Plan after consultation with stakeholders and filing the plan with the Commission for approval would establish a maintenance protocol to provide visitors with clean and safe recreation facilities.

Interpretive Signs and Information Board (REC–11 and REC–12)

Okanogan PUD proposes to place at least three interpretive signs (display panels) in areas accessible to visitors at the project. The purpose of these panels would be to develop visitor understanding of the cultural, historical, and biological resources in the project area and enhance visitor experience. Sign designs and locations would be consistent with those specified in the HPMP and would be finalized in consultation with BLM and the CRWG during the design phase.

The preliminary list of proposed sign locations and topics are as follows: (1) One display panel at or near the old bridge tower, below the falls, the focus of which would be the history of power generation at the site; (2) one display panel at or near the 1906 powerhouse foundation at the end of the new access road, the focus of which would be native legend about the falls and fish; and (3) one display panel near the parking and picnic area, which would have smaller versions of the two other panels and interpretive information about the environment (e.g., wetland, riparian, and shrub-steppe functions and values) around the project area.

The exact locations of the signs may change slightly to ensure that they do not obstruct views of other project features and are placed in appropriate locations relative to the features being interpreted.

Okanogan PUD also proposes to develop an information board in addition to the interpretive signs. At a minimum, the information board would include a map showing recreational features in the project area, visitor rules, and safety information.

BLM recommends the development of the interpretive signs and an information boards consistent with Okanogan PUD's proposal.

Our Analysis

Finalizing and implementing the plan for interpretive signage and information board after consultation with BLM and the CRWG, as part of the proposed Recreation Management Plan, would enhance the recreational experience by providing visitors with information about the project as well as important safety messages. In its proposed Recreation Management Plan, Okanogan PUD identified likely locations, themes, stories, objectives, and options for structures and sign displays within the project boundary. Because Okanogan PUD states that specific displays would be subject to alteration based on the outcome of consultation, a final Recreation Management Plan filed with the Commission for approval would ensure that the proper consultation has occurred and that the final site-specific information could be assessed properly.

Additional Measures To Improve Public Safety

In the interest of promoting public safety for all those who participate in recreational activities within the project area, Okanogan PUD proposes following additional safety measures.

Maintain Warning Signs, Safety Cable and Grab Ropes (SAFETY–01)

In consultation with BLM, Park Service, FWS, Washington RCO, Washington PC, Washington DNR, CRWG, Washington DFW, Washington DOE, Okanogan County Planning and Development Office, the Colville, Greater Columbia Water Trail Coalition, Pacific Northwest Trail Association,

Washington Water Trails Association, Wenatchee Valley Museum and Cultural Center, and grazing lessees, Okanogan PUD proposes to install a 1,500-foot long canoe/kayak portage trail. Paddlers would be able to identify the portage trail by signs informing boaters and paddlers where take-outs are located. Portage signs would be large enough to direct canoeists and kayakers to safe take-out locations.

Okanogan PUD also proposes to continue to maintain the existing signs and system of safety cables and grab ropes above the dam. The existing system of safety cables and grab ropes is located more than 300 feet upstream of Enloe dam and the proposed intake channel at a narrow point in the reservoir. The cables and grab ropes serve as a means of restraint and escape for people who are approaching the spillway and are not able to exit the water at the boat launch as directed by instructional signs and warnings.

Finally, a log boom would be placed at the entrance to the intake channel to serve as a restraining barrier for any boaters or swimmers approaching the intake channel.

Allow Limited Public Access to the Project Area During Construction (SAFETY–02)

Okanogan PUD proposes to allow limited public access to the project area during the 2.5-year construction period. Public access would be limited to areas upstream of the dam, outside of the construction and staging areas. Access to the primitive put-in/take-out area in the riparian wooded area would be available during most of the construction period. During periods when the put-in/take-out area would not be available for use, a sign would be placed upstream to alert boaters to use an alternate take-out location.

Because of safety and liability concerns, the area along the east bank of the river (extending approximately 250 feet above the dam and 550 feet below the dam), including all areas of active construction and materials stockpiling, would be off-limits to the public until major construction activities are completed. The off-limits area would be completely enclosed by a temporary chain link security fence. Signs would be erected at the entrance to main access road, alerting visitors that construction activities are taking place and that portions of the site may be closed to public use. Okanogan PUD would continue regular site inspections during periods of active construction.

Identify Options for Preventing Public Access to the Old Powerhouse (SAFETY–03)

Okanogan PUD proposes to coordinate with BLM, the state of Washington, and private land owners, as appropriate, to identify options for preventing public access to the old powerhouse. Options include installing fencing and/or gates at key access locations on the west bank of the river between the powerhouse and the old railroad. Warning signs with the words "Danger" and "No Entry" could also be installed at key locations. The fencing and signage could remain in place until another party has assumed ownership and management of the powerhouse or until the powerhouse and penstock are demolished and removed. Okanogan PUD would allow 5 years before the powerhouse is demolished to identify potential partners to restore the old powerhouse for interpretive opportunities (see section 3.3.8, *Cultural Resources,* for more discussion of this issue).

BLM recommends improving public safety by maintaining warning signs, safety cables, and grab ropes, allowing limited or controlled public access to the Enloe Project area during construction, and preventing or appropriately managing public access to the old powerhouse.

Our Analysis

Okanogan PUD has a responsibility for public safety and ensuring public access under parts 12 and 2.7 of the Commission's regulations. The proposed measures listed above to improve public safety are reasonable and appropriate to ensure public safety at the project. Public safety at the proposed new recreation site and other areas within the project area is also under the jurisdiction of law enforcement agencies, including the Okanogan County Sheriff's Office. It would be appropriate for Okanogan PUD to also coordinate with the local county sheriff's office and other emergency response entities to ensure that an appropriate level of public safety exists within the project area.

Recreation Management Plan (REC–13) and Monitoring

Okanogan PUD proposes to review, update, and/or revise the RMP if the FERC Form 80 monitoring indicates significant changes in recreation use and or conditions or substantial differences in uses versus capacity of recreation facilities. Changes would also be implemented if monitoring results indicate resource objectives are not being met. Any updates to the RMP would be made after consultation with BLM and filed for final Commission approval.

BLM recommends that Okanogan PUD conduct annual and periodic recreation plan monitoring. Within 90 days of license issuance, BLM recommends Okanogan PUD develop an Annual Visitor Use and Monitoring Form, in consultation with BLM. This form would be used to record visitor use; maintenance, both performed and needed; and report on the recreation facilities and recreation use within the Enloe Project area. The report would be submitted to BLM by December 1 each year for review and approval.

Every 6 years, starting with the issuance of an Enloe Project license, Okanogan PUD should review and evaluate information regarding recreation needs and report recreation use levels. Use levels would be documented by means of site visits and staff observations. Okanogan PUD would also conduct monitoring, using the Commission's FERC Form 80.

BLM recommends that every 5 years, Okanogan PUD review, and if necessary, update the final Recreation Management Plan. If the Form 80 monitoring, the Annual Visitor Use and Monitoring Form, or other sources identify issues, problems, or significant changes to recreational use levels, types, or other issues, Okanogan PUD would update or revise the final Recreation Management Plan to contain information on managing and providing adequate facilities to meet the needs of the current and projected recreation use. Significant change would include exceeding the project's recreation facility capacity as defined by the Commission's FERC Form 80 updates.

Our Analysis

Okanogan PUD's proposed recreational use monitoring and assessment of recreation-related effects on lands within the project boundary as a component of the proposed Recreation Management Plan would allow Okanogan PUD and stakeholders to consider measures to address recreational use, including dispersed use, over the term of a license. It would be beneficial for Okanogan PUD, in coordination with filing of the FERC Form 80, to file every 6 years a Recreation Monitoring Report summarizing the recreation monitoring results and any recommendations for future recreation management at the project. The monitoring would provide a mechanism for which recreation facilities could be maintained and improved over the term of a license.

Although monitoring recreation on an annual basis, as proposed by BLM, would also be beneficial, this amount of monitoring seems excessive due to the low amount of current recreational use at the project.

Coordination with other stakeholders, such as the Washington SHPO, BLM, NPS, Washington DNR, and Washington ROC would ensure that other environmental resources are appropriately considered when implementing any changes or new recreation measures into the Recreation Management Plan.

River Access Point at Miner's Flat

BLM recommends that Okanogan PUD place the Miner's Flat area within the Enloe Project boundary. Currently some visitors use Shanker's Bend as a boat take out to avoid paddling the flat water above the dam. BLM states that river visitors who take out at Shanker's Bend to avoid the flat water would now take out at Miner's Flat due to the increase in reservoir area as proposed. BLM recommends Okanogan PUD make recreation improvements to the Miners Flat area to accommodate future increases in recreation needs at this location. BLM proposes that recreational development at Miner's Flat incorporate the following: (1) Improve the existing entrance road, road through the site, and parking areas; (2) improve water access for launching and landing boats; (3) install an information kiosk with a map; (4) establish primitive campsites, including picnic tables and steel fire rings; (5) install a vault toilet; and (6) develop drawings showing the location of site improvements and consult with them on this plan.

Our Analysis

Currently, there is no suitable area for the development of a take-out within Okanogan PUD's proposed project boundary. It is likely that the raised reservoir level would result in more paddlers taking out at Miner's Flat to pass up the increased flatwater area.

Since an informal access already exists at Miner's Flat and the area is flat enough to accommodate a take-out area, it would be reasonable to develop a take-out within this location with minor upgrades made to the access road to the take-out. However, because Okanogan PUD has proposed to develop formalized campsites within the project boundary and two campgrounds already exists within two to five miles of the project, developing campsites at Miner's Flat would not be justified.

Land Use

Project Boundary

The Enloe Project boundary encompasses approximately 136.4 acres and includes Enloe reservoir, the corridor for the new access road proposed by Okanogan PUD, the location identified for the placement of boulder clusters in the riverbed (about 2.5 miles upstream of the dam) and the river corridor extending downstream from the dam 0.25 mile. Okanogan PUD does not propose to place additional lands associated with the proposed side-channel enhancement site, the restoration of the existing OITD road, and Miner's Flat within the project boundary.

Our Analysis

Okanogan PUD's proposal to enhance existing side channel to improve spawning, rearing, and summer thermal refugia would be a mitigation measure for the protection of environmental resources. This proposed facility would add approximately 0.75 acres of project lands approximately 5 miles downstream of the dam necessary for project operation. These enhancements would need to be maintained over the license term and, therefore, it would be appropriate to include these lands within the project boundary for the purpose of operation and maintenance of the proposed Enloe Project.

In addition, all but about 4,000 feet of the existing access road is currently proposed to be located within the project boundary. Because of the proposed modifications of the existing access road and the fact that the road is the only access route to the project, it is appropriate to include the entire access road within the project boundary. This would add approximately 5 acres of land to the project area.

Finally, the provision of an upgraded take-out area at Miner's Flat is justified due to the potential increase in recreational use as a result of the raising of the impoundment from current levels and anticipated increases in recreational use of the area over time. The inclusion of the recommended Miner's Flat take-out area, would be necessary for project purposes, such as recreation, shoreline control, or protection of environmental resources. This would add approximately one acre of land into the project boundary.

Law Enforcement, Emergency Services, and Fire Prevention

BLM recommends Okanogan PUD develop and implement, after consultation with BLM, a Law Enforcement, Fire, and Emergency Services Plan. The plan would include provisions for: (1) Coordination of and funds for law enforcement, fire, and emergency services personnel; (2) law enforcement presence, enhanced emergency communication and response procedures, public safety and security, protection measures for natural resources, recreation resources, and heritage resources; (3) an emergency telephone at the site; (4) an assessment of the need for additional law enforcement, including funds for additional personnel, to patrol BLM-administered lands; (5) a description of fire prevention and protection on BLM-administered lands to include: (a) An identification of hazard abatement procedures, (b) a notification process, (c) an identification of agencies to respond to fire reports, and (d) a process for reclaiming and/or rehabilitating burned lands; (6) coordination with BLM to evaluate the need for fire protection on BLM-administered lands, including monitoring and evaluating of man-made fires that affect BLM-administered lands; and (7) all costs provided by Okanogan PUD, if monitoring demonstrates an increased need for fire prevention, detection, and suppression.

Our Analysis

BLM indicated that increased recreational use in the Enloe Project area can lead to adverse effects on environmental and cultural resources, an increased risk of fire, and an increase in vandalism that will require law enforcement and emergency or fire response. As previously discussed, Okanogan PUD proposes to remove existing trash from defined areas on BLM land, conduct annual clean up events, and conduct project facility site reviews. Further, Okanogan PUD proposes to implement its Recreation Management Plan that contains measures to minimize conflicts between recreational use and associated effects on environmental resources. Overall, these measures, along with additional staff-recommended measures, would protect the environmental, recreational, and cultural values at the Enloe Project.

Providing funds for law enforcement, fire, and emergency services personnel is not a specific measure to protect and enhance fish and wildlife resources. The Commission has made clear that it is concerned with protecting resources and uses at the project rather than funding personnel.[38] However, a fire suppression program to rehabilitate

[38] *See Settlements in Hydropower Licensing Proceedings Under Part I of the Federal Power Act,* 116 FERC § 61,270 (2006).

lands subject to wildfire and to reduce fuel loads to prevent wildfire on project lands and adjoining wildlife areas could protect and enhance terrestrial resources affected by the construction, operation, and maintenance of the Enloe Project. A fire suppression program could include signage at recreation sites describing the hazards and costs of wildfire and undertaking habitat rehabilitation efforts, such as replanting with perennial grasses to reduce fuel loads.

Building Removal

BLM recommends that Okanogan PUD remove two small, deteriorating buildings at the north end of the proposed Enloe Dam Recreation Area. BLM states these buildings are deteriorating, unsafe to enter, marked with graffiti, and pose an unattractive nuisance to visitors to the site. In response to BLM, Okanogan PUD states that one of two small structures on the north end of the proposed Enloe dam recreation area is owned by a private landowner that maintains a lease with BLM. Okanogan PUD states it is not in a position to remove this structure, however, it will take reasonable measures to secure existing structures from unauthorized entry.

Our Analysis

Licensees are required to ensure that all reasonable precautions are taken to ensure that the construction, operation, and maintenance of structures or facilities on project lands occur in a manner that protects the scenic, recreational, and environmental values of the project.

If the deteriorating pump house structure is unsafe and does not serve project purposes, it would be appropriate for Okanogan PUD to maintain the building to a point where it is safe or remove it from the project boundary. Currently, it does not appear that these two buildings are being used for project purposes.

Non-Motorized Trails

BLM recommends Okanogan PUD support the development of the Similkameen Rail Trail, a cooperative, non-motorized public access trail along the old railroad grade from Oroville to Nighthawk, as a segment of the Pacific Northwest National Scenic Trail. BLM also recommends that Okanogan PUD support the development of the Similkameen portion of the Greater Columbia Water Trail. BLM recommends that Okanogan PUD consult with BLM, FWS, Park Service, Water Trail Committee, Pacific Northwest Trail Association, and Okanogan County to identify water and trail access points that are likely to become popular as the trails are developed in this area. BLM also recommends that Okanogan PUD rebuild the footbridge across the Similkameen River. The footbridge would provide the only foot access from the east side of the river (between the trestle bridge two miles downstream of the dam and Nighthawk six miles upstream) to the trail opportunities on the west side of the river.

Okanogan PUD states its recreation development proposal was crafted in consultation with local stakeholders, and local stakeholders did not identify that the footbridge providing public access to the west bank of the river was needed. Okanogan PUD states this is a request for an enhancement that goes beyond the need to mitigate project impacts. However, Okanogan PUD has indicated that it is receptive to proposals to restore the footbridge across the river if a proponent and source of funding were to come forward. Okanogan PUD would continue to coordinate with federal and state agencies and local historical societies to explore funding sources for restoring the footbridge.

Okanogan PUD states it supports the development of the Greater Columbia Water Trail as evidenced by the measures in the Recreation Management Plan that are supportive of and complementary to the goals and objectives of Greater Columbia Water Trail. Okanogan PUD states that it has demonstrated support for the Similkameen Rail Trail by transferring ownership of the trestle bridge to Okanogan County for use in developing the Similkameen Connector Trail, which has become part of the Similkameen Rail Trail and the Scenic Trail.

Our Analysis

Consultation with Okanogan PUD in the development of the Similkameen Rail Trail and the Similkameen portion of the Greater Columbia Water Trail within the project vicinity would ensure both planned trails are implemented in a manner consistent with the project. Rebuilding the footbridge across the Similkameen River downstream of the dam would provide access to the west side of the river, no project recreational facilities are being proposed for that area at this time. Recreational access to the west side of the Similkameen River could be improved in the future, once the plans for the Similkameen Rail Trail are finalized.

3.3.7 Aesthetic Resources

3.3.7.1 Affected Environment

Project Setting

Situated in north-central Washington (near the Canadian border) on the east side of the Cascade Mountains near the rural community of Oroville, the Enloe Project area is characterized by its remote, relatively undeveloped landscape. Accessed via the narrow Loomis-Oroville Road, the Enloe Project area features moderately steep mountainous terrain incised by eroded canyons. Created by the Similkameen River, the Enloe Project area's topography is distinguished by gradual to steep sloping canyon walls. These walls rise to elevations between 700–800 feet with Kruger Mountain rising 878 feet to the north and a series of smaller un-named 750- to 800-foot peaks line the southwest side. A small intermittent stream, the Ellemeham Draw, is situated between Enloe dam and the falls, and visually cleaves the southeast canyon wall. Most of the project area is undeveloped with a cluster of industrial structures and abandoned buildings assembled immediately around and just below Enloe dam.

The land surrounding the Enloe Project area is greatly influenced by its climate and geologic history. The eroded canyons that characterize the Enloe Project area are generally the result of retreating glaciers that last covered the area about 15,000 years ago. The eroded canyon slopes feature both gradual slopes, as well as steep, rocky inclines that rise to 800 feet (about 500 feet above the mean Enloe Project area elevation). Upstream, the Similkameen River follows a horseshoe-shaped turn enclosed between steeply sloped canyon walls, known as Shanker's Bend. The river within the Enloe Project area flows placidly through a shallow reservoir before spilling over Enloe dam and plunging down steep falls immediately downstream.

The hills on either side of the river are a combination of rocky outcrops and large areas of shrub steppe vegetation spotted with evergreen trees. Riparian forest, dominated by black cottonwood in stands, is found along the reservoir shoreline. In the spring, summer, and fall, colors in the landscape are primarily brown hues dotted with dark green vegetation. Snow is common in the winter. Textures in the landscape include rocks, sagebrush, trees, and water.

The overall landscape is a combination of natural and human-made elements. The natural elements

are characterized by unnamed mountains, sparse low level vegetation, and the Similkameen River snaking through the canyon. Several human-made elements are included in the landscape of this region. These include a vineyard, golf course, and residences approximately 2 miles north of Oroville. Linear elements include the Loomis-Oroville Road, which is located on the canyon rim above the Similkameen River and roughly follows the river's twists and turns, the abandoned Great Northern Railroad grade that lines much of the south or east shoreline of the river at the canyon floor, power distribution lines that run along the canyon walls and rim, and two dirt tracks that extend south from Loomis-Oroville Road and lead to the dam. The access roads proceed along the river's eastern perimeter to the dam, which is located at a point where the canyon narrows. While minimally visible from upstream, Enloe dam rises quite prominently when viewed from downstream. The historic powerhouse is similarly sheltered from view, perched against a sharp slope on the west side of the river, nestled within a rocky eddy. It is accompanied by horizontal penstocks, and prominently positioned cylindrical surge tanks that rest on raised concrete foundations. Human-made elements on the east side of the river include: A bridge remnant (which once connected the east side of the river to the powerhouse); two small outbuildings; and an abandoned concrete irrigation ditch. The town of Nighthawk, approximately 6 miles west of Enloe dam, is a historic mining community comprised of wood-frame buildings (residences and associated agricultural buildings) along a two-track dirt road.

Visitation to the Enloe Project area is largely confined to those persons traveling along the Loomis-Oroville Road or pursuing outdoor recreation activities in the canyon, as well as Native Americans and Canadian First Nations who attach cultural value to the natural setting and associated fishing areas.

Visual Resource Management

BLM manages its lands in accordance with its Visual Resource Management (VRM) System. The system designates landscape units in four classes that indicate the overall significance of the visual environment and establishes objectives for the management of each class in order to define the level of change from a proposed project that is acceptable in that class. By comparing the effects from a project to the established visual objective for that area, the visual acceptability of that project and mitigation measures needed to decrease the visual contrast are determined. The four visual management classes and their objectives are described below:

- Class I—The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic (background) landscape should be very low and must not attract attention.
- Class II—The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- Class III—The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class IV—The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

In consultation with the BLM, Okanogan PUD conducted visual resources analysis of the Enloe Project area using the VRM methodology outlined above and determined that the characteristics of the area fell within the Class IV management class. Four key observation points (KOPs) in the project area were identified for analysis of the most critically-traveled routes or observation points in the Enloe project boundary (figure 10): (1) Loomis-Oroville Road; (2) overlook from Loomis-Oroville Road approximately 3 miles north of Oroville; (3) rocks below Enloe dam on the Similkameen River; and (4) overlook near Enloe dam (figures 11 through 14).

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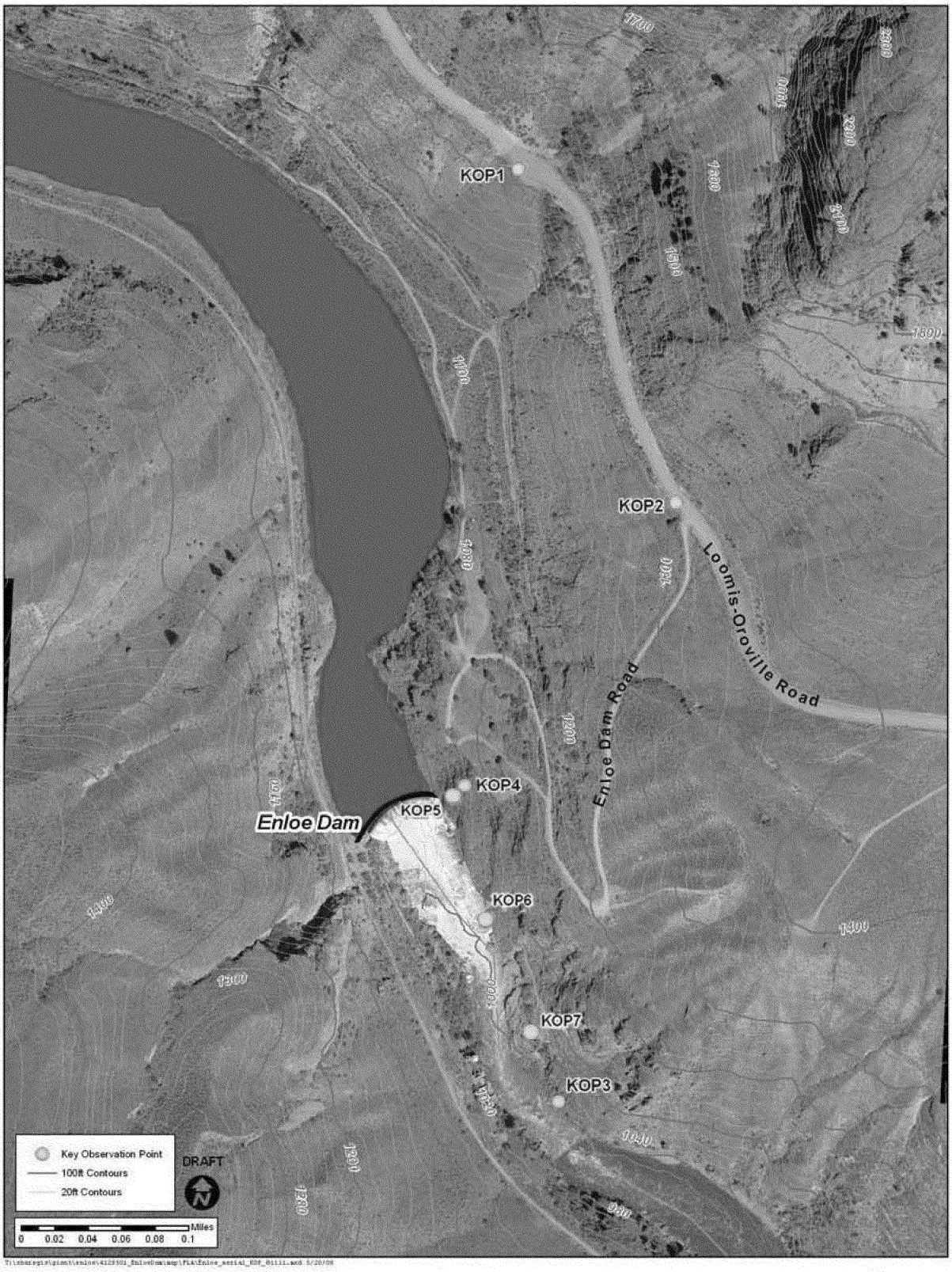

Figure 10. Enloe Project area KOPs (Source: Okanogan PUD, 2008a).

On May 29, 2009, additional information was submitted by Okanogan PUD regarding the visual resources study. Three additional KOPs were evaluated to include views associated with the proposed locations for interpretive displays (figure 10): The overlook east of Enloe dam and the areas where the two interpretive panels would be placed (figures 15 through 17). The dates that the photos were taken and the approximate river flows at that time were not included in the study.

Figure 11. KOP 1, Loomis-Oroville Road (Source: Okanogan PUD, 2008a).

Travelers on Loomis-Oroville Road view the Enloe Project area for a relatively short time in the foreground-middleground. Visibility of the Enloe Project area is generally unobstructed to travelers on Loomis-Oroville Road; however, the canyon topography makes it difficult for the travelers to view.

Figure 12. KOP 2, overlook from Loomis-Oroville Road approximately 3 miles north of Oroville (Source: Okanogan PUD, 2008a).

People stopping at the overlook on Loomis-Oroville Road have opportunities for extended views of the Enloe Project area. From this viewpoint, the dam is visible as are the abandoned penstock, surge tank, and the roof of the abandoned powerhouse.

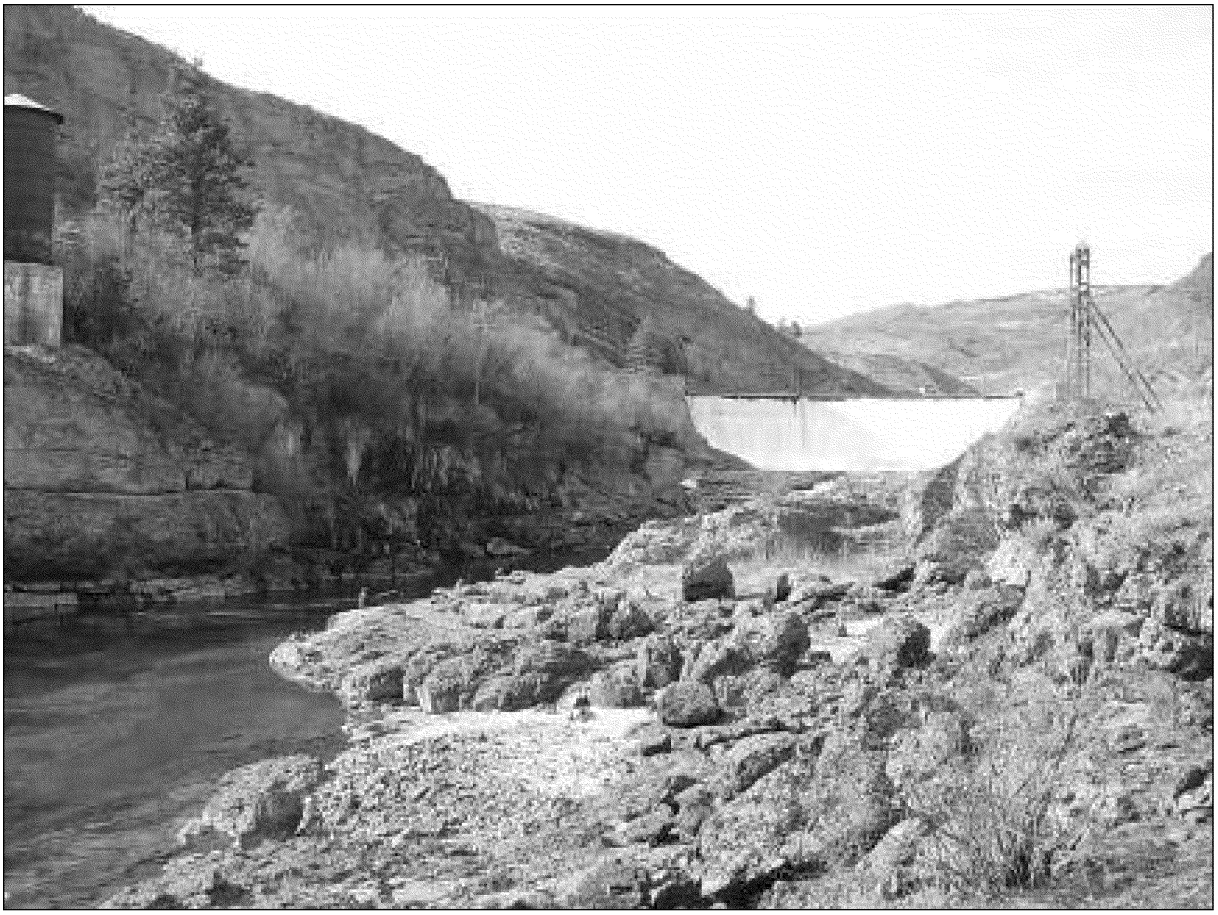

Figure 13. KOP 3, rocks below Enloe dam on the Similkameen River (Source: Okanogan PUD, 2008a).

Recreators on the river have extended views of the project area. From this viewpoint visitors see the existing human-made features to include the abandoned powerhouse, former footbridge tower, and Enloe dam.

Figure 14. KOP 4, overlook near Enloe dam (Source: Okanogan PUD, 2008a).

From this viewpoint, the dam and abandoned penstock are clearly visible.

Figure 15. KOP 5, overlook east of Enloe dam, looking south (Source: Okanogan PUD, 2009h).

From this viewpoint looking downstream, the abandoned penstock and powerhouse are visible.

Figure 16. KOP 6, view from proposed interpretive panel #1, looking north (Source: Okanogan PUD, 2009h).

Visitors stopping at this proposed interpretive panel location along a proposed pedestrian trail would have opportunities for extended views of the project area. From this viewpoint, the dam is clearly visible.

Figure 17. KOP 7, view from interpretive panel #2, looking north (Source: Okanogan PUD, 2009h)

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Visitors stopping at this proposed interpretive panel along a proposed pedestrian trail, located approximately 300 feet south of KOP #6 would also have opportunities for extended views of the project area. From this viewpoint, the dam, the abandoned penstocks, and Similkameen Falls are clearly visible.

Noise

Noise is generally defined as unwanted sound. It is emitted from various sources including airplanes, factories, railroads, and highway vehicles. The magnitude of noise is described by its sound pressure. Because the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, the decibel. Therefore, a sound pressure level is equivalent to a certain number of decibels.

Because sound pressure levels expressed in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical manner. If a sound of 70 dB is added to another sound of 70 dB, the increase is only 3 dB to 73 dB, not a doubling to 140 dB. If two sounds are of different levels, the lower level adds less to the higher level as their difference increases. For example, if the difference is as much as 10 dB, the lower level adds nearly nothing to the higher level. Adding 60 dB to a 70 dB sound increases the total sound pressure level less than 0.5 dB. Additionally, a decrease of 3 dB in sound pressure level means that the noise has been reduced to half of its original level.

In 1974, EPA identified indoor and outdoor noise levels to protect public health and welfare against hearing loss, annoyance, and activity interference (EPA, 1974). A 24-hour exposure level of 70 dB was identified as the limit of environmental noise which will protect against hearing damage. Levels of 55 dB outdoors and 45 dB indoors are identified as desirable limits to protect from activity interference and annoyance. These levels of noise are considered those which will permit spoken conversation and other activities such as sleeping, working, and recreation. The levels are not single event or peak levels, but are 24-hour averages. Further, these levels are not regulatory goals or requirements; they represent levels of environmental noise required to protect the public health and welfare with an adequate margin of safety (EPA, 2007).

The Enloe Project area is characterized by its remote, relatively undeveloped landscape. Accessed via the narrow Loomis-Oroville Road, the Enloe Project area features moderately steep mountainous terrain incised by eroded canyons. Natural noises which are associated with this site would include wildlife sounds such as animal calls and the sounds of wildlife moving through the environment and interacting with one another. Other natural sounds would include sounds of the physical environment such as wind, rain, thunder and the river rushing over

the dam or falls when flows are occurring. Human background noise would include the passing cars on the Loomis-Oroville Road, the sound of recreating visitors, and the activities Okanogan PUD employees occasionally checking the area of the dam.

3.3.7.2 Environmental Effects

Aesthetics Management Plan

Okanogan PUD proposes to implement its Aesthetics Management Plan to manage project effects on aesthetic resources associated with the proposed project. Okanogan PUD proposes the following measures within its Aesthetics Management Plan.

Use Visually-Compatible Colors and Building Materials and Non-Reflective Surfaces (AES–01 and AES–03)

Okanogan PUD proposes to use visually-compatible colors and building material textures that harmonize with the existing landscape for the new east-bank construction. A range of compatible colors and building material textures would be used to reduce the visual presence of new project facilities within the larger landscape.

The proposed east bank construction of project facilities consists of the (1) new crest gates at the top of the dam, (2) headworks that include an approach channel, river intake, and intake canal, (3) penstock intake, (4) two penstocks, (5) powerhouse, (6) tailrace, (7) recreational facilities north of the dam (picnic tables, vault toilet, boat launch), and (8) an improved access road.

It would be expected that the powerhouse, penstocks, and tailrace would be visible from KOPs #3 through #7 with the powerhouse representing the most visible new feature. To further reduce the visual presence of the new powerhouse and have the new structure harmonize with its surroundings, Okanogan PUD proposes colors consistent with suggested guidelines within the HPMP regarding new construction within the Enloe Project. These guidelines state that "muted, natural tone materials would be used. Okanogan PUD also proposes matte finishes, as opposed to glossy finishes. Consistent with guidance within the HPMP, new building materials, such as concrete, steel, and galvanized metal roofing would have minimal, but some discernable textures. Concrete, for instance, would in general be left exposed, trowelled smooth so that board forms are not visible, or coated with natural gray-colored stucco coatings to blend with the original features. While galvanized materials, such as steel or iron roofing, are by nature smooth, they would be primed with a matte finish and be nonreflective.

Consultation with Colville Confederated Tribes on Traditional Cultural Properties (AES–02)

The Colville attach cultural significance to the visual aesthetics of several natural features and their components (i.e., Traditional Cultural Properties) within the project area. Okanogan PUD proposes to consult with the Colville concerning these traditional cultural properties utilizing the existing Cultural Resources Working Group.

Dewatering and Construction of a New Facility That Could Block Existing Views (AES–04)

Okanogan PUD proposes to make trail improvements that would create closer and more intimate views of the falls. This would be from viewpoints that are not currently easily accessible to the public. The trail would be linked to the recreational improvements made above the dam and provide visitors with a trail with closer views of the falls and greater accessibility to the area below the dam. Interpretive signage, in concert with HIST–03, would also be placed along the trail to highlight historical flows over the dam. This new trail would help to replace views partially blocked by the construction of new project facilities and provide closer access to the falls for recreators during periods of high flows and high visitation.

The existing buildings would be removed unless a qualified third party entity assumes ownership and management of the old west bank powerhouse to maintain it for historic and recreation purposes. If a qualified third party entity is not identified within five years of licensing, then the historic Enloe powerhouse, located on the west side of the Similkameen River and below Enloe dam, would be demolished after completing mitigation measures undertaken in consultation with the Washington SHPO and Park Service. Such measures may include detailed Historic American Engineering Record (HAER) documentation.

Okanogan PUD states that the foundation of the powerhouse and surge tanks, which accounts for about 50 percent of the visible portions of the building, would be retained, but that the powerhouse and surge tank superstructures would be demolished to remove any deteriorated and unstable structures from the site. Okanogan PUD would also ensure that these actions are consistent with Measures HIST–01, HIST–02, and ARCH–01.

BLM recommends that Okanogan PUD revise and implement the Aesthetics Resource Management Plan to include the following: (1) Blending the existing and proposed Enloe Project into the existing landscape character; (2) revegetate, stabilize, and landscape new construction areas and areas immediately adjacent; (3) grading, planting native vegetation, repairing slopes damaged by erosion, preventing future erosion; (4) monitoring and maintenance; (5) implementation schedule; (6) periodic review and revision; and (7) providing river flows over Enloe dam.

BLM also noted in its 10(a) recommendations that Okanogan PUD's aesthetic analysis identified the Similkameen Area as having a Scenic Quality of B, but then based its analysis as having a Scenic Quality of C. Therefore, BLM recommends that the aesthetic analysis that Okanogan PUD conducted be revised to reflect a Scenic Quality of B and to similarly adjust the sensitivity rating given the current and projected recreation use, the identification of sightseeing as a use in the final license application, the designation of a National Scenic Trail which passes by the Enloe Project, and the proximity of a highway.

Our Analysis

Okanogan PUD's proposal to use visually-compatible colors and building material textures that harmonize with the existing landscape for the new east-bank construction and implement its Aesthetics Management Plan would reduce potential adverse visual effects at the proposed project. BLM's recommendation that Okanogan PUD include specific approaches concerning the blending of the existing and proposed Enloe Project facilities into the existing landscape character, revegetating and stabilizing and landscaping new construction areas and areas immediately adjacent, grading, planting native vegetation, repairing slopes damaged by erosion, preventing future erosion, monitoring and maintenance, implementation schedule, and periodic review and revisions would help ensure that project facilities would ensure protection of the visual resources at the proposed project. In addition, because the project is located on BLM lands, it would be beneficial if BLM were added to this consultation process in addition to consultation with the Colville. Revising the Aesthetics Management Plan to contain these elements could have a direct beneficial effect on aesthetic resources at the project by keeping BLM and the Colville informed on lay down or construction material storage areas that are yet to be determined. Consultation with BLM on

the revision of the aesthetic analysis to reflect a Scenic Quality of B, with an appropriate sensitivity rating reflecting the site conditions identified in BLM's 10(a) recommendation, would ensure that the project area has been appropriately evaluated and that appropriate measures are undertaken to preserve the aesthetic character of the area.

Aesthetic River Flows

As we've said, Okanogan PUD proposes a year-round minimum flows of 10 cfs in the bypassed reach. The flows would be seasonally adjusted to 30 cfs for the period of mid-July through mid-September. This proposal would provide minimum flows when spillage is not occurring—about 9.5 months of the year in low water years and 8 months in high water years. BLM, the Colville, Washington SHPO, and American Whitewater recommend an investigation into options for providing river flows over Enloe dam and the subsequent Similkameen Falls for aesthetic purposes, the incorporation of aesthetic flows into the Aesthetic Management Plan, and a survey of recreational users regarding aesthetic flow releases. Specifically, the parties request a study to assess the effects of dewatering the spillway and rocky area below the dam, including alternatives that would spill water over the dam all year long.

Okanogan PUD states that Similkameen River fisheries managers have expressed serious concern that aesthetic flows could increase temperature below the falls. For this reason, the minimum flows would be monitored for both DO and temperatures. Additionally, Okanogan PUD proposes to address issues with the minimum flow through an adaptive management plan.

Our Analysis

In consultation with BLM, Okanogan PUD conducted visual resources analysis of the Enloe Project area using the VRM methodology outlined above and determined that the characteristics of the area fell within the Class IV management class. In addition, Okanogan PUD provided aesthetic simulations showing the views of project area from various KOPs.

The lowest minimum monthly average flow of 191 cfs occurred on September 2003. The proposed minimum flow of 10 cfs (for the last 15 days of the month) is only 5 percent of the 79 year record (see table 2) and is less aesthetically desirable. However, any minimum flow must meet the water quality standards. The 10-cfs flow (with seasonal adjustment to 30 cfs) would meet water quality standards based on Okanogan PUD's best estimate of the bypassed reach dimensions and modeling of the temperature gained in the bypassed reach (see section 3.3.2.2, *Minimum Flow Proposal*).

While several assumptions were made in the modeling and size estimate of the bypass section, this is a proposed minimum flow and is subject to change based on real-world results. Additionally, the method of delivery of the minimum flow is undetermined at this time. As such, it is difficult to ascertain the full effects of the minimum flow on water quality and the aesthetic resources, namely the falls. However, the measure, along with an evaluation to determine effectiveness, should adequately provide a means for testing the proposals' effect on aesthetics and water quality while still providing a framework for making improvements, if needed. Observing recreation use at the falls as a part of the recreation monitoring plan would provide more information on if visitors to the project are visiting the falls as well.

Noise

Proposed construction activities at the Enloe project would cause unnatural noises. Okanogan PUD has taken steps to reduce the impacts of such noise, particularly with its Blasting Plan. It also proposes to concentrate construction activities with the loudest noise to occur in summer and early fall to minimize effects on overwintering birds and bald eagles as much as possible.

Once the project is complete, minor noise would be associated with the operation and maintenance of the hydroelectric facility (typically 54–68 decibels ten to sixty feet from the powerhouse, depending upon the design structure and topography), but it is not anticipated that routine project operations and maintenance would disturb wildlife or visitors in the project area.

Our Analysis

Although proposed construction activities would cause unnatural noises at the project, construction-related noise is considered a temporary and short-term effect. Constructing the project in the summer and early fall would reduce the effect on overwintering birds and bald eagles and other wildlife. Moreover, visitors would only be allowed limited public access to the project during construction as proposed in the Safety during Construction Plan. This would increase the distance between the public and construction activities at the project and further minimize the amount of construction-related noise visitors may hear when visiting the project.

3.3.8 Cultural Resources

3.3.8.1 Affected Environment

Section 106 of the National Historic Preservation Act

Section 106 of NHPA, as amended, requires the Commission to take into account the effects of licensing a hydropower project on any historic properties and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment if any adverse effects on historic properties are identified within the hydropower project's APE.

Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. In this EA, we also use the term "cultural resources" to include properties that have not been evaluated for eligibility for listing in the National Register. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register.

Section 106 also requires that the Commission seek concurrence with the Washington SHPO on any finding involving effects or no effects on historic properties. If Native American (i.e., aboriginal) 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 Effect (APE)

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a license within a project's APE. The APE is determined in consultation with the Washington SHPO and 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 its license application, Okanogan PUD (2008a) defined an APE as consisting of all lands within the Enloe Project boundary, described as the 1,055-foot above mean sea level elevation line that extends from the upstream end of Shanker's Bend, to approximately 1,000 feet downstream from Enloe dam. The APE includes the dam, penstocks, powerhouse, recreational sites, access roads, and appurtenant facilities. The APE for historic resources (buildings and structures) extends beyond the

project boundary to include an additional 100 feet (horizontally) where project operations may affect the character or use of historical resources and/or TCPs. Okanogan PUD included in its license application a letter dated July 24, 2009, from the Washington SHPO office which concurred with the APE.

In November 2008, Okanogan PUD requested Washington SHPO concurrence on an amended APE that consisted of the APE as described above, and also included an additional access road. Okanogan PUD's May 2009 HPMP identifies the APE as such, but also includes a limited number of power transmission lines that connect to a single utility pole.

On October 14, 2009, the Commission requested clarification of Okanogan PUD's response to additional information Item 11, side channel enhancement development. The Commission requested a map to clearly identify the proposed side channel's location in relationship to the project's defined APE and requested that the Okanogan PUD consult with the Washington SHPO regarding the side-channel enhancement site. Okanogan PUD filed its response on December 14, 2009. In its clarification response, PUD provided a copy of meeting minutes from a November 30, 2009, CRWG meeting. At the meeting, the possibility of two separate APEs was discussed: one consisting of the proposed project APE and another APE encompassing lands to be affected by the proposed side-channel enhancement site (side-channel APE). The CRWG agreed that two separate APEs for the Enloe Project would be appropriate and should be identified in the PA and associated HPMP. On September 23, 2010, Okanogan PUD requested Washington SHPO's concurrence on the side-channel APE. On September 28, 2010, the Washington SHPO concurred.

Prehistoric and Historic Background

The following text is a summary of the cultural overview provided in the May 2009 HPMP (Okanogan PUD, 2009e).

The Northern Columbia Plateau lies primarily within the Fraser Watershed, with a portion in the south draining into the Columbia River Watershed. It is an area that was occupied primarily by Interior Salish speakers who are now represented by the Colville. Colonizing groups were likely coastal people with a generalized Paleolithic foraging economy that spanned a much larger geographic area. Middle Holocene and later peoples followed a generally riverine subsistence economy typical of the large western river systems, including a collector strategy that was centered on ungulates and salmon and the gathering and storage of root crops. As a result of resource pressures, Plateau peoples tended to follow an annual round that led them to move to locations of stable, predictable resources on somewhat the same schedule every year. Changes to that schedule, such as moving from winter villages earlier in spring than usual, or leaving a common fishing location earlier, were generally due to variations in the productivity of the resource that existed that year. Several different regional cultural chronologies commonly employed for the region reflect prehistoric occupation to approximately 12,500 years before present.

At the time of contact, the Okanogan people occupied the portion of the Central Plateau region that includes the study area. The political structure of the people of the Central Plateau region consisted of small autonomous bands or villages. Bands were organized in small groups according to language, customs, and friendly relations, with group leaders generally inheriting their position. The seasonal round that groups made was based on the availability of salmon, berries, roots, and large game. Winter villages typically consisted of a long house covered with a tule-mat roof, one or more subterranean houses, and a sweat lodge. Villages were located near water and firewood. Near the project area, the falls, the location of Enloe dam, was a likely fishing site throughout the Holocene. If necessary, individuals would hunt deer, bear, or other game to supplement their winter food supplies.

In April, the members of the winter village moved to streams where they would catch trout and suckers, which were dried and eaten until the salmon runs began in June. Women gathered bitterroot and camas. From June to October, salmon fishing was a primary focus of subsistence activities with the continuation of gathering of berries and roots near rivers. The salmon were caught with spears, weirs, fish traps, large nets, and dipnets. They were dried on racks erected near the fishing camps.

Early Euroamerican presence in the Okanogan Valley was driven by economic interest in locating fur trading posts and establishing relations with local tribes. In 1811, the Canadian Northwest Company fur trader David Thompson was the first Euroamerican to travel to the Okanogan County seeking new trading opportunities. In fall 1811, the Pacific Fur Company established Fort Okanogan 1 mile north of the confluence of the Okanogan and Columbia rivers. By the late 1820s, nearby Fort Colville became the center for inland trading. By 1860, plagues caused a decline in the Native American population and the depletion of fur resources, which led to the decline of the fur industry in the Okanogan region.

Christian missionaries arrived in to the Northwest in the 1840s and contributed to the permanent Euroamerican settlement of the Northwest. The Whitman mission was established in 1841 south of the Okanogan region in Walla Walla, while Father Pierre Jean de Smet, who traveled widely, came to the Okanogan Valley in 1842. It was not until 1885 that missionary Etienne de Rouge established a mission for the Okanogan Indians at Ellisforde. Two years later, the mission was moved south to Lake Omak.

On May 3, 1853, Washington Territory was created out of the Oregon Territory. During this period, Territorial Governor Isaac Stevens negotiated treaties with local tribes. The treaties defined boundaries of ceded territories and removed Indian tribes to reservations, thereby opening lands for American settlement. Between 1855 and 1856 hostilities broke out between tribes and Euroamericans erupting into the Yakima War.

Another point of conflict for local tribes was the growing mining activity that had an impact on salmon spawning streams, brought an influx of Euroamericans to the Okanogan Valley, and further altered the local economy and development patterns. Miners formed temporary settlements in places with convenient access to supplies and the gold fields. One such encampment near the mouth of the Similkameen River following a gold strike at Shanker's Bend in 1859 was called "Okanagan City" and in 1860 had a population of 3,000.

Transportation in the area advanced from stage coaches following the Okanogan Trail to steamboats along the Columbia and Okanogan rivers during high water season. By the early 1900s, the Marcus Division Molson-Chopaka branch of the Great Northern Railway line was constructed along the Similkameen River offering improved access to the mineral of the area. The lead and zinc mining town of Nighthawk, just west of the project, was founded in the 1890s. The community once occupied 160 acres. Today, it is privately owned by a rancher, and several historical buildings remain standing, including the old post office and hotel dating to the mining era.

A USGS map from 1906 and county atlas from 1934 show additional roads

and trails in the vicinity of the APE (Metzger, 1934, as cited by Okanogan PUD, 2009e). The 1934 map also shows an irrigation canal between the Similkameen River and the Oroville-Tonasket Road to the east.

In 1955, the U.S. Bureau of Reclamation (Reclamation) began investigating the feasibility of establishing irrigation facilities for an Okanogan-Similkameen Division, using water from the nearby Chief Joseph Dam. The Oroville-Tonasket Unit of the Okanogan-Similkameen Division was authorized by the Act of October 9, 1962 (76 Stat. 761, Public Law 87–762), placed under construction in 1965, and completed in 1969 (Reclamation, 2007, as cited by Okanogan PUD, 2009e). Remnants of this later partially concrete-lined canal are within the project boundary APE.

The power potential of the falls site attracted the interest of Eugene Enloe, the owner of a store in Medicine Lake, who began buying small power companies in eastern Washington. In 1913, he incorporated the Okanogan Valley Power Company. By 1916, Okanogan Valley Power had also acquired the falls site including all the power generating equipment used at the original power plant. Use of the Great Northern Railway allowed for the delivery of construction materials for the powerhouse and dam. Designs for the new powerhouse were developed in 1916, and construction of the concrete arch-gravity Enloe dam began in 1919 and was completed in the summer of 1920.

Reflective of the move toward small utilities becoming part of a unified system, the Washington Water Power Company bought Okanogan Valley Power in 1923. Washington Water Power Company added a second unit of 1,600 kilowatts to the Enloe plant in 1924. Washington Water Power Company operated the complex until 1942 when it was acquired by Okanogan PUD. It became economically inefficient to operate the small complex after 1958, when the Bonneville Power Administration brought its high voltage line to the Okanogan Valley. Okanogan PUD ceased operation of the plant's generators on July 29, 1958.

According to a record search undertaken by Okanogan PUD, several cultural resources studies have been undertaken in the vicinity of the project boundary APE (Okanogan PUD, 2009e). The Corps conducted a cultural resources study between 1985 and 1987 (Salo, 1987, as cited by Okanogan PUD, 2009e). Within the APE in the vicinity of the project boundary, the Corps study identified five archaeological sites: 45OK367, 45OK532, 45OK533, 45OK565, and 45OK566.

Another study within the APE was conducted for a previous Enloe Project licensing effort (Galm, 1991, as cited by Okanogan PUD, 2009e). This previous effort identified the potential of adverse effects on the National Register-eligible Enloe dam and archaeological sites 45OK532, 45OK533, 45OK565, and 45OK566 (Okanogan PUD, 2009e). It was noted that licensing the project could result in adverse effects on unidentified TCPs.

A later study conducted by Archaeological and Historical Services (AHS) included test excavations at 45OK367, 45OK532, and 45OK566 (Boreson, 1992, as cited by Okanogan PUD, 2009e). AHS determined that both 45OK532 and 45OK566 were National Register-eligible under Criterion D.[39] AHS did not conduct archaeological investigations of sites 45OK533 and 45OK565.

A record search undertaken of the side channel APE identified six archaeological sites documented within one mile of the side channel APE: 45OK355, 45OK357, 45OK358, 45OK359, 45OK369, and 45OK370 (Okanogan PUD, 2009f). All of the sites were recorded in 1976 by the Corps. No archaeological, historic, or architectural resources had been previously identified within the boundary of the side channel APE. A dike constructed in the early 1970s is located in this APE, but according to Okanogan PUD, this feature does not meet the 50-year age requirement for National Register eligibility (Okanogan PUD, 2009f).

Archaeological and Historic-Era Properties and Structures

Between 2006 and 2007, Okanogan PUD conducted cultural resources inventories of lands within the project boundary APE. These results of these studies were presented in *Enloe Dam Licensing Project, Okanogan County, Washington, FINAL Cultural Resources Section 106 Technical Report* (Okanogan PUD, 2008b). These studies resulted in the documentation of eight archaeological sites and six historical features or structures within the APE. Two additional sites were identified directly adjacent to the project boundary APE. Table 18 provides a summary of all prehistoric and historic resources identified within or adjacent to the project boundary APE to date. A cultural resources study of the side channel APE conducted in October 2009 did not result in the documentation of any archeological or historic-era properties within this area.

TABLE 18—ARCHAEOLOGICAL AND HISTORIC RESOURCES WITHIN OR DIRECTLY ADJACENT TO THE ENLOE PROJECT BOUNDARY APE

[Source: Okanogan PUD, 2009e, as modified by Staff]

Primary No.	Description	National Register eligibility and rationale	Within APE
45OK367	Prehistoric occupation debris	Not eligible due to lack of integrity	Y
45OK368	Enloe dam	Listed on the National Register; eligible under Criterion A.[40]	Y
45OK368	Enloe powerhouse	Listed on the National Register; eligible under Criterion A	Y
45OK532	Lithic debris	Eligible under Criterion D	Y
45OK533H	Historic homestead	Not eligible; does not meet National Register criteria	Y
45OK565	Prehistoric site	Unknown; consultant could not relocate site	Y
45OK566	Lithic scatter	Eligible under Criterion D	Y
45OK1238 (AR–1)	Gensey homestead site	Unevaluated (outside of APE)	N
45OK1239 (AR–4)	Similkameen Falls powerhouse	Not eligible due to lack of integrity	Y
45OK1240 (AR–5)	Railroad camp	Unevaluated (outside of APE)	N
45OK1241 (AR–6)	Historic roads	Not eligible; does not meet National Register criteria	Y
45OK1265 (AR–4)	Historic can dump	Not eligible; does not meet National Register criteria	Y

[39] Criterion D is as follows, "that have yielded, or may be likely to yield, information important in prehistory or history." 36 CFR 60.4.

[40] Criterion A is as follows, "that are associated with events that have made a significant contribution to the broad patterns of our history." 36 CFR 60.4.

TABLE 18—ARCHAEOLOGICAL AND HISTORIC RESOURCES WITHIN OR DIRECTLY ADJACENT TO THE ENLOE PROJECT BOUNDARY APE—Continued

[Source: Okanogan PUD, 2009e, as modified by Staff]

Primary No.	Description	National Register eligibility and rationale	Within APE
HR–1	Great Northern Railroad Grade	Eligible under Criterion A (June 19, 2007)	Y
HR–2	Access road to operator's house	Not eligible; does not meet National Register criteria	Y
HR–3	Pump house and water tank	Not eligible; does not meet National Register criteria; integrity compromised.	Y
HR–4	Oroville-Tonasket Irrigation Canal	Portion within the APE not eligible; does not meet National Register criteria, integrity compromised.	Y

In June 2007, the Washington SHPO concurred that resources 45OK368 (Enloe dam, Enloe powerhouse and penstock), and HR–1 (Great Northern Railroad Grade) are eligible for or listed in the National Register and that resources HR–2 (access road to operator's house at Enloe dam) and HR–3 (pump house and water tank) are not eligible (letter from G. Griffith, Deputy State Historic Preservation Officer, Washington Department of Archaeology and Historic Preservation, Olympia, Washington, to K. Demuth, ENTRIX, Inc., Seattle, Washington, June 19, 2007). In its letter, the Washington SHPO also concurred that the portion of HR–4 (Oroville-Tonasket Irrigation Canal) located within the APE does not contribute to the potential significance of other portions of the canal that were previously determined to be eligible. However, the Washington SHPO recommends that the system be re-evaluated for National Register eligibility 5 to 10 hence. The HPMP notes that both the historic Enloe dam and powerhouse have been documented according to HAER standards (Holstine and Eminger 1990, as cited by Entrix 2009).

In September 2008, the Washington SHPO concurred that sites 45OK532 and 45OK566 are eligible for the National Register and that sites 45OK367, 45OK533H, 45OK1239, 45OK1241, and 45OK1265 are not eligible (letter from R. Whitlam, State Archaeologist, Washington Department of Archaeology and Historic Preservation, Olympia, Washington, to R. Bailey, District Archaeologist, Spokane District Office, BLM, Spokane Valley, Washington, September 23, 2008).

Traditional Cultural Properties

In 2006, Okanogan PUD consulted with the Colville to identify potential TCPs that could be present within the project APE. A final TCP report was included as an appendix to the *Enloe Dam Licensing Project, Okanogan County, Washington, Final Cultural Resources Section 106 Technical Report* (Okanogan PUD, 2008b). Within the APE, two potential TCPs were identified.

3.3.8.2 Environmental Effects

In a letter filed August 6, 2009, the Washington SHPO concurred that the proposed Enloe Project would have an adverse effect on significant cultural resources listed in, or determined eligible for listing in, the National Register. In view of the adverse effect determination, the Washington SHPO recommended development of a Memorandum of Agreement or PA.

In this section, we evaluate the effects of Okanogan PUD's proposed project construction, operation, and maintenance on the following cultural resources: (1) Archaeological resources; (2) TCPs; and (3) historic buildings and structures.

Project Construction

In its HPMP and section 106 Technical Report, Okanogan PUD states that construction activities would adversely affect one archaeological site located within the project boundary APE: Archaeological site 45OK532, which is eligible for the National Register under Criterion D (Okanogan PUD, 2009e, 2008b). The access road needed for project construction site would use the existing OTID Ditch Road that crosses site 45OK532. During construction, Okanogan PUD proposes to improve this road to a one-lane gravel road with turnouts. As discussed below, changes in chemical characteristics (including pH) of soils and increases in soil moisture content due to ground-disturbing activities can affect the preservation of site 45OK532.

Proposed ground-disturbing construction (parking area, trails, fencing) would occur in the vicinity of site 45OK367. However, this site has been determined ineligible for the National Register due to disturbance of the prehistoric archaeological deposits during the historic period. The remaining sites are either ineligible for the National Register, eligible (45OK566), or unevaluated (45OK565); however, they are not located where ground disturbance may occur. Okanogan PUD also concluded that any demolition of the historic Enloe powerhouse is unlikely to affect historically significant archaeological resources (Okanogan PUD, 2009e).

In its Section 106 Technical Report, Okanogan PUD (2008b) states that short-term effects on TCPs identified in the project boundary APE, such as noise, dust, vibrations, and access restrictions, would not be adverse. However, construction of the new powerhouse would have an adverse visual effect on one of the two TCPs identified within the project APE.

National Register-eligible Great Northern Railroad Grade (HR–1) and National Register-listed Enloe dam (45OK368) and historic Enloe powerhouse (45OK368) are historically significant resources. The Enloe powerhouse and Great Northern Railroad Grade, both of which are abandoned, are located across the river from the proposed construction site; therefore, Okanogan PUD states that project construction would not result in long-term effects on the Great Northern Railroad Grade (Okanogan PUD, 2009e, 2008b). Long-term effects on the historic Enloe powerhouse are discussed under *Operation and Maintenance Effects* below.

The historic Enloe dam would need to be refurbished to meet current dam safety requirements and to extend its service life. Okanogan PUD states that activities associated with refurbishment would not contribute to the extended life of the structure. These effects would therefore not be considered adverse if they are completed according to the Secretary of the Interior's *Standards for Rehabilitation* (Okanogan PUD, 2009e, 2008b).

Other project-related construction would entail an approximate 2.3-acre staging area near the proposed new powerhouse site and areas potentially affected by spoil disposal. At this time, effects on cultural resources that may be

associated with these areas are unknown. The HPMP, however, includes a provision for the discovery of previously unidentified cultural resources, which would ensure that the resource is addressed in accordance with section 106.

Project Operation and Maintenance

In its HPMP, Okanogan PUD states that operation of the proposed Enloe Project would not adversely affect National Register-eligible archaeological site 45OK566 and that effects on site 45OK565 have not been assessed because the site could not be relocated during project surveys (Okanogan PUD, 2009e). However, because prehistoric site 45OK532 is buried within an alluvial terrace adjacent to the reservoir's edge, Okanogan PUD explains that fluctuating water levels in the reservoir could potentially disturb archaeological deposits at this site. Additionally, the access road passing through this site may result in disturbance of archaeological deposits as a result of maintenance activities and increased traffic. Okanogan PUD therefore concludes that effects on this site are adverse.

Prehistoric site 45OK566 is situated on a terrace outcrop above the river, limiting the potential of project-related erosion effects at this historically significant site. Okanogan PUD therefore states that there would be no operational adverse effects to this site (Okanogan PUD, 2009e).

Okanogan PUD states that proposed recreation improvements could increase public use of the project area resulting in the potential of increased site disturbance by recreationalists (Okanogan PUD, 2009e, 2008b). However, revegetating disturbed areas with native vegetation, as discussed in section 3.3.6, *Recreation and Land Use,* could minimize project-related erosion effects at the sites. Additionally, consultation with the CRWG, including the Washington SHPO and the tribe, regarding project-related recreation improvements, would protect the sites through placement of the facilities.

In its HPMP, Okanogan PUD states that operational effects on the historic Enloe dam would not be adverse (Okanogan PUD, 2009e). Also, Okanogan PUD states that proposed construction of a new powerhouse on the east side of the river would not adversely affect the historic Enloe powerhouse. However, per the HPMP, the powerhouse would either assume new ownership with portions demolished, or it would be entirely demolished. In either case, any demolition of the historic Enloe powerhouse would result in an adverse effect on a historic property. Additionally, because of the powerhouse's proximity to a known TCP, there is a possibility intact archaeological resources could be uncovered during demolition activities. In its HPMP, Okanogan PUD proposes to monitor this area during ground disturbance.

Further, demolition of part or all of the historic powerhouse would require the transportation of equipment and supplies along the existing National Register-eligible Great Northern Railroad Grade, which serves as an access road to the Enloe powerhouse. However, Okanogan PUD states that the use of heavy equipment and hauling of refuse along the railroad grade would not damage the grade, including elements to its existing railroad grade surface or tunnel, which are located outside the APE (Okanogan PUD, 2009e, 2008b). Okanogan PUD therefore concludes that there would be no adverse effect to the railroad grade as a result of the project.

Historic Properties Management Plan

The HPMP was prepared after consultation with the CRWG, consisting of representatives from Okanogan PUD; BLM; Forest Service; Washington SHPO; the Colville; and the Commission staff. In its HPMP, Okanogan PUD proposes to appoint an HPMP Coordinator and implement review procedures that would apply to non-routine maintenance activities, structural modifications or additions that may be necessary in the future. Additionally, the HPMP includes measures and procedures for: (1) Monitoring during construction activities and over the license term; (2) addressing unanticipated discoveries and evaluating cultural resources for National Register-eligibility; (3) discovery of human remains; (4) emergency undertakings; (5) annual reporting and agency coordination; (6) periodic review and revision to the HPMP every 5 years; (7) employee training; (8) records management and curation of any recovered archaeological materials; and (9) activities exempt from section 106 consultation. The HPMP includes a process for identifying resource-specific measures for historic properties within the APE after consultation with the CRWG.

The HPMP describes standards to be applied during project activities that have the potential to affect the historic integrity of the historic Enloe dam. Okanogan PUD would apply specific standards adapted from the Secretary of the Interior's *Standards for Historic Preservation Projects* to ensure preservation of the dam. Additionally, the HPMP includes historic resource maintenance guidelines that would guide future dam maintenance.

In its license application, Okanogan PUD proposes to implement four measures to address project effects on significant historic structures (HIST–01, HIST–02, HIST–03, and HIST–04). Additionally, Okanogan PUD proposes five measures for archaeological resources (ARCH–01, ARCH–02, ARCH–03, ARCH–04, and ARCH–05). Of the nine measures, all but two of these measures were subsequently incorporated into the May 2009 HPMP. HIST–04 would entail a review of appropriate measures, and although the HPMP does not specifically identify measure ARCH–05 (Determine Potential Recreational Impacts to Archaeological Sites) by name, the HPMP discusses measures to address potential recreational effects on cultural resources. The HPMP discusses the other measures and describes how Okanogan PUD is seeking an outside entity to assume ownership of the historic Enloe powerhouse (HIST–01). If a new owner is not identified within 4 years, Okanogan PUD would consult with the CRWG, which includes the Commission, to identify appropriate mitigation options prior to demolishing the structure (HIST–02), which may include updated HAER photography, stabilization of a portion of the powerhouse as a "ruin," development of interpretive materials for display in the project boundary (HIST–03), offering bricks, windows and other materials for salvage, providing turbines and other equipment from the powerhouse for use in local museums, and developing an interpretive facility that houses artifacts from the powerhouse and Enloe dam. If demolition is determined necessary, a Memorandum of Agreement between the Commission and the Washington SHPO would be developed that could identify agreed-upon mitigation measures. The powerhouse penstocks and surge tanks would be demolished regardless of whether a new owner would be identified. To mitigate adverse effects on these features, Okanogan PUD would photograph the powerhouse, penstocks, and surge tanks to HAER standards prior to their demolition.

In its HPMP, Okanogan PUD proposes to monitor shoreline areas for erosion as a result of reservoir fluctuation (ARCH–01), avoid known historic properties during construction (ARCH–02), and monitor sites 45OK532 and 45OK367 during construction activities (ARCH–03). If removal of the historic Enloe powerhouse becomes necessary,

Okanogan PUD proposes to mitigate potential effects on an identified TCP by monitoring any ground-disturbing activity in the vicinity of the site during demolition. Other treatment options for site 45OK532 include capping the portions of site that would be crossed by the improved access road with gravel and/or dirt rather than re-grading the existing road and placing road turnouts and shoulders outside of the site boundary. However, in Appendix E of the HPMP, Okanogan PUD states that data recovery of site 45OK532 prior to construction may be necessary. Although site 45OK367 is not eligible for the National Register, Okanogan PUD would monitor it during construction in the event that intact deposits might be identified. To protect both of these sites from recreational use, Okanogan PUD proposes to implement a long-term monitoring program. If any changes to site conditions are identified, Okanogan PUD would implement a review procedure with the CRWG to determine appropriate next steps. Additionally, Okanogan PUD's annual report would summarize monitoring efforts and CRWG consultation. Other measures include implementing an inadvertent discovery program and training staff about protocols for such discoveries (ARCH–04) and determining if there would be effects on archaeological sites in the vicinity of recreational facilities (ARCH–05).

Interior recommends revising the May 2009 HPMP, after consultation with BLM, the Washington SHPO, and the Colville, to include the following:

- Revise the APE to accommodate modifications to the Enloe Project boundary, if any, and any project-related actions that may affect historic properties on BLM-administered lands;
- A process for evaluating any previously unidentified cultural resources identified on BLM-administered lands;
- Provision for annual reports describing activities involving BLM-administered cultural resources;
- Periodic review of the HPMP;
- Site monitoring program for long-term cultural resource monitoring on BLM-administered lands;
- A process for developing site-specific treatment or stabilization measures for previously unidentified historic properties on BLM-administered lands;
- A plan for updated cultural resources inventory to be conducted if the project boundary is modified to include additional land or project operations result in newly exposed, previously un-surveyed lands;
- Provision for consultation with regard to cultural interpretative and educational plans (including signage);
- Provision for making records of cultural resource data gathered by Okanogan PUD on BLM-administered lands available to the BLM; and
- Provision for inadvertent discoveries.

In its response, Okanogan PUD states that the May 2009 HPMP provides procedures for the majority of the issues raised by Interior and that, as provided for in the HPMP, Okanogan PUD would review the HPMP within 1 year of license issuance to address any concerns raised by the CRWG, including by Interior.

As previously mentioned, the Washington SHPO concurred that a portion of the Oroville-Tonasket Irrigation Canal within the project's defined APE is considered "non-contributing" to other portions of the system that have previously been determined National Register eligible. However, the Washington SHPO recommends that the system be re-evaluated for National Register eligibility 5 to 10 years hence.

Our Analysis

Okanogan PUD's May 2009 HPMP addresses many of Interior's recommendations and contains measures for the protection of historic properties within the defined Enloe Project APE. However, we discuss particular measures contained within the HPMP, and where appropriate, Interior's recommendations.

The two APEs defined for the Enloe Project encompass all areas related to, or necessary for, the construction, operation, and maintenance of the entire proposed project. However, the May 2009 HPMP does not identify or discuss the side-channel enhancement site, including its defined APE. While no historic properties have been identified in this area, we find that inclusion of the side-channel enhancement site and a definition of its APE in the HPMP would ensure that measures applied to lands within the project boundary would also apply to lands within the side-channel enhancement site APE. Additionally, as recommended by Interior, the HPMP should include a process for reviewing and revising the APE, particularly where project-related ground-disturbing activities may occur in the future. In particular, this provision would ensure that any design modification to the proposed side-channel enhancement site would be taken into account.

Okanogan PUD's proposal to appoint an HPMP Coordinator would ensure that the requirements of the HPMP are followed. Annual reporting to agencies and the Colville on the status of cultural resources management over the course of the year would provide a regularly scheduled forum for parties to discuss the HPMP and provide comments. A periodic review process for the HPMP undertaken every 5 years would provide a basis for continued implementation of the HPMP. Interior recommended that the May 2009 HPMP be revised within 1 year of license issuance to address its recommendations. Interior's recommended timeframe should allow Okanogan PUD sufficient time to consult with Interior and the CRWG in order to revise the HPMP accordingly.

Okanogan PUD's proposal to conduct training sessions as needed for staff involved with the public or involved in planning and implementation of actions potentially affecting cultural resources at the project would ensure that employees are regularly informed about issues, procedures, and protocols regarding cultural resource. Consulting with the Colville with regard to Okanogan PUD employee training would contribute toward staff understanding properties of traditional religious and cultural importance to the tribe.

Okanogan PUD's implementation of review procedures during the planning of potential ground-disturbing activities, as well as protocols for inadvertent discovery of previously unknown cultural resources (as recommended by Interior), human remains, and emergency procedures as specified in its HPMP, would ensure that cultural resources are not inadvertently affected by project-related actions; and, therefore cultural resources and human remains would be appropriately addressed.

While the May 2009 HPMP does not specifically contain a detailed discussion of public interpretation and education, HIST–03 includes a provision for installing public interpretive panels. Okanogan PUD's proposed measures REC–11 and REC–12 also provide for installing interpretive signs and an information board that would focus on the history of hydroelectric power, the falls, and the fishery resources. Including a provision in the HPMP to coordinate public information on archaeological and historic resources at the project with REC–11 and REC–12 interpretive signage could lead to an enhanced visitor experience and encourage protection of environmental and cultural resources.

Okanogan PUD proposes to: (1) Maintain records relating to cultural resources located within the APE; (2)

ensure confidentiality of these records; (3) provide any recovered cultural materials to BLM for inclusion in its repository; and (4) consider donating historic materials recovered from the historic Enloe powerhouse to the Okanogan Historical Society or another group. This proposal would address Interior's recommendation regarding the collection of cultural resource materials and would ensure that such materials are properly conserved and also accessible, under properly controlled conditions, to those with appropriate research or cultural interests.

Okanogan PUD's proposal to implement a long-term monitoring program at all sites within the project boundary APE would help determine if any observed effects are project-related. This would enable Okanogan PUD to determine the need for and frequency of future monitoring. It would also assist in the development of appropriate treatment measures if disturbances are identified as being related to project-related activities. As recommended by Interior, including a provision in the HPMP to develop a more detailed monitoring plan would ensure that monitoring is undertaken and in a way that documents and quantifies resulting data for consideration. This measure could also apply to the side channel enhancement site.

Okanogan PUD determined that erosion has the potential to adversely affect site 45OK532 and that the site would also be adversely affected by road construction. In its HPMP, Okanogan PUD discusses the possibility of capping the site to protect it from road construction activities and use. A 1992 study by the Corps (Mathewson *et al.,* 1992) found that burial of archaeological resources increases the vertical load on sites, causes changes in chemical characteristics (including pH) of soils, and increases the moisture content. These changes can affect the preservation of site components, particularly organic materials such as botanical and faunal remains. The Corps concluded that site burial "* * * should be used only when preservation of the site by burial is ensured." If the processes that result from burial are deemed to be detrimental to the site components, other preservation techniques should be considered (Mathewson *et al.,* 1992). While capping of site 45OK532 may be viewed as a protective measure, further consideration of this measure within the HPMP, particularly as it may relate to site preservation, would ensure that archaeological materials contained within the site are not inadvertently damaged over the long term.

Okanogan PUD identifies measure ARCH–05 (Determine Potential Recreational Impacts to Archaeological Sites) and states that it is "discussing the proposed recreation plan with the CRWG to determine if there would be impacts on archaeological sites in the vicinity of the recreation facilities" (Okanogan PUD, 2008a). Okanogan PUD further explains that the HPMP would specify necessary mitigation and treatment measures to protect prehistoric sites from recreational effects and that its staff would be provided with information about the potential for archaeological deposits to be found. While the HPMP includes employee training and a protocol for pre-project review, the HPMP does not specifically address measure ARCH–05 and it does not address proposed or future recreational improvements. Revision of the HPMP to specifically address recreational use and currently proposed or future project recreation sites would be consistent with ARCH–05 and would ensure that cultural sites are considered during recreation planning.

Also, Okanogan PUD explains in its May 2009 HPMP that because site 45OK566 is situated on a terrace outcrop above the river, the potential for project-related erosion at the site is limited. However, Okanogan PUD acknowledges that the site may also be affected by increased public use. The site sketch map contained within the site record depicts a foot path leading to the site; however, the HPMP concludes that there would be no adverse effects on site 45OK566 resulting from project operation. Absent information related to the assessment of effects at this site, it is uncertain how the determination of "no adverse effects" to this site was made. A discussion of this assessment within a revised HPMP and how it may related to measure ARCH–05 would provide clarification.

In its HPMP, Okanogan PUD acknowledges that modifications to Enloe dam would affect this historic structure, but recommends that, if undertaken in accordance with the Secretary of the Interior's *Standards for Rehabilitation,* effects would not be adverse. Implementation of Okanogan PUD's proposed guidance contained within the HPMP with respect to construction and maintenance standards would ensure that the qualities of this property that make it eligible for the National Register are not diminished over the license term. However, in its HPMP, Okanogan PUD states that HAER documentation of Enloe dam has been previously undertaken, but does not discuss the purpose of the Enloe dam HAER documentation nor does it provide evidence of Washington SHPO or Park Service acceptance of the documentation as a resolution of an adverse effect. Typically, HAER documentation is completed as mitigation of an adverse effect on a historic property. If HAER documentation was undertaken to resolve such effects, and agency concurrence has been received, additional measures may not be necessary. Including a discussion in a revised HPMP regarding the purpose of HAER documentation and agency consultation would provide clarification.

In section 4.2 of the HPMP, Okanogan PUD states that under this plan, the existing Enloe powerhouse would be demolished. However, in section 5.14 of the HPMP, Okanogan PUD explains that it is soliciting outside parties to assume ownership of the structure. Revision of the HPMP to correct and clarify Okanogan PUD's intent with regard to the powerhouse would be appropriate. Additionally, Appendix C of the HPMP states that the transfer, lease, or sale of property out of federal ownership without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance would be an adverse effect in accordance with the implementing regulations of the NHPA found at 36 CFR800.5(a)(2)(vii). Consequently, consultation with the CRWG regarding the resolution of adverse effects on the historic Enloe powerhouse prior to any transfer or demolition would ensure compliance with section 106.

Two TCPs have been identified within the project boundary APE. In its Section 106 Technical Report, Okanogan PUD (2008b) states that short-term effects on one of the identified TCPs would not be adverse and that construction of the new powerhouse would have an adverse visual effect. In its HPMP, Okanogan PUD also implies that there would be a potential adverse effect on this resource as a result of any demolition activities at the historic Enloe powerhouse. While Okanogan PUD does not propose any measures to mitigate visual effects on this TCP in its HPMP, it proposes to monitor this resource during any powerhouse demolition activities. Inclusion of measures within the HPMP to mitigate adverse visual effects and a requirement to consult with the Colville prior to initiating demolition activities, in addition to monitoring, would ensure that this resource is addressed in accordance with section 106.

3.3.9 Socioeconomics

3.3.9.1 Affected Environment

The City of Oroville is the nearest community, with an estimated population of 1,653 in 2000 (U.S. Bureau of the Census, 2009a). The U.S. Bureau of the Census reports that the top three industries in the City of Oroville in terms of employment were educational, health, and social services (18.2 percent); retail trade (17.1 percent); and agriculture, forestry, fishing and hunting, and mining (11.2 percent).

Table 19 presents population and other demographic data for the City of Oroville, Okanogan County, and for Washington from the U.S. Bureau of the Census.

TABLE 19—POPULATION CHARACTERISTICS OF THE CITY OF OROVILLE, OKANOGAN COUNTY, AND WASHINGTON

[Source: U.S. Bureau of the Census, 2009a,b]

	Population 2000	Population estimate 2008	Private nonfarm employment 2007	Median household income 2008	Persons below poverty level 2008 (percent)
City of Oroville	1,653	.....	.....	[a] $30,114	[a] 28.9
Okanogan County	39,564	40,033	8,718	37,900	19.6
Washington	5,894,143	6,549,224	[b] 2,501,684	58,081	11.3

[a] 1999 statistics.
[b] Includes data not distributed by county.

The U.S. Census Bureau reports that in 2000 there were approximately 7.5 persons per square mile in Okanogan County and 88.6 persons per square mile in Washington as a whole. Population increases between 2000 and 2008 have shown a slight 1.2 percent increase in Okanogan County (U.S. Bureau of the Census, 2009b). The very slow growth in Okanogan County can be accounted for by the remoteness of most of the county from population centers.

3.3.9.2 Environmental Effects

In terms of construction employment, Okanogan PUD estimates a small increase in engineering and construction management employment of 1 person or 0.4 full-time equivalents (FTE) in year one, ramping up to 3.5 FTE at the start of year two. It would peak at 4 FTE during that year, and then stabilize throughout year three at 3 FTE. Construction employment requirements begin at the start of year two, with 2.5 FTE, increasing to 46.5 FTE near the end of year two. Construction during year three would require 27 FTE at the start of the year, ramping down to 9 FTE by the end of the three-year construction phase.

The Enloe Project would have an unmanned power station. The increased human-hours associated with the operation and maintenance of the project would be 8,000 hours (or approximately 4 FTE) per year. However, due to the ability of current Okanogan PUD staff to accommodate these needs, there would be no long-term increase in on-site employment or payroll due to the operation of the project.

The Enloe Project would benefit the local economy by providing a reliable source of power and by providing recreational opportunities. Okanogan PUD did not propose any measures specifically associated with socioeconomic resources.

Our Analysis

Operation of the proposed project by Okanogan PUD would provide an economical source of power to the region, helping to support future economic growth. The additional spending associated with implementing various resource measures, such as the rehabilitation of degraded vegetation and the improvement of developed and dispersed recreation areas, would provide for some additional employment during the period of construction and monitoring.

3.4 No-Action Alternative

Under the no-action alternative, the Enloe Project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project would not occur. The power that would have been developed from a renewable resource would have to be replaced from nonrenewable fuels.

4.0 Developmental Analysis

In this section, we look at the Enloe Project's use of the Similkameen 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.,*[41] the Commission compares the current project to an estimate of the cost of obtaining the same amount of energy and capacity using a 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.[41]

For each of the licensing alternatives, our analysis includes an estimate of: (1) The cost of individual measures considered in the EA 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 Economic Benefits of the Project

Table 20 summarizes the assumptions and economic information we use in our analysis. This information was provided

[41] 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.

by Okanogan PUD in its license application. We find that the values provided by Okanogan 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 operation and maintenance cost; and Commission fees. We do not include, in our analysis, any measures with minimal, zero, or unknown costs.

TABLE 20—PARAMETERS FOR THE ECONOMIC ANALYSIS OF THE ENLOE HYDROELECTRIC PROJECT

[Source: Okanogan PUD, 2008a, as modified by Staff]

Parameter	Value
Period of analysis (years)	30
Initial construction cost, $[a]	28,887,550
Operation and maintenance of project, $/year[b]	894,470
Energy value ($/MWh)[c]	67.88
Capacity rate ($/kilowatt-year)[d]	157
Interest rate (%)[e]	4.5
Discount rate (%)[f]	4.5

Notes:
[a] License application, table D–1, adjusted to 2010 dollars.
[b] License application, table D–1, adjusted to 2010 dollars.
[c] License application, table D–4, total value divided by total average annual generation.
[d] Staff based on Energy Information Administration Annual Outlook for 2010. This value is based on the amortization and fixed operation and maintenance cost for a simple-cycle combustion turbine.
[e] License application, table D–2.

4.2 Comparison of Alternatives

Table 21 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 EA: Okanogan PUD's proposal and the staff alternative.[42]

4.2.1 No-Action Alternative

Under the no-action alternative, the project would not be constructed as proposed. The dam is managed by the Okanogan PUD, but because there are no operational generating facilities, the project is not subject to a Commission license.

TABLE 21—SUMMARY OF ANNUAL COST OF ALTERNATIVE POWER AND ANNUAL PROJECT COST FOR THE ALTERNATIVES FOR THE ENLOE HYDROELECTRIC PROJECT

[Source: Staff]

	Okanogan PUD's Proposal	Staff Alternative
Installed capacity (MW)	9.0	9.0
Annual generation (MWh)	44,409	44,409
Dependable capacity (MW)	1.14	1.14
Annual cost of alternative power	$3,193,460	$3,193,460
($/MWh)	71.91	71.91
Annual project cost	$3,086,990	$3,109,540
($/MWh)	69.51	70.02
Difference between the cost of alternative power and project cost	$106,470	$83,920
($/MWh)	2.40	1.89

4.2.2 Okanogan PUD's Proposal

Okanogan PUD proposes to construct a new hydroelectric project using the existing Enloe dam. Okanogan PUD also proposes to implement numerous environmental measures, as presented in table 23, prior to initial construction, during construction, and after construction once the proposed project is operational. Under Okanogan PUD's proposal, the project would have an installed capacity of 9 MW, and generate an average of 44,409 MWh of electricity annually. The average annual cost of alternative power would be $3,193,460, or $71.91/MWh. The average annual project cost would be $3,086,990, or $69.51/MWh. Overall, the project would produce power at a cost that is $106,470, or $2.40/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative includes all of Okanogan PUD's proposed environmental measures except for its proposal to place boulder clusters in riffles or in plain-bed portions of the river and entrainment and resident fish monitoring. Additionally, staff made modifications and recommended additional measures. Table 22 shows the staff-recommended additions, deletions, and modifications to Okanogan 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 Okanogan PUD's proposal. Under the staff alternative, the average annual cost of alternative power would be

[42] There are no mandatory conditions filed at this time.

$3,193,460, or $71.91/MWh. The annual project cost would be $3,109,540, or $70.02/MWh. Overall, the project would produce power at a cost that is $83,920, or $1.89/MWh, less than the cost of alternative power.

4.3 Cost of Environmental Measures

Table 22 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.

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
Geology and Soils Resources				
1. Develop and implement an ESCP (WQ–06).	Okanogan PUD, Interior—10(j), NMFS—10(j), Staff	$21,510	$0	$1,460
2. Develop and implement a CSMP (WQ–08).	Okanogan PUD, Staff	80,660	0	5,460
3. Develop and implement a Spoil Disposal Plan.	Interior, Washington DOE, Staff	5,000 [b]	0	340
Water and Water Quality				
1. Monitor water temperatures at three locations for a period of 5 years (WQ–01).	Okanogan PUD, Interior—10(j), NMFS—10(j), Staff.	0	580	580
2. Provide aeration in the turbine draft tubes (WQ–03).	Okanogan PUD, NMFS—10(j), Staff	43,020	2,150	5,060
3. Monitor TDG and DO at the project intake and in the pool below the falls for a period of 5 years (WQ–04).	Okanogan PUD, Staff	26,890	7,000 for 1st 5 years.	3,850
4. Monitor DO at the project intake and in the pool below the falls for the term of license.	NMFS	0	7,000 for years 6–30.	5,500
5. Develop and file with the Commission, in consultation with the TRG, a water quality monitoring plan including: Selecting the monitoring locations; filing a report at the end of year 5 documenting the results of monitoring and recommendations for the need for continued monitoring development, and conducting water temperature, TDG, and DO monitoring for a period longer than 5 years if needed.	Staff	10,000 [b]	0	680
6. At project initiation, develop and implement the Spill Plan including a hazardous substance plan (WQ–07).	Okanogan PUD, NMFS—10(j), Staff	26,890	0	1,820
Aquatic Resources				
1. Implement a Blasting Plan and use BMPs (FISH–01).	Okanogan PUD, Staff	107,540	0	7,280
2. Place two boulder clusters in riffles or in flat sections of the river (FISH–02).	Okanogan PUD	64,520	0	4,370
3. Ensure that logs and other large woody debris can pass over the dam spillway during the annual flood and, if needed, transport some large woody debris around the dam and place it in the river downstream of the dam to provide fish habitat (FISH–03).	Okanogan PUD, Interior—10(j), Staff	0	4,300	4,300
4. Design and construct the intake trashracks with a 1-inch bar spacing (FISH–04).	Okanogan PUD, Staff	32,260	0	2,180

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
5. Design, construct, and file detailed drawings of the intake fish screen with a schedule to build the facility before commercial operation starts.	Interior, Washington DFW	16–24M	0	1.1–1.6M
6. Monitor seasonal variation in entrainment susceptibility; observe trauma and mortality caused by entrainment, and monitor fish population distribution and abundance in the reservoir (FISH–05).	Okanogan PUD, Interior	107,540	0	7,280
7. Install tailrace barrier nets in the powerhouse draft tubes including annual inspection and maintenance (FISH–06).	Okanogan PUD, Interior—10(j), NMFS—10(j), Washington DFW—10(j), Staff.	26,510	5,380	7,180
8. File detailed design drawings of the conical net barrier at least 1 year before the start of land-disturbing or land-clearing activities.	Okanogan PUD, Interior—10(j), NMFS—10(j), Washington DFW—10(j), Staff.	2,000 [b]	0	140
9. Monitor tailrace barriers with video cameras (FISH–07).	Okanogan PUD, Interior—10(j), Staff	0	1,240	1,240
10. Develop and implement a written operation plan for the tailrace barriers.	Okanogan PUD, Interior—10(j), NMFS—10(j), Staff.	5,000 [b]	0	340
11. Develop and implement a postconstruction evaluation and monitoring plan for the tailrace barrier.	Okanogan PUD, Interior—10(j), NMFS—10(j), Staff.	10,000 [b]	0	680
12. Develop and implement an inspection and maintenance plan for the tailrace barrier.	Okanogan PUD, Interior—10(j), NMFS—10(j), Staff.	5,000 [b]	0	340
13. Develop a powerhouse operation plan to provide 48 hours of flow continuation in the event of emergency project shutdown.	Interior	5,000 [b]	0	340
14. Develop and implement a project operations and compliance monitoring plan.	Staff	10,000 [b]	0	680
15. Design and construct the tailrace to avoid effects on fish (FISH–09).	Okanogan PUD, Staff	120,450	0	8,150
16. Enhance an existing side channel (FISH–10).	Okanogan PUD, Interior—10(j), NMFS—10(j), Washington DFW—10(j), Staff.	397,510	3,310	30,210
17. Implement a gravel supplementation program (FISH–11).	Okanogan PUD, Interior—10(j), NMFS—10(j), Washington DFW—10(j), Staff.	0	11,950	11,950
18. File a Resident Fish Habitat Management Plan that includes provisions for WQ–01, FISH–05, BOTA–01, –02, –04, –05, to stock sterile triploid trout, and to implement a fish habitat monitoring plan.	Interior	5,000 [d]	50,000 [d]	50,340
19. File a Fisheries Enhancement Plan that includes provisions for FISH–10, FISH–11, and to stock sterile triploid trout.	Washington DFW	0	50,000 [d]	50,000
20. File a Fisheries Enhancement Plan that includes provisions for FISH–03, FISH–10, and FISH–11.	Interior	0 [d]	0 [d]	0 [d]
21. Develop a biological review process which includes provisions for establishing a TRG to provide ongoing refinement and measure effectiveness of environmental measures (FISH–12).	Okanogan PUD, Washington DFW, Staff.	16,130	10,750	11,840

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
22. Develop a fisheries monitoring database for organizing and storing monitoring data related to aquatic resources for use by the TRG to monitor effectiveness of measures (FISH–13).	Okanogan PUD, Staff	48,390	0	3,280
23. Develop an adaptive management plan within 1 year of license issuance for the protection and mitigation of impacts to fish and wildlife resources.	Washington DFW	10,000 [b]	0	680
24. Conduct a paleolimnological study of historical anadromy above Enloe dam.	CRITFC	100,000 [b]	0	6,770
Minimum Flow Proposal				
1. Provide a minimum flow of 10 cfs year-round and 30 cfs from mid-July to mid-September, monitor temperature and DO, select an appropriate minimum flow release location, and make appropriate project modifications to provide minimum flow releases for the bypassed reach.	Okanogan PUD, Washington DFW, Washington DOE, Staff.	5,000 [b]	37,610 [b]	37,940
2. Determine appropriate thresholds for downramping rates after emergency shutdown immediately downstream of Enloe dam.	Okanogan PUD, Washington DFW, Washington DOE, Staff.	5,000 [b]	0	340
3. Establish minimum instream flows in the bypassed reach varying from 400 cfs to 3,400 cfs depending on the month.	American Rivers *et al.*	0	1,295,830 [b]	1,295,830
Terrestrial Resources				
1. Implement the Vegetation Plan, including goals, the species to be used, methods, and benchmarks of success for botanical resources (BOTA–01).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	32,260	0	2,180
2. Develop a Vegetation Resource Management Plan.	Interior—10(j), Washington DFW—10(j).	10,000 [b]	0	680
3. Develop a Wildlife Management Plan including planting native riparian trees, grasses, and shrubs.	Interior, Washington DFW	10,000 [b]	0	680
4. Plant riparian vegetation along the west and east banks of the reservoir shoreline (BOTA–02).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	32,260	0	2,180
5. Return existing shoreline road to natural conditions, eliminate the current interruption between the shoreline and upland habitat, relocate access road segment, and develop trail to provide recreation access to the river below the dam on the east bank (BOTA–03 and part of REC–13).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	376,390	1,450	26,920
6. Plant woody riparian species in the riparian area along the abandoned road corridor (BOTA–04).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	16,130	0	1,090
7. Plant woody riparian vegetation along the east and west banks of the reservoir downstream of Shanker's Bend (BOTA–05).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	21,510	0	1,460

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
8. Install grazing control measures including fencing (BOTA–06).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	26,890	0	1,820
9. Monitor restored areas annually for 5 years and replant as necessary, and provide annual reports of the monitoring results (BOTA–07).	Okanogan PUD, Staff	16,130	2,900	3,990
10. Additional monitoring of restored areas.	Interior—10(j), Washington DFW—10(j).	100,000 [b]	0	6,770
11. Employ BMPs including measures such as flagging and temporarily fencing any wetland and riparian vegetation in the vicinity of the project, and limiting construction and maintenance-related disturbance of sensitive habitats to the extent possible (BOTA–08).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	2,690	0	180
12. Develop and implement an environmental training program (BOTA–09).	Okanogan PUD, Staff	5,380	0	360
13. Provide a biological monitor during construction (BOTA–10).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	77,430	0	5,240
14. Implement the Noxious Weed Control Program (BOTA–11).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	13,980	1,340	2,290
15. Survey disposal sites and control noxious weeds by implementing control measures prior to spoil disposal (BOTA–12).	Okanogan PUD, Staff	3,230	0	220
16. Hydroseed disposal sites using native upland species (BOTA–13).	Okanogan PUD, Staff	14,200	0	960
17. Conduct survey for Ute ladies'-tresses prior to, during, and postconstruction (BOTA–14) for 3 years.	Okanogan PUD	0	1,820	1,820
18. Develop an Ute ladies'-tresses plan after agencies consultation, and if present in project areas, develop plan to avoid or minimize effects.	Staff	10,000 [b]	0	680
19. Conduct survey for Ute ladies'-tresses within 1 year of license issuance, and every 5 years thereafter.	Interior—10(j), Washington DFW—10(j).	70,000 [b]	0	4,740
20. GIS mapping and development of a digital database for sensitive species, noxious weeds, and habitat restoration sites.	Interior	15,000 [b]	0	1,020
21. Place the project transmission line in location to reduce adverse effects of the line on raptors and other birds (WILD–01).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	540	0	40
22. Concentrate construction activities to occur in summer and early fall (WILD–02).	Okanogan PUD, Interior—10(j), Washington DFW—10(j), Staff.	134,430	0	9,100
23. Conduct pre-disposal site survey for wildlife and time clearing vegetation at spoil disposal sites (WILD–03).	Okanogan PUD, Staff	3,230	0	220
24. Install nest boxes for small birds in areas that lack snags or natural tree cavities.	Interior, Washington DFW	25/box	0	minimal
25. Retain dead tress and install 10 artificial perch poles along the reservoir shoreline.	Interior, Washington DFW, Staff	10,000 [b]	0	680
26. Install barriers on irrigation canal tunnels to prevent human entry while still allowing use by bats.	Interior, Washington DFW	2,000 [b]	0	140

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
Recreation and Land Use Resources				
1. Revise and implement the Fence Plan in coordination with the Recreation Management Plan to include (a) installation of barricades and fencing on the east side of the dam and the area below the dam; (b) use of non-barbed wire at the recreation area; and (c) installation of a stock watering tank north of the proposed recreation site as an alternative source of drinking water for all grazing cattle with rights to this area (REC–01).	Okanogan PUD, Interior, Staff	91,410 [c]	0	6,190
2. Provide recreation access below Enloe dam on the east bank by developing a trail to the river below the dam (REC–02).	Okanogan PUD, Interior, Staff	5,000	2,000	2,340
3. Transfer to Okanogan County ownership rights to the trestle bridge that is located on the west side of the river with certain conditions (REC–03).	Okanogan PUD, Interior, Staff	10,750	0	730
4. Improve the existing informal boat ramp located on the east bank upstream of the dam (REC–04).	Okanogan PUD, Interior, Staff	80,660	0	5,460
5. Clean up and restore wooded area on east bank of the reservoir (REC–05).	Okanogan PUD, Interior, Staff	10,750	0	730
6. Develop an interpretive publication including a map illustrating public access and recreation sites (REC–06).	Okanogan PUD, Interior, Staff	5,380	0	360
7. Remove existing trash and conduct annual cleanup activities (REC–07).	Okanogan PUD, Interior, Staff	5,380	1,610	1,970
8. Develop parking area and install a vault toilet on the east bank and upstream of Enloe dam (REC–08).	Okanogan PUD, Interior, Staff	107,540	0	7,280
9. Install picnic tables near the parking area taking advantage of existing trees for shading (REC–09).	Okanogan PUD, Interior, Staff	16,130	0	1,090
10. Develop primitive campsites near the parking and picnic area (REC–10).	Okanogan PUD, Interior, Staff	26,890	0	1,820
11. Install one interpretive sign near the parking and picnic area and one sign near the abutment of the old powerhouse access bridge (REC–11).	Okanogan PUD, Interior, Staff	5,380	0	360
12. Place an information board near Enloe dam (REC–12).	Okanogan PUD, Interior, Staff	2,690	0	180
13. Finalize and implement the Recreation Management Plan (REC–13).	Okanogan PUD, Interior, Staff	43,020	0	2,910
14. Implement major recreational development at the BLM-owned Miner's Flat site and bring into project boundary.	Interior	125,000 [b]	15,000 [b]	23,460
15. Develop a formal boater take-out area at Miner's Flat, upgrade the access roads to the take-out if necessary, and include approximately 1 acre on which the take-out would be located within the project boundary.	BLM, Staff	35,000 [b]	1,000 [b]	3,370
16. Conduct recreation monitoring and provide Recreation Management Plan updates.	Interior, Staff	0	5,000 [b]	5,000

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
17. Provide for recreation site grounds maintenance.	Interior	0	50,000 [b]	50,000
18. Rebuild the footbridge across the Similkameen River.	Interior	10,000 [b]	500 [b]	1,180
19. Develop and post a snow plowing schedule annually for the project access road.	Staff	1,000 [b]	0	70
20. Remove the small, deteriorated, privately-owned pump house at the north end of the proposed Enloe dam recreation area.	BLM	2,500 [b]	0	170
21. Remove the one small, deteriorated building on Okanogan PUD land at the north end of the proposed Enloe dam recreation area.	BLM, Staff	2,500 [b]	0	170
22. Maintain the existing signs and system of safety cables and grab ropes above the dam, install canoe/kayak take-out signs, install dam safety/warning signs for boaters, and install a log boom access the powerhouse intake channel to protect boaters (SAFETY–01).	Okanogan PUD, Staff	10,750	2,690	3,420
23. Identify options for preventing public access to the old powerhouse (SAFETY–03).	Okanogan PUD, Staff	10,750	0	730
24. Develop and implement the Safety During Construction Plan.	Okanogan PUD, Interior, Staff	5,000 [b]	0	340
25. Develop and implement a Law Enforcement, Fire, and Emergency Services Plan.	Interior	5,000 [b]	15,000 [b]	15,340
26. Develop a Fire Suppression Program.	Staff	2,000 [b]	5,000 [b]	5,140
Aesthetic Resources				
1. Use visually-compatible colors and building materials for construction (AES–01).	Okanogan PUD, Interior, Staff	10,750	0	730
2. Consult with the Colville during restoration activities (AES–02).	Okanogan PUD, Interior, Staff	21,510	0	1,460
3. Revise and implement the Aesthetics Management Plan, including provisions of AES–01, AES–02, and AES–04, and consultation with BLM on the revision of the aesthetic analysis.	Interior, Staff	5,000 [b]	0	340
Cultural Resources				
1. Solicit a new owner of the existing historic Enloe powerhouse within 4 years from issuance of a license (HIST–01).	Okanogan PUD, Interior, Staff	5,380	0	360
2. Allow at least 5 years during which Okanogan PUD would solicit and review offers to parties that might be interested in acquiring the historic Enloe powerhouse.	Interior	4,390 [b]	0	300
3. If a qualified owner is not identified for the existing historic powerhouse, consult with the CRWG, which includes the Commission, prior to demolition of the historic Enloe powerhouse (HIST–02).	Okanogan PUD, Staff	129,050	0	8,730

TABLE 22—COST OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE PROPOSED ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Enhancement/Mitigation measures	Entity	Capital cost (2010$) [a]	Annual cost (2010$) ;[a]	Levelized annual cost (2010$)
4. Install interpretive panels about the historic powerhouse (HIST–03).	Okanogan PUD, Interior, Staff	26,890	0	1,820
5. Review and reach agreement on the May 2009 HPMP and incorporate information into a PA (HIST–04).	Okanogan PUD	5,000 [b]	0	340
6. Monitor effects of shoreline fluctuations on archaeological sites in shoreline areas, and mitigate, as needed (ARCH–01).	Okanogan PUD, Interior, Staff	69,900	0	4,730
7. Avoid known National Register-eligible archaeological sites to prevent damage during construction (ARCH–02).	Okanogan PUD, Interior, Staff	16,130	0	1,090
8. Monitor eligible sites during construction activities to avoid damage to these sites (ARCH–03).	Okanogan PUD, Interior, Staff	20,000 [b]	0	1,350
9. Develop and implement an inadvertent discovery plan if a site is discovered during construction and include training of staff and construction workers about the potential for discovery of archaeological deposits (ARCH–04).	Okanogan PUD, Interior, Staff	16,130	0	1,090
10. Determine if there would be effects on archaeological sites in the vicinity of recreation facilities (ARCH–05).	Okanogan PUD, Interior, Staff	10,000 [b]	0	680
11. Revise the May 2009 HPMP (as identified in section 3).	Interior, Staff	16,000 [e]	10,000 [e]	11,080
12. Include in the revised HPMP provisions for: (a) Further consideration of capping site 45OK532; (b) a description of the proposed side-channel enhancement site; (c) two separate defined APEs; (d) consultation with the CRWG regarding the resolution of adverse effects on the historic Enloe powerhouse; and (e) re-evaluating the Oroville-Tonasket Irrigation Canal for National Register-eligibility.	Staff	52,000 [b]	5,000 [b]	8,520

[a] Unless otherwise noted, all cost estimates are from Okanogan PUD.
[b] Cost estimated by Staff.
[c] Cost estimated by Okanogan PUD and Staff.
[d] Cost estimated by Staff and includes only addition measures not proposed by Okanogan PUD.
[e] This staff-estimated cost includes all of the revisions to the HPMP that Interior recommends. Staff does not recommend that Okanogan PUD needs to allow 5 years to solicit entities that might be interested in acquiring the historic Enloe powerhouse; there is no additional cost for this measure.

5.0 Conclusions and Recommendations

5.1 Comparison of Alternatives

In this section we compare the development and non-developmental effects of Okanogan PUD's proposal and Okanogan PUD's proposal as modified by staff (staff alternative).

We estimate the annual generation of the project under the two alternatives identified above. Our analysis shows that the annual generation would be 44,409 MWh for the proposed action and the staff alternative.

We summarize the environmental effects of the action alternatives in Table 23.

TABLE 23—SUMMARY OF KEY DIFFERENCES IN THE POTENTIAL EFFECTS OF OKANOGAN PUD'S PROPOSAL AND THE STAFF ALTERNATIVE

[Source: Staff]

Resource/issue	Okanogan PUD proposal	Staff alternative
Spoil Disposal Plan	No provisions for spoil disposal.	Spoil Disposal Plan to address disposal/storage of waste soil and/or rock materials (spoils) generated by road maintenance, slope failures, and construction projects.
Water Quality	Reduced TDG from diversion of water around falls, and adequate DO from aeration of the draft tube downstream. Adequate temperature and DO in bypassed reach from minimum flows. Adequate levels ensured by monitoring, with potential for additional measures. Protections from erosion and sedimentation during construction.	Same as Okanogan PUD's proposal, but with Water Quality Monitoring Plan to provide more specificity and oversight to ensure intended results.
Project Operations and Compliance Monitoring Plan.	Protection of aquatic, recreation, and aesthetics resources from run-of-river operation, minimum flows in the bypassed reach, and ramping rates both in the project tailrace and in the bypassed reach.	Same as Okanogan PUD's proposal, but with Project Operations and Compliance Monitoring Plan to further define protective operations and ensure compliance.
Aquatic Resources	Potential minor losses of fish from blasting and increased turbidity and sedimentation during construction. Enhanced anadromous fish habitat downstream of project (including critical habitat for threatened UCR steelhead) due to decrease in TDG and maintenance of adequate DO levels and temperature, enhanced side channel habitat, woody debris transfer downstream, gravel augmentation, and new riparian vegetation. Reduced aquatic habitat in short bypassed reach for resident fish. Minor losses to fish entrainment, with further evaluation of potential effects to resident fishery. Potential limited benefits to whitefish in river upstream of project, but potential negative effect on recreational boating and water temperatures.	Same as Okanogan PUD's proposal, but without further evaluation of potential effects to resident fishery, and no potential limited benefit to whitefish or adverse effects from boulder placement in river upstream of project.
Raptor and Other Avian Perching Habitat.	Retention of non-hazard dead trees along the reservoir	Same as Okanogan PUD's proposal, but with addition of 10 artificial perch poles along the reservoir shoreline.
Vegetation	Vegetation Plan and control of noxious weeds	Same as Okanogan PUD's proposal, but with additional oversight.
Ute Ladies'-Tresses Plan	Protection of Ute Ladies'-Tresses during initial construction and continued monitoring.	Same as Okanogan PUD's proposal, but protection measures postconstruction if warranted.
Recreation Management Plan.	Recreation Management Plan, including numerous measures to protect and enhance recreation at the project. Potential negative effect on recreational boating in river upstream of project from boulder placement.	Same as Okanogan PUD's proposal, but with additional provisions for fire suppression, monitoring to ensure resource protection, added assurance of O&M of the entire length of the public access road from the Loomis-Oroville Road to Enloe dam (5 acres), additional river access take-out point at Miner's Flat, and removal of one small, deteriorated building. No potential negative effect on recreational boating from boulder placement in river upstream from project.
Aesthetics	Aesthetics Management Plan, including numerous measures to address aesthetics, and new riparian vegetation enhancing appearance of shoreline over existing condition with trees lost to fire. Restoration of a shoreline road to a natural condition. Reduction of flows in short bypassed reach and over falls.	Same as Okanogan PUD's proposal, but with additional provisions to ensure oversight and compliance, and ensure other resource measures do not detract significantly from aesthetics. Additionally, removal of a deteriorated building.
Cultural Resources	May 2009 HPMP	Same as proposed, but with greater detail, evaluation, consultation, and oversight to ensure protection of cultural resources.
Consultation and Commission approval.	Limited consultation and Commission approvals for plans.	Oversight of resource plans to ensure intended results.

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 proposed hydropower project, we consider the water quality, fish and wildlife, recreation, cultural, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. In deciding whether, and under what conditions a hydropower project should be licensed, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing the waterway. This section contains the basis for, and a summary of, our recommendations for licensing the Enloe Project. We weigh the costs and benefits of our

recommended alternative against other proposed measures.

Recommended Alternative

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,[43] we recommend the proposed action with staff-recommended measures as the preferred alternative.

We recommend the staff alternative because: (1) Issuance of a new license would allow Okanogan PUD to construct and operate the project as a beneficial and dependable source of electrical energy; (2) the 9.0 MW of electric capacity available comes from a renewable resource which does not contribute to atmospheric pollution; and (3) the recommended environmental measures would protect water quality, enhance fish and wildlife resources, protect cultural resources, and improve public use of the project's recreational facilities and resources.

Measures Proposed by Okanogan PUD

Based on our environmental analysis of Okanogan PUD's proposal discussed in section 3 and the costs discussed in section 4, we conclude that the following measures proposed by Okanogan 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.

- Develop and implement an ESCP to minimize the effects of construction, repair, and operation of the dam and intake, penstocks, powerhouse, tailrace, impoundment, access roads, powerline, and construction camp (WQ–06).
- Develop and implement a CSMP to minimize sediment disturbance and maximize sediment containment during construction (WQ–08).
- Operate the project in a run-of-river mode so that there are no detectable changes in flows below Similkameen Falls (FISH–08) and avoid flow fluctuations that might affect downstream resources by complying with ramping rate restrictions as recommended by resource agencies.
- Monitor water temperatures at three locations for a period of 5 years to determine if the operation of the new crest gates causes an increase in the water temperatures when compared with upstream of the reservoir (WQ–01) (as modified below).
- Design the powerhouse tailrace so that it discharges to and circulates water in the plunge pool downstream of Similkameen Falls, preventing stagnation and consequently water quality degradation of the pool habitat (WQ–02).
- Provide aeration in the powerhouse turbine draft tubes during low flow summer months (WQ–03).
- Monitor total TDG and DO at the project intake and in the pool below Similkameen Falls for a period of 5 years to assess TDG and DO levels under project operations (WQ–04) (as modified below).
- Design a broad, shallow intake structure and channel to minimize sediment disturbance from project construction and operation in the reservoir near the intake (WQ–05).
- Develop and implement at project initiation a Spill Plan to reduce potential effects from accidental spills when heavy machinery is operating near the river and reservoir (WQ–07).
- Implement the Blasting Plan and use BMPs to avoid and minimize potential blasting effects on aquatic resources, including federally listed or sensitive species, associated with blasting (FISH–01).
- Ensure that logs and other large woody debris can pass over the dam spillway during the annual flood and, if needed, transport some large woody debris around the dam and place it in the river downstream of the dam to provide fish habitat (FISH–03).
- Design the intake trashrack with 1-inch bar spacing so that smaller fish would be able to pass safely through the trashrack and larger fish would be discouraged or prevented from passing through the trashracks and turbines (FISH–04).
- Install tailrace barrier nets in the powerhouse draft tubes to prevent fish in the tailrace from swimming upstream into the draft tubes during low flows and maintain the nets (FISH–06).
- Monitor barrier nets with video cameras to observe if adult salmonids are able to enter the draft tubes past the barrier nets (FISH–07). Develop and implement a written operation plan, a postconstruction evaluation and monitoring plan, and an inspection and maintenance plan to ensure that the tailrace barrier operates effectively.[44]
- Design and locate the tailrace in an area to avoid effects on fish that use the plunge pool below Similkameen Falls (FISH–09).
- Enhance an existing side channel to improve spawning, rearing, and summer thermal refugia downstream of the powerhouse tailrace (FISH–10).
- Implement a gravel supplementation program to increase the amount of gravel in the river downstream of Enloe dam and improve spawning habitat (FISH–11).
- Develop a biological review process which includes establishing a TRG to provide ongoing refinement and evaluate effectiveness of environmental measures (FISH–12).
- Develop a fisheries monitoring database for organizing and storing monitoring data related to aquatic resources for use by the TRG to monitor effectiveness of measures. (FISH–13).
- Provide minimum flows of 30 cfs from mid-July to mid-September, and 10 cfs rest of the year in the bypassed reach for resident fish using the plunge pools.
- Monitor DO and water temperature in the bypassed reach for a period of time postconstruction to be determined in consultation with the TRG, and adopt an adaptive management program to enhance DO and water temperatures should monitoring indicate that state water quality standards are not being met (as modified below).
- Determine appropriate thresholds for downramping rates in the bypassed reach based on monitoring and field observations prior to operations (as modified below).
- Select an appropriate minimum flow release location in consultation with fisheries resource agencies (Washington DOE, Washington DFW, Interior, NMFS, BLM, and the Colville), and make appropriate project modifications to provide minimum flow releases for the bypassed reach (as modified below).
- Implement the Vegetation Plan to minimize effects on riparian and wetland vegetation, including goals, the species to be used, methods, and benchmarks of success for botanical resources (BOTA–01) (as modified below).[45]
- Plant riparian vegetation along the west and east banks of the reservoir shoreline to mitigate the temporary loss of habitat due to higher reservoir levels while fringe riparian vegetation establishes along the new water line (BOTA–02).
- Return the existing shoreline road to natural conditions after project construction to improve wildlife habitat along the reservoir and eliminate the current interruption between the

[43] BLM stated that it would require Okanogan PUD to remove the dam and all associated facilities from the public lands under the existing right-of-way permit if a license is be issued. We discussed dam removal under cumulative effects Section 3.2.

[44] Okanogan PUD proposed these additional plans as modified (April 9, 2010) from NMFS recommendations (February 26, 2010).

[45] The Vegetation Plan (BOTA–01) contains the measures BOTA–2 through BOTA–7, BOTA–11, REC–01, and AES–04.

shoreline and upland habitat (BOTA–03, also analyzed as part of REC–13).

• Plant woody riparian species in the riparian area along the abandoned road corridor (BOTA–04).

• Plant woody riparian vegetation along the east and west banks of the reservoir downstream of Shanker's Bend and upstream of the reservoir (BOTA–05).

• Install grazing control measures, including fencing, to protect riparian plantings and sensitive areas from cattle grazing (BOTA–06, also analyzed as part of REC–1).

• Monitor restored areas annually for 5 years and then once again at 8 years, and plant additional willows if performance criteria are not met; provide annual reports of the monitoring results to the Corps and Washington DOE (BOTA–07) (as modified below).

• Employ BMPs to protect riparian and wetland vegetation, including measures such as flagging and temporarily fencing any wetland and riparian vegetation in the vicinity of the project that would reduce or avoid accidental impacts, and limiting construction and maintenance-related disturbance of sensitive habitats to the extent possible to protect these resources (BOTA–08).

• Develop and implement an environmental training program to inform employees and contractor employees who work on the project site or related facilities during construction and operation about the sensitive biological resources associated with the project area (BOTA–09).

• Provide a biological monitor to check construction sites on a weekly schedule to ensure that protected areas are not disturbed and that fencing and other control measures are intact (BOTA–10).

• Implement the Noxious Weed Control Program to control weeds along roads and construction sites (BOTA–11).

• Survey disposal sites and control noxious weeds by implementing control measures prior to spoil disposal (included in Okanogan PUD, 2009d) (BOTA–12).

• Hydroseed disposal sites using native upland species, following completion of spoil disposal (included in Okanogan PUD, 2009d) (BOTA–13).

• Place and install the project transmission line to minimize effects on raptors and other birds (WILD–01).

• Concentrate construction activities to occur in summer and early fall to minimize effects on overwintering birds and bald eagles (WILD–02).

• Conduct pre-disposal site survey for wildlife and time the clearing of vegetation at spoil disposal sites to minimize wildlife impacts (WILD–03), (included in Okanogan PUD, 2009d).

• Conduct surveys for Ute ladies'-tresses prior to, during, and postconstruction to either confirm that the species does not occur in areas affected by the project or guide the development of avoidance or mitigative measures (BOTA–14) (as modified below).

• Revise and implement the Recreation Management Plan which includes 12 measures for recreation and four measures for safety of and access to the project areas (REC–13) (as modified below).

• Revise and implement the Fence Plan in coordination with the Recreation Management Plan to include: (a) Installation of barricades and fencing on the east side of the dam and the area below the dam; (b) use of non-barbed wire at the recreation area; and (c) installation of a stock watering tank north of the proposed recreation site as an alternative source of drinking water for all grazing cattle with rights to this area (REC–01).

• Provide public access below Enloe dam on the east bank by developing a trail to the river below the dam (REC–02).

• Transfer to Okanogan County ownership rights to the trestle bridge for the development of a future public trail located on the west side of the river downstream of the dam with certain conditions (REC–03).

• Improve the existing informal boat ramp located on the east bank upstream of the dam (REC–04).

• Clean up and restore the wooded area on the east bank of the reservoir (REC–05).

• Develop an interpretive publication, in collaboration with Okanogan County, the Water Trail Committee, and other interested parties, including a map illustrating public access and recreation sites (REC–06).

• Remove existing trash and conduct annual cleanup activities within the wooded area on the east bank of the reservoir and along the OTID Ditch Road leading from the Loomis-Oroville Road to the dam site (REC–07).

• Develop an accessible parking area and install a vault toilet on the east bank and upstream of Enloe dam (REC–08).

• Install picnic tables, at least one of which should incorporate universal design principles, near the parking area taking advantage of existing trees for shading (REC–09).

• Develop primitive campsites near the parking and picnic area (REC–10).

• At a minimum, install one interpretive sign near the parking and picnic area and one sign near the abutment of the old powerhouse access bridge, below Similkameen Falls (REC–11).

• Place an information board near Enloe dam to depict public access areas and information concerning visitor use of the project area (REC–12).

• Maintain the existing signs and system of safety cables and grab ropes above the dam, install dam safety/warning signs for boaters, and install a log boom across the powerhouse intake channel to protect boaters (SAFETY–01).

• Allow limited public access to the project during construction (SAFETY–02).

• Coordinate with BLM and other land owners, as appropriate, to identify options for preventing public access to the old powerhouse (SAFETY–03).

• Develop and implement a Safety During Construction Plan.

• Implement the Aesthetics Management Plan (as modified below), including:

○ Using visually-compatible colors and building materials for construction occurring on the east bank (AES–01).

○ Consulting with the Colville and other stakeholders during restoration activities (AES–02).

○ Using non-reflective surfaces where possible during construction (AES–03).

○ Grading and repairing all slopes where buildings are removed and plant native grasses and other riparian vegetation (AES–04).

• Solicit a new owner for the existing historic powerhouse (HIST–01).

• If a qualified owner is not identified for the existing historic powerhouse, demolish the existing historic powerhouse and create an interpretive site (HIST–02).

• Install interpretive panels about the existing historic powerhouse (HIST–03).

• Review and reach agreement on the draft HPMP and incorporate information into a PA (HIST–04) (as modified below).

• Monitor effects of shoreline fluctuations on archaeological sites in shoreline areas, and mitigate, as needed. (ARCH–01).

• Avoid known National Register-eligible archaeological sites to prevent effects during construction (ARCH–02).

• Monitor eligible sites during construction activities to avoid effects on these sites (ARCH–03).

• Develop and implement an inadvertent discovery plan, specifying required actions and procedures if a site is discovered during construction and including training staff and construction workers about the potential for discovery of archaeological deposits (ARCH–04).

• Determine if there would be effects on archaeological sites in the vicinity of recreational facilities (ARCH–05).

Additional Staff-Recommended Measures

We recommend the measures described above, along with nine additional staff-recommended measures/modifications. The additional staff-recommended measures include the following: (1) A spoils disposal plan; (2) consultation and approval of plans; (3) a water quality monitoring plan; (4) a project operations and compliance monitoring plan; (5) modifications to the proposed Vegetation Plan; (6) provision for eagle perching habitat; (7) modifications to the Recreation Management Plan; (8) modifications to the Aesthetics Management Plan; (9) modifications to the Ute ladies'-tresses survey proposal; and (10) modifications to the proposed HPMP. Below, we discuss the rationale for our modifications and our additional staff-recommended measures.

Spoil Disposal Plan

Although Okanogan PUD proposed to implement an ESCP and a CSMP which would lessen the potential effects associated with land-disturbing activities during project construction and operation, they do not propose anything for spoil disposal. Interior recommends that Okanogan PUD develop and implement a Spoil Disposal Plan prior to any construction activities that may affect the BLM-administered public lands. The plan would address disposal and/or storage of waste soil and/or rock materials (spoils) generated by road maintenance, slope failures, and construction projects. Introduction of waste soil or rock into the Similkameen River would have negative effects on water quality. Implementation of the measures in a Spoil Disposal Plan would minimize effects from excavated materials on water quality or the surrounding environment within the project boundary and that such a plan would be worth the estimated levelized annual cost of $340.

Consultation and Approval of Plans

Okanogan PUD proposes a Blasting Plan, a plan for woody debris, a plan for the side-channel enhancement, a gravel supplementation program, and a Spill Plan. We recommend consultation with the TRG and Commission approval prior to implementation of these plans to ensure that these plans are developed with expertise and recommendations from the TRG. The cost of this additional measure would be minimal.

Water Quality Monitoring Plan

Okanogan PUD's water quality monitoring proposals include a number of aspects that need to be clarified. These include: (1) A description of the methods, equipment, maintenance and calibration procedures, and specific locations that will be used to monitor water temperature, TDG, and DO above the dam and below the dam in both the bypassed reach and in the tailrace; (2) a description of the protocol for annually reporting monitoring data to the Commission and Washington DOE; and (3) an implementation schedule. Therefore, we recommend that Okanogan PUD develop a Water Quality Monitoring Plan for the Enloe project, in consultation with the TRG, to be filed for Commission approval that includes these measures and with this level of detail.

Okanogan PUD proposes to monitor temperature at three unspecified locations in the reservoir for a period of five years and in the bypassed reach to determine if state water quality standards are being met. Additionally, Okanogan PUD proposes to monitor TDG and DO at the project intake and in the project tailrace for the same time period, as well as DO monitoring in the bypassed reach. Interior and NMFS have recommended these same provisions, and NMFS further recommends that DO be monitored for the life of any license granted. Monitoring temperature, TDG, and DO during the first 5 years of operation would provide information on possible project effects on these parameters, but if water quality standards are not met regularly, additional monitoring and alternative measures may be necessary. A report at the end of five years evaluating the need for continued monitoring and/or measures, and implementation of any additional measures as needed, would ensure that water quality is maintained at a level that will support aquatic resources at the project. Therefore, we recommend that the Water Quality Management Plan includes provisions for Okanogan PUD to file a report with the Commission for approval at the end of the five-year monitoring period, developed in consultation with the TRG, documenting the results of the monitoring and any proposals and recommendations for the need for continued monitoring and/or measures. This plan would ensure that water quality at the project is effectively monitored and maintained, and would be worth the estimated levelized annual cost of $680.

Project Operations Compliance and Monitoring Plan

Okanogan PUD proposes to operate the project in a run-of-river mode, to provide minimum flows in the bypassed reach, and to implement ramping rates both in the project tailrace and in the bypassed reach. The proposal includes many details which are yet to be determined, including: (1) How to document compliance with the run-of-river operations, minimum flow requirements (including exact dates to provide the minimum flows), and ramping rates requirements; (2) critical flow thresholds for downramping of flows in the bypassed reach; and (3) the means of flow delivery to the bypassed reach. Therefore, we recommend that Okanogan PUD develop a project operations compliance and monitoring plan for the Enloe project, in consultation with the TRG, to be filed for Commission approval that includes the details above. This plan would ensure that the project operation is clearly defined and that compliance could be demonstrated. The benefit of such a plan would be worth the estimated levelized annual cost of $680.

Reporting Monitoring Results for Restored Areas

In its Vegetation Plan, Okanogan PUD proposes to provide to the Corps and Washington DOE an annual report on its monitoring of restored areas annually for 5 years and then once again at year 8. Comments provided by the FWS, BLM, and Washington DFW indicate interest in reviewing the reports on the restoration efforts, given the agencies' responsibilities. In addition, the Commission would need to be apprised of the success of restoration and the need for any further measures to meet the Vegetation Plan's performance criteria. Therefore, Okanogan PUD should revise its Vegetation Plan to include providing FWS, BLM, and Washington DFW with its monitoring reports at the same time it provides them to the Corps and Washington DOE. In addition, the Vegetation Plan should be revised to include filing with the Commission its monitoring reports for years 1 through 5 and 8, and for approval, any proposals for further measures, developed in consultation with the agencies.

Eagle Perching Habitat

A previous fire resulted in a loss of large shoreline cottonwoods and other trees that could be used by bald eagles and other raptors. Interior and Washington DFW recommend retaining dead trees along the reservoir for bald

eagle perching habitat, with the exception of trees that pose a hazard. Okanogan PUD agrees with this measure in their reply comments. Interior and Washington DFW also recommend installation of 10 artificial perch poles for perching habitat along the reservoir shoreline. The retention of dead trees, until such time as they pose a hazard, and installation and maintenance of artificial perch poles, would enhance the use of the project area by bald eagles and other raptors. We estimate that retaining non-hazard dead trees would have no additional cost than typical maintenance, and the levelized annual cost of the perch poles would be $680. We conclude that the potential benefits of these measures would justify the low cost, and therefore would be in the public interest.

Ute Ladies'-Tresses Plan

Okanogan PUD proposes to conduct additional surveys prior to, during, and postconstruction for the threatened Ute ladies'-tresses. Okanogan PUD should prepare a plan, after consulting with FWS, BLM, and Washington DFW, for conducting these additional surveys, and should include in the plan a provision to provide each year's survey results to the Commission and the consulted agencies. The plan should also include a provision to file with the Commission for approval, an additional plan, after consultation with the agencies, with measures to avoid or mitigate adverse impacts on Ute ladies'-tresses or other listed species if the surveys identify a listed species in areas that would be affected by the proposed project or side channel enhancement. Development of the plan would have an estimated levelized annual cost of $680. Therefore, we recommend development of the plan to ensure that the additional surveys to confirm the presence or absence of Ute ladies'-tresses are conducted and adequate, and that appropriate measures are developed to avoid or mitigate impacts to the species.

Recreation Management Plan

Okanogan PUD proposes to implement a Recreation Management Plan. Staff recommends that Okanogan PUD revise the proposed Recreation Management Plan to coordinate with other proposed plans for the project (specifically, the Aesthetics Management Plan and the HPMP) and include consultation with stakeholders. In addition to Okanogan PUD's proposal, staff recommends Okanogan PUD establish a snow plowing schedule to allow visitors winter access to project lands and waters; develop and implement a recreation use monitoring plan to include monitoring at the falls; develop and implement a fire suppression program; add approximately 5.0 acres to the project boundary incorporating the entire length of the public access road from the Loomis-Oroville Road to Enloe dam; develop a river access take-out point at Miner's Flat and incorporate approximately 1 acre into the project boundary; and removal of the one small, deteriorated building on Okanogan PUD land at the north end of the proposed Enloe dam recreation area. Including consultation with stakeholders and coordinating the Recreation Management Plan with other proposed plans for the project would ensure proposed measures would not adversely affect other environmental resources at the project. Including these measures in the proposed Recreation Management Plan would improve access to existing recreational facilities and opportunities at the project, prevent wildfire on project lands and adjoining wildlife areas, and would be worth the estimated levelized annual cost of $13,580.

Building Removal

BLM recommends that Okanogan PUD remove two small, deteriorating buildings at the north end of the proposed Enloe Dam Recreation Area. Okanogan PUD states that one of two small structures on the north end of the proposed Enloe dam recreation area is owned by a private landowner that maintains a lease with BLM. Okanogan PUD states it is not in a position to remove the BLM-leased structure, however, it will take reasonable measures to secure existing structures from unauthorized entry. Removal of the BLM-leased structure is discussed later in this section under *Measures Not Recommended.* Because the remaining structure is not currently being used as a pump house, nor is it being used for project purposes, staff recommends Okanogan PUD remove this building from the north end of the proposed Enloe Dam Recreation Area. Removal of this deteriorating building would improve visual aesthetics at the proposed Enloe Dam Recreation Area, improve safety at the site, and would be worth the estimated levelized annual cost of $170.

Aesthetics Management Plan

Okanogan PUD proposes to implement an Aesthetics Management Plan. Staff recommends that Okanogan PUD revise the Aesthetics Management Plan to coordinate with other proposed plans for the project (specifically the Recreation Management Plan and the HPMP). Staff also recommends Okanogan include consultation with the Colville and BLM, and file with Commission for approval, to ensure the project area has been appropriately evaluated and that appropriate measures are undertaken to preserve the aesthetic character of the area at a minimal cost of $340.

Cultural Resources

Okanogan PUD proposes to implement its May 2009 HPMP; however, the May 2009 HPMP does not include consideration of Okanogan PUD's proposed side-channel enhancement site. We recommend that Okanogan PUD revise its May 2009 HPMP to include the proposed side-channel enhancement site and additional measures for the protection of historic properties at the Enloe Project. These measures include: (1) Further consideration of the potential effects of capping site 45OK532; (2) a description of the proposed side-channel enhancement site; (3) two separate defined APEs that delineate the proposed Enloe project and the proposed side-channel enhancement site; (4) consultation with the Cultural Resources Working Group (CRWG) regarding the resolution of adverse effects on the historic Enloe powerhouse; (5) re-evaluating the Oroville-Tonasket Irrigation Canal for National Register-eligibility; (6) completing determinations of eligibility for unidentified cultural resources on BLM lands; (7) periodic review of the HPMP; (8) a site monitoring program; (9) cultural interpretative and education measures; and (10) revising the APEs to accommodate modifications to the project boundary, if any. These additional measures would ensure protection of historic properties and would be worth the estimated levelized annual cost of $19,600.

Measures Not Recommended

Some of the measures proposed by Okanogan PUD and recommended by other interested parties would not contribute to the best comprehensive use of the Similkameen River water resources, do not exhibit sufficient nexus to project environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend some of the measures proposed by Okanogan PUD and recommended by other entities.

DO Monitoring for Term of License

NMFS recommends that DO be monitored at the project intake and in the tailrace for the life of any license

granted. Monitoring DO during the first 5 years of operation would provide good information on possible project effects on DO, but if water quality standards are not met regularly, additional monitoring and alternative measures may be necessary. For this reason, we recommend that Okanogan PUD file a report with the Commission at the end of five years evaluating the need for continued monitoring and/or measures as part of the Water Quality Management Plan. This plan would be developed in consultation with the TRG and would ensure that the water quality monitoring effort would be designed and implemented in an effective manner. This approach would be sufficiently protective of water quality in the area; therefore, we do not recommend that Okanogan PUD be required to monitor DO for the life of any license that may be granted.

Minimum Flows

Washington DFW, American Rivers *et al.,* Interior, and CRITFC recommend a minimum flow be provided in the bypassed reach immediately downstream of Enloe dam. Washington DFW, Interior, and CRITFC did not specify a recommended minimum flow, but American Rivers *et al.* recommended a minimum flow that would range from 400 cfs to 3,400 cfs depending on the month. In a filing with the Commission on October 28, 2010, Okanogan PUD stated that it has agreed with Washington DOE and Washington DFW to provide a minimum flow of 10 to 30 cfs downstream of Enloe dam. Although American Rivers *et al.* states that their recommended flow is based on Washington regulations to ensure that state water quality standards are met, neither of the Washington agencies has recommended this flow, nor has American Rivers *et al.* provided a technical justification for its flows beyond stating that its flow would provide adequate depth, substrate, cover and velocity in the bypassed reach. The bypassed reach is only 370-feet long and there is no evidence that this short reach provides habitat that is critical for the life stages of any fishes. In addition, anadromous fish do not occur in the bypassed reach because they are unable pass Similkameen Falls. Therefore, American Rivers *et al.'s* recommended minimum flows would not result in benefits that would justify the estimated levelized annual cost of $1,295,830.

Boulder Clusters

Okanogan PUD proposes (FISH–02) to construct and install boulder clusters to improve mountain whitefish habitat and recreational fisheries in the river upstream of the reservoir. Interior does not recommend the boulder clusters because they could be a hazard to recreational boaters and may further increase water temperatures in the reservoir by creating further heat sink. Washington DFW also does not recommend the boulder cluster placement, as it states that boulder clusters are an insufficient measure to mitigate for project impacts on resident fish.

As discussed in section 3.3.3.1, the current reservoir and the river upstream of the reservoir is shallow, has little habitat diversity, and habitat quality is the limiting factor for resident fishes. Most of the fish in the reservoir are non-native species that are better adapted to warmer, slower velocity water than native coldwater fishes, such as the mountain whitefish. The project would raise the elevation of the reservoir by 4 feet, which would result in more warm, slow water habitat and less riverine habitat suitable for coldwater, resident fishes. Okanogan PUD's proposal to add boulder clusters upstream of the reservoir to provide habitat for resident, coldwater fish may create a small amount of pool habitat behind the clusters that could be used by native coldwater fishes, such as the mountain whitefish. However, very few whitefish (0 in 2006; 2 in 2007) have been found in the reservoir during recent surveys, probably due to a combination of northern pikeminnow predation, warm water temperatures, lack of cover, and the sand-silt substrate It is unlikely that the proposed boulder clusters would provide much if any benefit to the limited mountain whitefish fishery due to these limiting factors, while creating additional negative effects on recreational boating and water temperatures. We do not recommend this measure at an estimated levelized annual cost of $4,370.

Entrainment and Resident Fish Population Monitoring

Okanogan PUD proposes to monitor seasonal variation in entrainment susceptibility, to observe trauma and mortality caused by entrainment, and to monitor reservoir fish populations to relate the entrainment observations with the fish distribution and abundance in the reservoir. Interior recommends monitoring resident fish populations in the reservoir as part of its Resident Fish Habitat Management Plan, which is discussed below. As discussed in section 3, both entrainment levels and mortality of entrained fish are expected to be very low since there are very few small fish in the area of the intake due to unsuitable habitat. Likewise, effects of project entrainment on reservoir populations are expected to be nominal for the same reason. Therefore, these data collection efforts likely would not produce useful data. Additionally, Okanogan PUD did not specify if these monitoring efforts could lead to potential additional measures to adjust the proposed measures to reduce any adverse effects associated with operation of the intake. Therefore, we conclude that this monitoring would not be worth the estimated levelized annual cost of $7,280.

Fisheries Enhancement Plan and Resident Fish Habitat Management Plan

Washington DFW recommends a Fisheries Enhancement Plan that would consist of three measures: (1) Side channel enhancement at locations in the lower Similkameen River; (2) gravel supplementation downstream of the tailrace; and (3) stocking of sterile triploid trout above Enloe Dam. Interior also recommends a Fisheries Enhancement Plan that contains three measures, the first two of which were identical to the measures proposed by Washington DFW. The third measure of Interior's recommended plan provides for downstream transport and placement of large woody debris captured at the project intake and trashrack. The first two measures of the Washington DFW plan and all three of the measures in Interior's recommended plan are identical to measures proposed by Okanogan PUD (FISH–10, FISH–11, and FISH–03) and are recommended by staff. We discuss the third measure recommended by Washington DFW (stocking of sterile triploid trout) below.

Interior recommends a Resident Fish Habitat Management Plan. This plan consists of six measures including: (1) A study of resident fish populations and habitat conditions in the project reservoir; (2) a study of the impacts of the project on water temperatures; (3) an evaluation of the possible solutions for lowering water temperatures and improving fish habitat in the Similkameen River, particularly through riparian plantings; (4) the possible stocking of sterile rainbow trout in the reservoir; and (5) a monitoring plan for fish habitat in the project reservoir. Recommendation 1 is identical to Okanogan PUD's proposal for resident fish population monitoring (FISH–05), which we do not recommend as discussed above. Recommendation 2 would be accomplished by Okanogan PUD's proposal to monitor water temperatures at the project for 5 years (WQ–01), which we recommend with the option of continued monitoring after

the preparation of a report at the end of the five years of monitoring. Recommendations 3 and 4 are consistent with Okanogan PUD's recommendations for riparian plantings in the project area (BOTA–01, –02, –04, –05), which we recommend. Recommendation 5 is discussed below. Regarding recommendation 6, the proposed run-of-river operation of the project would likely have no effect on reservoir species, and would have little effect on the riverine habitat upstream of the reservoir. The raising of the reservoir would have short-term effects, but the system would stabilize over time and the habitat would be enhanced by the planting of riparian vegetation. Therefore, we do not recommend the measure because it is not worth the estimated levelized annual cost of $65,110.

As mentioned above, Interior and Washington DFW recommend stocking sterile triploid rainbow trout to support a recreational fishery upstream of Enloe dam. This recommendation could result in a number of adverse effects. While these fish would not live long and cannot reproduce, there is a potential that stocking of fish could introduce disease into native fish populations. The British Columbia Ministry of Environment opposes stocking of fish in the Similkameen River above the falls citing concerns that stocking could introduce disease into upstream native populations. Stocking rainbow trout would also not substantially contribute to the recreational fishery, in that the fishery would be limited to a brief time during cooler months, because of the high water temperatures in the reservoir. Stocked rainbow trout would also compete with resident fishes for resources and could negatively affect their populations. Due to the potential adverse effects and limited benefit to the fishery, we do not recommend the stocking of triploid trout in the project reservoir at an estimated levelized annual cost of $50,000.

Intake Fish Screen

Okanogan PUD proposes to install a modified, narrow-spaced trashrack to prevent fish entrainment. Interior and Washington DFW recommend that Okanogan PUD install a fish screen at the project intake, instead of the narrow-spaced trashrack, but do not specify the kind of screen. Okanogan PUD's proposed trashrack would have a 1-inch spacing between its bars, which would physically exclude most larger fish (greater than 6 inches in length) from entrainment. As discussed in Section 3.3.3.2, smaller fish which would be unable to swim away from the trashrack and would fit though the one-inch spacing would become entrained, but it is estimated that their survival rate would be in the range of 84–95%. Additionally, fish surveys have shown that few fish reside in the area of the proposed intake. A fish screen would likely exclude smaller fish from entrainment, but at a much higher cost to build, install, and maintain. Okanogan PUD estimates that a fish screen in its proposed intake channel would cost between $16 and $24M, or $1.1 and $1.6M annualized, to construct.[46] While we can not verify this number due to the agencies' lack of specificity in their recommendations, we can assume that a fish screen would cost much more than the $32,260 annualized cost of Okanogan PUD's proposed narrow-spaced trashrack. Given the analysis above, and that the proposed narrow-spaced trashrack would provide a sufficient level of protection to resident fish, and at a much lower cost, we do not recommend a fish screen at the project intake. We do, however, recommend that Okanogan PUD consult with Interior and Washington DFW during the final design of the intake structure and trashrack with 1-inch spacing.

Fish Passage

CRITFC and BIA recommended that production potential estimates for salmon and UCR steelhead upstream of Enloe dam be included as part of a fish passage alternative in the current licensing proceeding, and CRITFC recommended a paleolimnological study of historical anadromy above Enloe dam. The BIA also commented that cost estimates for designing, constructing, operating, and maintaining upstream and downstream fish passage facilities for the term of any license need to be developed in case such an action is required in the future.

Both FWS and NMFS recommend that upstream anadromous fish passage facilities not be required now, and have reserved their authority to require fish passage under section 18 in the future. The British Columbia Ministry of the Environment states that it does not support fish passage at Enloe Dam because the introduction of anadromous fishes above Enloe dam would have adverse effects on the ecosystem, in the form of disease transfer and competition for food and space with native fishes.

As discussed in section 3.3.3.2, there are no documented accounts of Chinook salmon, sockeye salmon, UCR steelhead, or Pacific lamprey above Similkameen Falls. In addition, Native Americans who have inhabited the area for thousands of years believe that Similkameen Falls has been a barrier to anadromous fish passage since the beginning of their history. The Okanogan Sub-basin Plan, which was prepared for the Northwest Power and Conservation Council, concluded that Similkameen Falls is an impassable historic barrier to upstream salmon migration. The Upper Columbia Salmon Recovery Board issued a recovery plan that does not identify upstream and downstream passage of fish at Enloe dam as being a short-term or long-term action that would contribute to the restoration of these fish stocks, based on the uncertainty of fish being able to ascend Similkameen Falls. Further, there have been no verified accounts of a sighting of an anadromous fish above the falls. We, therefore, have insufficient evidence to conclude that Enloe dam blocks anadromous fish passage into the upper Similkameen River. Additionally, due to the absence of anadromous fish and the potential adverse effects that could occur upstream if anadromous fish were to be passed, we conclude that any additional studies of historical anadromy above Enloe dam are not worth the estimated levelized annual cost of $6,770.

Flow Continuation

Interior recommends the development of a plan to provide 48 hours of flow continuation in the event of an emergency project shutdown at the unmanned, remotely operated powerhouse. In the case of an unplanned outage, the power plant control system, using battery and diesel generator back-up, would automatically start opening the crest gates to maintain tailwater elevation at the powerhouse within the proposed ramping rate criteria. This would ensure an uninterrupted flow of water downstream of the project tailrace. The proposed crest gate operations, as proposed by Okanogan PUD, would protect and maintain aquatic habitat downstream of the project. Downstream aquatic habitat, including UCR steelhead designated critical habitat and Chinook salmon EFH below Similkameen Falls, would be protected in the event of operating emergencies or planned outages. Based on this, we conclude there would be no need for a specific flow continuation plan as recommended by Interior.

Evidence of Financial Capability for Project Decommissioning

Washington DFW recommends that Okanogan PUD provide evidence of

[46] See Okanogan PUD's response to REA comments filed on April 9, 2010.

financial securities to ensure that at the end of any license, they would be capable of decommissioning the project. The Commission has consistently denied requests for decommissioning cost studies and establishment of decommissioning funds in licenses where the project is determined to be economically and physically sound, not to have significant adverse environmental impacts, no party has suggested decommissioning in the foreseeable future after project construction, and there is no indication that the licensee would lack the financial resources to decommission the project if it were to be decommissioned. Commission policy states that a theoretical risk of licensee's inability to pay for decommissioning is insufficient basis for requiring a decommissioning fund or evidence of financial securities. Therefore, we do not recommend this measure.

Vegetation Resources Management Plan

Interior and Washington DFW recommend the development of a Vegetation Resources Management Plan that would include the measures contained in Okanogan PUD's Vegetation Plan, but also include additional measures, such as long-term monitoring of restored areas, GIS mapping, and creation of a digital database. We discuss the agencies' recommended additional measures in the following sections and conclude that they are not necessary. Therefore, the levelized annual cost of $680 to develop a Vegetation Resources Management Plan that contains those additional measures is not justified, and we do not recommend development of such a plan.

Long-Term Monitoring for Restored (Revegetated) Areas and Surveys for the Ute Ladies'-Tresses

Interior recommends a long-term survey effort for restored (revegetated) areas and threatened and endangered plants. Specifically, Interior recommends that Okanogan PUD monitor restored upland, riparian, and wetland habitat sites every year for 5 years, continue monitoring every 5 years thereafter, and replant sites as needed; and survey for threatened and endangered plants within 1 year of license issuance and every 5 years thereafter for the duration of any license.

Okanogan PUD proposes in its Vegetation Plan to monitor restored areas annually for 5 years and to plant additional willows if performance criteria are not met, but states that monitoring should be discontinued once the criteria are met. We estimated that the levelized annual cost of Interior's recommended monitoring schedule would be $6,770. Monitoring restored areas after the new plantings have met performance criteria would serve no purpose, would not warrant the cost, and would not be in the public interest. Therefore, we cannot support this recommendation.

The only threatened or endangered plant with suitable habitat in the project area is Ute ladies'-tresses, and Okanogan PUD's surveys did not locate any individuals of this species. Monitoring for Ute ladies'-tresses for an additional 3 years, as Okanogan PUD proposes, would be adequate to confirm the presence or absence of this plant. If the surveys identify Ute ladies'-tresses in areas that could be affected by the proposed project, developing a plan, after consultation with the agencies, to avoid or minimize adverse impacts, as staff recommends, would be appropriate to protect these plants. Monitoring according to Interior's recommended schedule would have a levelized annual cost of $4,740, and because the additional monitoring would not be expected to provide greater protection to the species, the cost is not warranted. Therefore, we do not recommend Interior's schedule for threatened and endangered plant monitoring.

GIS Mapping and Digital Database

Interior recommends GIS mapping and development of a digital database for sensitive species, noxious weeds, and habitat restoration sites, to assist in associated management activities at the project. Sufficient information exists on the location of sensitive species, noxious weeds, and habitat, with the exception of the side channel enhancement site that would be included in the proposed 3 years of surveys for Ute ladies'-tresses. Staff estimates that GIS mapping and the creation of a digital database would have an estimated levelized annual cost of $1,020. Staff supports Okanogan PUD's proposals for monitoring restored areas and noxious weeds and conducting Ute ladies'-tresses surveys, but finds that using the monitoring and survey results to create GIS mapping and a digital database is not needed to manage project lands and their cost do not justify the benefits. Therefore, staff does not recommend these measures.

Wildlife Management Plan

Interior and Washington DFW recommend the development of a Wildlife Management Plan that would include Okanogan PUD's proposed wildlife habitat mitigation measures, but also include additional measures, such as visually marking the transmission line, installing a maintaining nest boxes and artificial perch poles, placing seasonal restrictions on project activities, installing barriers on irrigation tunnels, and creating a 200-foot wetland/riparian buffer. We discuss each of the agencies' individual additional measures separately, and conclude that, with the exception of the artificial perch poles as discussed above, the measures are not necessary. Therefore, the levelized annual cost of $680 to develop a Wildlife Management Plan that contains those additional measures is not justified, and we do not recommend development of such a plan.

Visual Marking of Transmission Line

Interior and Washington DFW recommend visual marking of the transmission line crossing the Similkameen River to prevent bald eagles and other birds from colliding with the line. We do not recommend this measure because the line would not cross the Similkameen River.

Nest Boxes

Interior and Washington DFW recommend installing and maintaining nest boxes for small birds in areas that lack natural tree cavities. The agencies have not specified the number of nest boxes or the target species, nor have they documented the need for enhancing such species at the project. Therefore, we cannot estimate the total cost or support this recommendation at this time.

Seasonal Restrictions on Project Activities

Interior and Washington DFW recommend excluding project activities during the winter hibernation period for Townsend's big-eared bats. This recommendation lacks specific activities that would be excluded and could result in Okanogan PUD's inability to operate and properly maintain the project facilities. Therefore, we do not recommend this measure.

Barriers on Tunnels

Interior and Washington DFW recommend installing barriers on the OTID's abandoned irrigation tunnels to prevent human disturbance of Townsend's big-eared bats in the tunnels. Only one OTID tunnel has an entrance within the project boundary. Entrance to this tunnel is prevented due to landslide blockage. Tunnels with greater bat habitat potential are located near Shanker's Bend and further upstream, and are far enough from the

project site that recreational or construction activity associated with the project would be unlikely to affect bats using those tunnels. Therefore, we do not recommend installing barriers on the abandoned irrigation tunnel.

200-Foot Wetland/Riparian Buffer

Washington DFW recommends providing a 200-foot wetland/riparian buffer to protect and enhance wildlife habitat. Under existing conditions, wetlands occur in scattered patches along the reservoir, and riparian shrub and forest communities occur in a narrow fringe along the reservoir, with the largest stand consisting of riparian forest on the east side of the reservoir just upstream from Enloe dam. With the exception of the riparian forest area just upstream from the dam, there are no 200-foot-wide areas of wetland/riparian habitat within the project boundary, and we do not expect the use of flashboards on the dam to foster a 200-foot-wide zone of wetland/habitat area around the reservoir. The substrate along the reservoir is unsuitable in places (i.e., rocks) for wetland/riparian habitat. Therefore, providing a 200-foot wetland/riparian buffer around the entire reservoir would be impossible. Further, we conclude that the measures in the Vegetation Plan, including the planting of riparian vegetation and restoration of the existing shoreline road segment that traverses riparian forest, are adequate to protect and enhance riparian wildlife habitat, and a 200-foot buffer is not warranted.

Recreation and Land Use

BLM recommends that Okanogan PUD provide a footbridge to the west side of the Similkameen River at the project. Access to the west side of the Similkameen River is not needed due to the lack of public facilities and recreation opportunities (existing or proposed) on that side. Therefore, the provision for adding a footbridge to the west side of the Similkameen River downstream of the dam is not warranted because there is no project effect or need that would benefit from the measure BLM recommends.

BLM recommends that Okanogan PUD remove two small, deteriorating buildings at the north end of the proposed Enloe Dam Recreation Area. Okanogan PUD states that one of two small structures on the north end of the proposed Enloe dam recreation area is owned by a private landowner that maintains a lease with BLM. Okanogan PUD states it is not in a position to remove BLM-leased structure. Although staff recommended removal of the unused pump house earlier in this section under *Additional Staff-Recommended* Measures, removal of the BLM-leased pump house at the north end of the proposed recreation area is not warranted because it does not interfere with the project operation and it is being used for private purposes. We conclude that these measures would not be worth the estimated levelized annual cost of $1,350.

Interior recommends that Okanogan PUD provide recreational development at the Miner's Flat site, including parking areas, water access for launching and landing boats, installing an information kiosk with a map, establishing primitive campsites, including picnic tables and steel fire rings, and installing a vault toilet.[47] Miner's Flat is BLM-owned and operated, and it is reasonable to assume BLM will continue to operate and maintain the site throughout a new license term. Moreover, Okanogan PUD has proposed to develop formalized campsites within the project boundary and staff is recommending a river access site within BLM's Miner's Flat recreation site for a boating take-out. These measures provide sufficient access to formal campsites and water-based recreation at the project. Therefore, making BLM's Miner's Flat recreation area a project feature and bringing the entire site into the project boundary would not be justified. We conclude that the cost for BLM's recommendation would not be worth the estimated levelized annual cost of $23,460.

BLM recommends that Okanogan PUD provide for law enforcement and emergency services plan, including funds. The Commission is concerned with protecting resources through specific measures enforceable as to the licensee, rather than requiring a licensee to provide funding to another entity, because the Commission would have no way of assuring that the activity paid for by the licensee would actually serve a project purpose or ameliorate a project effect. Moreover, while enforcement of the requirements of any license would be Okanogan PUD's responsibility, enforcement of local laws within the project area and the river basin is not a matter of Commission jurisdiction but is the responsibility of local law enforcement agencies. Therefore, we do not recommend this provision with an estimated levelized annual cost of $15,140.

[47] BLM also recommends Okanogan PUD provide recreation site grounds maintenance. Grounds maintenance is included in Okanogan PUD's proposal and is included in the normal, day-to-day O&M costs for the project.

Cultural Resources

Interior recommends Okanogan PUD revise its May 2009 HPMP to allow at least 5 years during which Okanogan PUD would solicit and review offers to parties that might be interested in acquiring the historic Enloe powerhouse. We do not recommend this measure. Instead, Okanogan PUD's May 2009 HPMP proposes, and we recommend, a 4-year provision. If a new owner is not identified within 4 years, Okanogan PUD would consult with the CRWG, which includes the Commission, to identify appropriate mitigation options prior to demolishing the structure. If demolition is determined necessary, a Memorandum of Agreement between the Commission and the Washington SHPO would be developed that would identify agreed-upon mitigation measures. We conclude that Interior did not provide any evidence to indicate why 4 years is insufficient to allow parties to come forward with an offer for acquiring the historic Enloe powerhouse.

Conclusion

Based on our review of the agency and public comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Enloe Project, as proposed by Okanogan PUD (with the exception of the boulder clusters and entrainment and resident fish monitoring), with additional staff-recommended measures, would be best adapted to a plan for improving or developing the Similkameen River watershed.

5.3 Unavoidable Adverse Effects

Although Okanogan PUD proposes to implement a Blasting Plan and BMPs, it is expected that blasting would cause short-term disturbance to fish. It is not expected that there would be any long-term effects.

Although Okanogan PUD proposes to implement an ESCP, a CSMP, and use appropriate BMPs, it is expected that sediment transport created by project construction would cause short-term disturbances to fish and aquatic species in the project area. These effects are expected to be short-term and should have no lasting impact.

There would be a short-term loss of riparian and wetland habitats resulting from the change in reservoir elevation. The long-term effect of this change would be minimal due to the planting of native riparian species.

There would be a reduction of flow in the bypassed reach which would reduce fish habitat and DO in this short reach

and reduce the aesthetics of flows over Similkameen Falls. Raising of the reservoir by 4 feet would convert 16 acres of riparian habitat to aquatic habitat; however, new riparian habitat would be established and enhanced with vegetative planting.

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, and 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 other applicable law, the Commission and the agency will 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: NMFS (letter filed February 26, 2010); Interior, on behalf of BLM and FWS (letter filed February 26, 2010); and Washington DFW (letter filed February 26, 2010). Table 23 lists the federal and state recommendations filed subject 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.

Of the 35 recommendations that we consider to be within the scope of 10(j), we wholly include 28, include 1 in part, and do not include 6. We discuss the reasons for not including those recommendations below in table 24.

TABLE 24—FISH AND WILDLIFE AGENCY RECOMMENDATIONS FOR THE ENLOE HYDROELECTRIC PROJECT

[Source: Staff]

Recommendation	Agency	Within the scope of 10(j)	Annualized cost	Adopted or not adopted
Downstream Water Quality				
Improve DO concentrations during low flow period by providing aeration in the draft tubes.	NMFS	Yes	$5,060	Adopted.
Monitor and report water temperature and TDG concentrations for 5 years.	NMFS	Yes	$3,850	Adopted.
Monitor and report DO concentrations for life of the license.	NMFS	Yes	$5,500	Not adopted—5 years of monitoring likely would be adequate to characterize DO conditions. Also, monitoring could be extended if needed by the TRG after the first 5 years.
Implement the ESCP	NMFS	Yes	$1,460	Adopted.
Implement the spill prevention, containment and clean-up plan.	NMFS	Yes	$1,820	Adopted.
Allow Washington DFW, tribes, and other interested resource agencies to inspect the project site during construction and operation.	Washington DFW	No—not a specific measure to protect fish and wildlife.	n/a	Adopted—provided that adequate notice is given.
Develop an adaptive management plan.	Washington DFW	No—not a specific measure to protect fish and wildlife.	n/a	Adopted—Okanogan PUD's proposed biological review process appears to fulfill the recommendation.
Provide evidence of financial security to ensure that Okanogan PUD would be capable of project decommissioning at the end of any license.	Washington DFW	No—not a specific measure to protect fish and wildlife.	n/a	Not adopted—theoretical risk of applicant's inability to pay for decommissioning is insufficient basis for requiring.
Fisheries Enhancement Measures				
Construct and file detailed design drawings of an intake fish screen.	Interior, Washington DFW	Yes	$16–$24M	Not adopted—Okanogan PUD's proposed trash rack will provide adequate protection at significantly less cost.
Implement a powerhouse operational plan.	Interior	Yes	$340	Adopted.

TABLE 24—FISH AND WILDLIFE AGENCY RECOMMENDATIONS FOR THE ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Recommendation	Agency	Within the scope of 10(j)	Annualized cost	Adopted or not adopted
Provide continuous instream flows in the bypassed reach.	Washington DFW	Yes	$37,940	Adopted.
Design and construct tailrace net barriers and implement associated plans.	Interior, NMFS, Washington DFW.	Yes	$9,580	Adopted.
Implement side-channel/off-channel development/enhancement at locations in the lower Similkameen River or near the Okanogan River.	Interior, NMFS, Washington DFW.	Yes	$30,210	Adopted.
Implement gravel supplementation downstream of Enloe dam.	Interior, NMFS, Washington DFW.	Yes	$11,950	Adopted.
Transport downstream and place large woody debris captured at the project's intake and trashrack.	Interior	Yes	$4,300	Adopted.
Stock sterile triploid rainbow trout to support a recreational fishery upstream of Enloe dam.	Interior, Washington DFW	Yes	$10,340	Not adopted—Stocked trout pose a disease and competition risk to native populations.
Provide ramping rates during project start-up and shut-down.	Interior, NMFS, Washington DFW.	Yes	$0	Adopted.
Select the location for ramping rate monitoring in consultation with NMFS, FWS, Washington DFW, the Yakima, and the Colville.	Interior, NMFS, Washington DFW.	Yes	n/a	Adopted.
Develop a Wildlife Management Plan including the following measures:	Interior, Washington DFW	Yes	$680	Adopted (for preparing plan).
Restore the existing unimproved shoreline road along Enloe reservoir to a natural condition, eliminating the current interruption between the shoreline and upland habitat.	Interior, Washington DFW	Yes	[b] $26,920	Adopted.
Relocate access road to the reservoir.	Interior, Washington DFW	Yes	Cost included in measure above.	Adopted.
Locate the project's existing and proposed transmission lines and pole to prevent raptor electrocution and include the line within the project boundary.	Interior, Washington DFW	Yes	minimal	Adopted.
Include a provision to avoid disturbing foraging bald eagles between October 31 and March 31 in the schedules for project and transmission line construction.	Interior, Washington DFW	Yes	$9,100	Adopted.

TABLE 24—FISH AND WILDLIFE AGENCY RECOMMENDATIONS FOR THE ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Recommendation	Agency	Within the scope of 10(j)	Annualized cost	Adopted or not adopted
Retain dead trees along the reservoir unless they become a hazard, and install 10 artificial perch poles along the reservoir shoreline and in places where perch trees are sparse or lacking, and maintain, repair, or replace perch poles as necessary.	Interior, Washington DFW	Yes	[a] $680	Adopted.
Plant native riparian trees, grasses, and shrubs, when they are called for. Part of BOTA–02, 04, and 05.	Interior, Washington DFW	Yes	$6,730	Adopted.
Visually mark the section of the project transmission line crossing the Similkameen River.	Interior, Washington DFW	No—no relationship to proposed project.	minimal	Not adopted—The transmission line does not cross the Similkameen River.
Install nest boxes for small birds in areas that lack snags or natural tree cavities.	Interior, Washington DFW	No—number of boxes and type unspecified.	[a] $25/box	Not adopted—Insufficient detail on measure and support for need.
Install barriers on irrigation canal tunnels to prevent human entry while still allowing use by bats.	Interior, Washington DFW	Yes	[a] $140	Not adopted—Tunnel near Enloe dam blocked by landslide and other tunnels are far enough away from activity to not warrant barriers.
Exclude project activities in the winter hibernation period for bats.	Interior, Washington DFW	No—not a specific measure; specific activities undefined.	n/a	Not adopted—Generic exclusion could prohibit necessary project activities.
Provide a 200-foot wetland/riparian buffer.	Washington DFW	Yes	n/a	Not adopted—The measures in the Vegetation Plan are adequate to protect riparian habitat
Develop a Vegetation Resources Management Plan.	Interior, Washington DFW	Yes	$680	Adopted (for preparing plan).
Plant fast-growing native shade producing trees along the reservoir, such as native willows, alders, and/or cottonwoods.	Interior, Washington DFW	Yes	[b] $4,730	Adopted.
Abandon and restore the existing shoreline road.	Interior, Washington DFW	Yes	[b] $26,920	Adopted.
Plant riparian species along abandoned road corridor.	Interior, Washington DFW	Yes	[b] $1,090	Adopted.
Plant riparian species on the east and west banks downstream of Shanker's Bend.	Interior, Washington DFW	Yes	[b] $1,460	Adopted.
Install grazing control measures, including fencing to protect sensitive riparian areas and restored sites.	Interior, Washington DFW	Yes	[b] $1,820	Adopted.
Monitor restored areas (upland sites, riparian and wetland sites) every year for 5 years and continue monitoring every 5 years thereafter and replant sites as needed.	Interior, Washington DFW	Yes	[a] $6,770	Adopted in part—Staff recommends monitoring for 5 consecutive years and once in year 8.

TABLE 24—FISH AND WILDLIFE AGENCY RECOMMENDATIONS FOR THE ENLOE HYDROELECTRIC PROJECT—Continued

[Source: Staff]

Recommendation	Agency	Within the scope of 10(j)	Annualized cost	Adopted or not adopted
Employ BMPs during construction and implementation to protect riparian and wetland vegetation.	Interior, Washington DFW	Yes	[b] $180	Adopted.
Provide biological monitoring during construction to ensure minimal impact to aquatic and terrestrial resources.	Interior, Washington DFW	Yes	[b] $5,240	Adopted.
Implement a noxious weed control program.	Interior, Washington DFW	Yes	[b] $2,290	Adopted.
Survey for and document threatened and endangered plants within one year of the license issuance and every 5 years thereafter for the duration of the license.	Interior, Washington DFW	Yes	$4,740	Not adopted—Okanogan PUD's proposed measures are adequate to protect resources.

Note: Unless otherwise noted, all costs are from Okanogan PUD.
[a] Estimated by Staff.
[b] Part of Okanogan PUD's Vegetation Plan.

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 23 comprehensive plans that are applicable to the Enloe Project, located in Washington State. No inconsistencies were found.

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6.0 Finding of No Significant Impact

Construction and operation of the Enloe Project, with our recommended measures, involves land disturbing activities associated with access road clearing and grading and excavation of intake channel, powerhouse, and powerhouse tailrace. There would be a temporary loss of riparian and wetland habitats from the increased reservoir operating level. There may also be short-term turbidity and contamination caused from the resuspension of reservoir sediments and in-water excavation of the powerhouse tailrace channel. Our recommended measures would ensure water quality standards are not exceeded, ensure protection of

anadromous and resident fish, restore riparian vegetation, protect and enhance public access and recreation opportunities, and protect cultural and historic resources.

On the basis of our independent analysis, we find that the issuance of a license for the Enloe Project, with our recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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